

Ocean Academy Charter School
Curriculum Guide
Grade 8 - Mathematics



Original Adoption:	August 2025
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OCEAN ACADEMY CHARTER SCHOOL 8th Grade Mathematics Curriculum	
Content Area: Mathematics	
Course Title: Math/8	
Grade Level: 8	
Unit Title	Pacing Guide in Days
<u>Unit Plan 1:</u> Exponents, Pythagorean Theorem, Expressions and Equations	Days 55
<u>Unit Plan 2:</u> Linear Equations, Systems of Equations, Scatter Plots and Functions	Days 61
<u>Unit Plan 3:</u> Volume and Transformations	Days 39
<u>Unit Plan 4:</u> Scientific Notation and Angles and Triangles	Days 25

OCEAN ACADEMY CHARTER SCHOOL Unit 1 Overview	
Content Area: Mathematics	
Unit Title: Exponents, Pythagorean Theorem, Expressions and Equations	Duration: 55 Days
Target Course/Grade Level: Math 8	
Introduction/Unit Focus:	

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In this unit, students will build on their knowledge of number operations and algebraic reasoning to explore integer exponents, solve multi-step equations, and apply geometric relationships in two-dimensional space.

Students will develop a deeper understanding of the properties of exponents, including how to simplify and evaluate expressions involving powers with integer exponents. They will apply these properties to solve real-world and mathematical problems efficiently.

The unit also focuses on developing students' algebraic skills by solving multi-step equations, including those that involve variables on both sides. Students will learn to isolate variables, rewrite equations in equivalent forms, and interpret their solutions in the context of a problem.

Additionally, students will explore the Pythagorean Theorem and its converse, using them to find missing side lengths in right triangles. They will apply the theorem to solve real-world problems involving distances and measurements in two dimensions, including in coordinate geometry.

By the end of this unit, students will be able to:

- Apply the laws of exponents to simplify numerical and algebraic expressions involving integer exponents.
- Solve linear equations in one variable, including multi-step equations and equations with variables on both sides.
- Rewrite and rearrange equations to solve for a specific variable.
- Understand and apply the Pythagorean Theorem and its converse to solve problems involving right triangles.
- Use the Pythagorean Theorem to calculate distances in real-world and coordinate plane contexts.

This unit lays the foundation for more advanced algebra and geometry concepts in high school mathematics.

Disciplinary Concepts for the Unit

Standard 9.1 Personal Financial Literacy

This standard outlines the important fiscal knowledge, habits, and skills that must be mastered in order for students to make informed decisions about personal finance. Financial literacy is an integral component of a student's college and career readiness, enabling students to achieve fulfilling, financially-secure, and successful careers.

Standard 9.2 Career Awareness, Exploration, Preparation and Training

This standard outlines the importance of being knowledgeable about one's interests and talents, and being well informed about postsecondary and career options, career planning, and career requirements.

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Standard 9.4 Life Literacies and Key Skills

This standard outline key literacies and technical skills such as critical thinking, global and cultural awareness, and technology literacy* that are critical for students to develop to live and work in an interconnected global economy.

Standard 8.1 Computer Science

Computer Science outlines a comprehensive set of concepts and skills, such as data and analysis, algorithms and programming, and computing systems.

Standard 8.2 Design Thinking

Technology, outlines the technological design concepts and skills essential for technological and engineering literacy. The framework design includes Engineering Design, Ethics and Culture, and the Effects of Technology on the Natural world among the disciplinary concepts

Amistad Law: N.J.S.A. 18A:52:16A-88 Every board of education shall incorporate the information regarding the contributions of African-Americans to our country in an appropriate place in the curriculum of elementary and secondary school students.

Holocaust Law: N.J.S.A. 18A:35-28 Every board of education shall include instruction on the Holocaust and genocide in an appropriate place in the curriculum of all elementary and secondary school pupils. The instruction shall further emphasize the personal responsibility that each citizen bears to fight racism and hatred whenever and wherever it happens.

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Diversity and Inclusion: C.18A:35-4.36a Curriculum to include instruction on diversity and inclusion.

The instruction shall:

- (1) highlight and promote diversity, including economic diversity, equity, inclusion, tolerance, and belonging in connection with gender and sexual orientation, race and ethnicity, disabilities, and religious tolerance;
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Asian Americans and Pacific Islanders (AAPI)

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Ensures that the contributions, history, and heritage of Asian Americans and Pacific Islanders (AAPI) are included in the New Jersey Student Learning Standards (NJSLS) for Social Studies in kindergarten through Grade 12 (P.L.2021, c.416).

21st Century Themes and Skills

“Twenty-first century themes and skills” means themes such as global awareness; financial, economic, business, and entrepreneurial literacy; civic literacy; health literacy; learning and innovation skills, including creativity and innovation, critical thinking and problem solving, and communication and collaboration; information, media, and technology skills; and life and career skills, including flexibility. Career readiness, life literacies, and key skills education provides students with the necessary skills to make informed career and financial decisions, engage as responsible community members in a digital society, and to successfully meet the challenges and opportunities in an interconnected global economy.”

Unit 1 Focus Standards (Major Standards) [New Jersey Student Learning Standards-Mathematics](#)

- MP.1- Make sense of problems and persevere in solving them.
- MP.2- Reason abstractly and quantitatively
- MP.3- Reason abstractly and quantitatively
- MP.4- Model with mathematics.
- MP.5- Reason abstractly and quantitatively
- MP.6- Attend to precision.
- MP.7- Look for and make use of structure.
- MP.8- Look for and express regularity in repeated reasoning.

Content Standards with Statement	iReady Resource	Suggested Mathematical Practices <u>Description of Mathematical Practices</u>	Critical Knowledge Concepts	Skills Objectives
8.EE.A.1. Know and apply the properties of integer exponents to generate equivalent numerical expressions. <i>For example, $3^2 \times 3^{-5} = 3^{-3} = 1/3^3 = 1/27$.</i>	8.1, 8.2 8.3, 8.4	MP.1, MP.2, MP.3, MP.4, MP.5, MP.6, MP.7, MP.8	Exponents as simplified representation of repeated multiplication	<ul style="list-style-type: none"> ➤ apply properties of exponents to numerical expressions. ➤ generate equivalent numerical expressions using positive and negative integer exponents.
8.EE.A.2 Use square and cube root symbols to represent	9.1, 9.2, 9.3		Square root and cube roots; perfect	<ul style="list-style-type: none"> ➤ give the value of square roots of small perfect squares.

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<p>solutions to equations of the form $x^2=p$ and $x^3=p$, where p is a positive rational number.</p> <p>8.EE.A.2a Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that the square root of 2 is irrational.</p> <p>8.EE.A.2b Simplify numerical radicals, limiting to square roots (i.e. nonperfect squares).</p>			<p>squares and perfect cubes</p> <p>Inverse relationship between powers and square roots</p>	<ul style="list-style-type: none"> ➤ solve equations of the form $x^2 = p$, where p is a positive rational number. ➤ use the square root symbol to represent solutions to equations of the form $x^2 = p$. ➤ give the value of cube roots of small perfect cubes.
<p>8.G.B.6 Explain a proof of the Pythagorean Theorem and its converse.</p>	<p>9.2, 9.6</p>		<p>Pythagorean Theorem</p> <p>If the square of one side of a triangle is equal to the sum of the squares of the other two sides, then the triangle is a right triangle (Pythagorean theorem converse).</p>	<ul style="list-style-type: none"> ➤ given a proof of the Pythagorean theorem, explain the proof. ➤ given a proof of the converse of the Pythagorean theorem, explain the proof
<p>8.G.B.7 Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real world and mathematical</p>	<p>9.2</p>		<p>Pythagorean Theorem</p> <p>If the square of one side of a triangle is equal to the sum of the</p>	<ul style="list-style-type: none"> ➤ determine side lengths of right triangles by applying the Pythagorean Theorem to solve real world and mathematical problems involving

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<p>problems in two and three dimensions.</p>			<p>squares of the other two sides, then the triangle is a right triangle (Pythagorean theorem converse).</p>	<p>two dimensional spaces.</p> <ul style="list-style-type: none"> ➤ Determine side lengths of right triangles by applying the Pythagorean Theorem to solve real world and mathematical problems involving three dimensional spaces.
<p>8.G.B.8 Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.</p> <p>8.NS.A.3 Understand that the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational.</p>	<p>9.2</p>		<p>Pythagorean Theorem</p> <p>If the square of one side of a triangle is equal to the sum of the squares of the other two sides, then the triangle is a right triangle (Pythagorean theorem converse).</p>	<ul style="list-style-type: none"> ➤ determine the distance between two points in a coordinate plane by drawing a right triangle and applying the Pythagorean Theorem.
<p>8.EE.C.7. Solve linear equations in one variable</p>	<p>1.1, 1.2, 1.3, 1.4</p>		<p>Linear equations may have an infinite number of solutions.</p> <p>Linear equations may have no solution or a single solution.</p>	<ul style="list-style-type: none"> ➤ give examples of linear equations in one variable with one solution ($x = a$), infinitely many solutions ($a = a$), or no solutions ($a = b$.) ➤ transform a given equation, using the properties of equality, into simpler forms. ➤ transform a given equation until an

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				equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (a and b are different numbers).
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).	1.1, 1.2, 1.3		<p>Linear equations may have an infinite number of solutions.</p> <p>Linear equations may have no solution or a single solution.</p>	<ul style="list-style-type: none"> ➤ give examples of linear equations in one variable with one solution ($x = a$), infinitely many solutions ($a = a$), or no solutions ($a = b$.) ➤ transform a given equation, using the properties of equality, into simpler forms. ➤ transform a given equation until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (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.	1.1, 1.2, 1.3,		<p>Linear equations may have an infinite number of solutions.</p> <p>Linear equations may have no solution or a single solution.</p>	<ul style="list-style-type: none"> ➤ give examples of linear equations in one variable with one solution ($x = a$), infinitely many solutions ($a = a$), or no solutions ($a = b$.) ➤ transform a given equation, using the properties of equality, into simpler forms. ➤ transform a given equation until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (a and b are different numbers).

[Unit 1 New Jersey Student Learning Standards: Interdisciplinary Connections](#)
[New Jersey Student Learning Standards-ELA](#)

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RI.CR.8.1. Read closely to determine what the text says explicitly and to make logical inferences and relevant connections from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.

SL.PE.8.1. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 8 topics, texts, and issues, building on others' ideas and expressing their own clearly.

L.KL.8.2. Acquire and use accurately a range of general academic and domain-specific words and phrases sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when encountering an unknown term important to comprehension or expression.

W.AW.8.1. Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.

Unit 1 New Jersey Student Learning Standards: [Career Readiness, Life Literacies, and Key Skills](#)

Disciplinary Concepts
Credit and Debt Management
Career Awareness and Planning
Technology Literacy
Digital Citizenship

Core Ideas

**Performance Expectations
(Identified with Standard Number and statement)**

There are strategies to increase your savings and limit debt.

Credit management includes making informed choices about sources of credit and requires an understanding of the cost of credit.

Early planning can provide more options to pay for postsecondary training and employment.

9.1.8.CDM.1: Compare and contrast the use of credit cards and debit cards for specific purchases and the advantages and disadvantages of using each.

9.1.8.CDM.2: Demonstrate an understanding of the terminology associated with different types of credit (e.g., credit cards, installment loans, mortgages, lines of credit) and compare and calculate the interest rates associated with each.

9.1.8.CDM.3: Compare and contrast loan management strategies, including interest charges and total principal repayment costs.

9.2.8.CAP.6: Compare the costs of postsecondary education with the potential increase in income from a career of choice.

9.4.8.TL.1: Construct a spreadsheet in order to analyze multiple data sets, identify relationships, and facilitate data-based decision-making.

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<p>Some digital tools are appropriate for gathering, organizing, analyzing, and presenting information, while other types of digital tools are appropriate for creating text, visualizations, models, and communicating with others.</p> <p>Digital footprints are publicly accessible, even if only shared with a select group. Appropriate measures such as proper interactions can protect online reputations.</p>	<p>9.4.8.TL.2: Gather data and digitally represent information to communicate a real-world problem (e.g., MS-ESS3-4, 6.1.8.EconET.1, 6.1.8.CivicsPR.4).</p> <p>9.4.8.TL.3: Select appropriate tools to organize and present information digitally.</p> <p>9.4.8.DC.4: Explain how information shared digitally is public and can be searched, copied, and potentially seen by public audiences.</p> <p>9.4.8.DC.5: Manage digital identity and practice positive online behavior to avoid inappropriate forms of self-disclosure.</p> <p>9.4.8.DC.6: Analyze online information to distinguish whether it is helpful or harmful to reputation.</p>
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Unit 1 New Jersey Student Learning Standards: [Computer Science and Design Thinking](#)

**Disciplinary Concepts
Data & Analysis**

Core Ideas	Performance Expectations (Identified with Standard Number and Statement)
<p>People use digital devices and tools to automate the collection, use, and transformation of data. The manner in which data is collected and transformed is influenced by the type of digital device(s) available and the intended use of the data.</p>	<p>8.1.8.DA.1: Organize and transform data collected using computational tools to make it usable for a specific purpose.</p>

New Jersey Student Learning Standards: [Climate Change Mandate](#)

Core Ideas	Performance Expectations

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(Identified with Standard Number and Statement)	
Multiple solutions often exist to solve a problem.	<p>9.4.8.CT.1: Evaluate diverse solutions proposed by a variety of individuals, organizations, and/or agencies to a local or global problem, such as climate change and use critical thinking skills to predict which one(s) are likely to be effective.</p> <p>9.4.8.CT.2: Develop multiple solutions to a problem and evaluate short- and long-term effects to determine the most plausible option (e.g., MS-ETS1-4, 6.1.8.CivicsDP.1).</p>

Unit 1 Knowledge and Skills

Unit Learning Targets (Objectives):

Students will be able to...

- Evaluate square roots of perfect squares and cube roots of perfect cubes.
- Use square root and cube root symbols to represent solutions to equations of the form $x^2 = px^2 = p$ and $x^3 = px^3 = p$, where p is a positive rational number.
- Identify and explain why $2\sqrt{2}$ is an irrational number.
- Apply the properties of integer exponents, such as the product of powers and power of a power, to write and simplify equivalent expressions.
- Explain and understand a proof of the Pythagorean Theorem and its converse.
- Apply the Pythagorean Theorem to find unknown side lengths in right triangles in both two- and three-dimensional contexts.
- Use the Pythagorean Theorem to calculate distances between points on the coordinate plane.
- Solve linear equations in one variable that contain rational number coefficients by applying the distributive property and combining like terms.
- Analyze and describe the number of solutions to a linear equation using equivalent forms, such as $x = ax = a$, $a = aa = a$, or $a = ba = b$ where a and b are different numbers.

Unit Enduring Understandings:

Students will know...

- How to represent repeated multiplication using exponents and evaluate expressions with powers.
- How to apply exponent rules, including the product of powers, quotient of powers, power of a power, and powers of zero and negative exponents.
- How to simplify and evaluate algebraic expressions involving integer exponents, including zero and negative exponents.
- How to apply the laws of exponents to solve real-world and mathematical problems.
- How to find and interpret square roots and cube roots, and how to use them to solve equations.
- How to distinguish between square roots and cube roots and understand their different applications.

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- How to use the Pythagorean Theorem and its converse to solve problems involving right triangles.
- How to determine if a triangle is a right triangle using side lengths or coordinate geometry.
- How to use the Pythagorean Theorem to calculate distances between two points in the coordinate plane.
- How to solve one-step, two-step, and multi-step equations using the properties of equality.
- How to model and solve real-life problems using multi-step equations.
- How to solve equations with variables on both sides and determine whether an equation has one solution, no solution, or infinitely many solutions.
- How to manipulate and rewrite literal equations to solve for a specified variable

Unit Essential Questions:

- How can exponents be used to represent and simplify repeated multiplication?
- What patterns and properties can be observed when working with integer exponents?
- How do you simplify and divide powers with the same base?
- What is the value of a nonzero number raised to the zero power or a negative exponent?
- How do square roots and cube roots help solve equations involving area or volume?
- How is finding the cube root of a number different from finding the square root?
- How are the side lengths of a right triangle related?
- How can the Pythagorean Theorem be used to solve problems involving distance and unknown side lengths?
- How can rules or patterns be discovered and tested in mathematics?
- What steps are needed to solve multi-step equations effectively?
- How can the reasonableness of a solution be checked?
- How do you solve equations with variables on both sides, and how can you determine the number of possible solutions?
- How can you rearrange formulas to solve for a specific variable in real-life situations?

Instructional Plan

Suggested Activities

- Guided Notes
- iReady Interactive Platform
- Task Cards
- Scavenger Hunt
- Videos
- Gallery Walk
- Games
- Whiteboards Practice
- Record and Practice Journal

Resources

- EdPuzzle
- iReady Math
- Kahoot
- Blooket
- IXL
- Nearpod
- Desmos
- LinkIt
- NJSLA Digital Library of Released Items

Evidence of Student Learning

Formative Assessments:

- Observation
- Do-Now/ Quick Check
- Homework
- Notebook/journal
- Class participation
- Whiteboards
- Record and Practice Journals
- Exit passes
- Online platforms: Quizizz, Kahoot!, Quizlet, Quizalize
- IXL

Summative Assessments:

- Chapter Tests
- Quizzes
- Presentations
- Projects
- Final Exams
- National/State/District Wide Assessments

Benchmark Assessments:

- SGO Assessments
- Common Unit Assessments
- Linkit Benchmarks A<B<C

Alternative Assessments:

- Portfolio
- Project

Performance Tasks: (When appropriate) This type of task demonstrates students transfer of learning and application to a performance task. Think about what you want the students to be able to do at the end of the unit.

- iReady Resources - there are performance tasks for multiple standards
- Example Performance Assessment Tasks

Suggested Options for Differentiation and Modifications

Special Education

- Follow all IEP modifications.
- Use scaffolds, leveled texts, and differentiated assignments.
- Provide visuals, graphic organizers, and outlines.
- Pre-teach and review vocabulary/concepts.
- Offer summaries, study guides, and note-taking supports.
- Use small-group or one-on-one instruction as needed.
- Provide peer tutoring or partner support.

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- Allow preferential seating.
 - Give extra time on tests and assignments.
 - Accept oral or dictated responses.
 - Modify workload or number of questions when appropriate.
 - Provide large-print, Braille, or digital text with audio tools.
 - Allow access to scribes or communication devices.
 - Use interactive/multimedia content to reinforce skills.
-

Students with 504 Plans

- Follow the 504 plan.
 - Provide extended time for assignments/tests.
 - Offer small-group or quiet testing settings.
 - Accept oral or dictated responses.
 - Provide large-print, Braille, or digital text with assistive technology.
 - Allow use of scribes or communication devices.
-

Students at Risk of School Failure

- Use visuals, outlines, and step-by-step directions.
 - Pre-teach key vocabulary and provide real-world connections.
 - Offer small-group instruction and frequent check-ins.
 - Model problem-solving processes and think-alouds.
 - Assign peer support when appropriate.
 - Provide preferential seating and structured routines.
 - Break down multi-step tasks into smaller parts.
 - Provide feedback in manageable, frequent intervals.
-

Gifted and Talented

- Ask open-ended and higher-order questions (analyze, evaluate, create).
 - Provide opportunities for discovery and independent research.
 - Offer interest-based extensions and advanced texts.
 - Use flexible grouping for enrichment projects.
 - Provide choice in assignments and assessments.
 - Incorporate simulations, debates, and project-based learning.
 - Encourage cross-curricular connections and problem-solving challenges.
 - Provide opportunities for reflection and presentation.
-

Multilingual Learners

- Collaborate with ESL/MLL specialists.
 - Provide small-group instruction with language scaffolds.
 - Pre-teach and revisit vocabulary using visuals and cognates.
 - Use sentence frames, discussion stems, and guided writing supports.
 - Allow oral responses and extended time.
 - Provide bilingual glossaries and labeled visuals.
 - Use digital supports (translation tools, audio text, captioning).
 - Scaffold academic conversations with structured partner/group activities.
-

Diversity and Inclusion

- Respect and integrate cultural traditions and perspectives.
- Provide alternative assignment formats when needed.
- Use visuals, outlines, and clear academic language.
- Avoid slang and idioms; speak at an appropriate pace.
- Collaborate with cultural liaisons, language specialists, and support staff.
- Foster an inclusive classroom climate with routines and positive relationships.
- Build strong school-family connections.

Supplemental Resources

- Instructional Materials
 - Guided Notes
 - iReady Interactive Platform
 - Record and Practice Journal
- Supplemental Materials
 - Task cards
 - Scavenger Hunts
 - Gallery Walks
 - Interactive Google Activities
 - Desmos
- Intervention Materials
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 - Translated material
 - LinkIt

Unit 1 Teacher Notes



OCEAN ACADEMY CHARTER SCHOOL
Unit 2 Overview

Content Area: Mathematics

Unit 2 Title: Linear Equations, Systems of Equations, Scatter Plots, and Functions

Duration: 61 Days

Target Course/Grade Level: 8th Grade

Introduction/Unit 2 Focus:

In this unit, students will develop a deep understanding of proportional relationships and how they connect to lines and linear equations. They will explore the concept of functions by defining, evaluating, and comparing different types of functions to describe relationships between quantities. Using these functions, students will model real-world situations and mathematical relationships effectively.

They will analyze and solve various types of linear equations, including single-variable equations and systems of simultaneous linear equations, applying algebraic methods to find solutions. Throughout the unit, students will investigate how proportional relationships translate into graphical representations on the coordinate plane, and how these relate to the algebraic expressions of lines and functions.

By the end of the unit, students will be proficient in interpreting and constructing linear models, understanding the behavior of functions, and solving equations that arise from these models to answer complex problems in both abstract and applied contexts.

Disciplinary Concepts for the Unit

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Unit 2 Focus Standards (Major Standards) [New Jersey Student Learning Standards-Mathematics](#)

Content Standards with Statement	iReady Resource	Suggested Mathematical Practices <u>Description of Mathematical Practices</u>	Critical Knowledge Concepts	Skills Objectives
8.EE.B.5 Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. For example, compare a distance-time graph to a distance time equation to determine which of two moving objects has greater speed.	4.1, 4.3	MP.1, MP.2, MP.3, MP.4, MP.5, MP.6, MP.7, MP.8	Quantitative relationships can be represented in different ways	<ul style="list-style-type: none"> ➤ graph proportional relationships. ➤ interpret unit rate as the slope of a graph. ➤ compare two different proportional relationships that are represented in different ways (table of values, equation, graph, verbal description).
8.EE.B.6 Use similar triangles to explain why the slope m is the same between	4.2, 4.3, 4.4, 4.5		Quantitative relationships can be	<ul style="list-style-type: none"> ➤ show, using similar triangles, and explain why the slope, m, is the same between any

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<p>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.</p>			<p>represented in different ways</p>	<p>two distinct points on a non-vertical line.</p> <ul style="list-style-type: none"> ➤ derive, from two points, the equation $y = mx$ for a line through the origin. ➤ derive, from two points, the equation $y = mx + b$ for a line intercepting the vertical axis at b.
<p>8.F.B.4 Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.</p>	<p>4.6, 4.7</p>		<p>As with equations, two (x,y) values can be used to construct a function</p>	<ul style="list-style-type: none"> ➤ construct a function in order to model a linear relationship. ➤ interpret the rate of change and initial value of a linear function in context.
<p>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</p>	<p>5.1, 5.4</p>		<p>Simultaneous linear equations may have an infinite number of solutions.</p>	<ul style="list-style-type: none"> ➤ solve systems of two linear equations in two variables algebraically. ➤ estimate solutions of a linear system of two equations by graphing.

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<p>points of intersection satisfy both equations simultaneously.</p>			<p>Simultaneous linear equations may have no solution or a single solution.</p> <p>Solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs.</p>	<ul style="list-style-type: none"> ➤ solve simple cases of a linear system of two equations by inspection. ➤ solve real-world and mathematical problems leading to two linear equations in two variables.
<p>8.EE.C.8b Solve systems of two linear equations in two variables using the substitution method and estimate solutions by graphing the equations. Solve simple cases by inspection. For example: by inspection, conclude that and have no solution because cannot simultaneously be 5 and 6. Solve and use the substitution method; Solve and using the substitution method.</p>	<p>5.1, 5.2, 5.3, 5.4</p>		<p>Simultaneous linear equations may have an infinite number of solutions.</p> <p>Simultaneous linear equations may have no solution or a single solution.</p> <p>Solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs.</p>	<ul style="list-style-type: none"> ➤ solve systems of two linear equations in two variables algebraically. ➤ estimate solutions of a linear system of two equations by graphing. ➤ solve simple cases of a linear system of two equations by inspection. ➤ solve real-world and mathematical problems leading to two linear equations in two variables.
<p>8.EE.C.8c Solve real-world and mathematical problems leading to</p>	<p>5.1, 5.2, 5.3, 5.4</p>		<p>Simultaneous linear equations may have an</p>	<ul style="list-style-type: none"> ➤ solve systems of two linear equations in two variables

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<p>two linear equations in two variables. For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair.</p>			<p>infinite number of solutions.</p> <p>Simultaneous linear equations may have no solution or a single solution.</p> <p>Solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs.</p>	<p>algebraically.</p> <ul style="list-style-type: none"> ➤ estimate solutions of a linear system of two equations by graphing. ➤ solve simple cases of a linear system of two equations by inspection. ➤ solve real-world and mathematical problems leading to two linear equations in two variables.
<p>8.SP.A.1 Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.</p>	<p>6.1, 6.2, 6.4</p>		<p>Association in data (bivariate measurement data)</p>	<ul style="list-style-type: none"> ➤ construct and interpret scatter plots. ➤ analyze patterns of association between the two quantities represented in a scatter plot. ➤ describe clustering, outliers, positive or negative association, linear or nonlinear association when explaining patterns of association in a scatter plot.
<p>8.SP.A.2 Know that straight lines are widely used to model relationships between two quantitative variables. For scatter</p>	<p>6.2</p>		<p>Straight lines are used to model approximately linear relationships between</p>	<ul style="list-style-type: none"> ➤ informally fit a line (of best fit) to a scatter plot that suggests a linear association. ➤ informally assess the model's fit by

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<p>plots that suggest a linear association, informally fit a straight line, and informally assess the model fit (e.g. line of best fit) by judging the closeness of the data points to the line.</p>			<p>quantitative variables</p>	<p>judging the closeness of the data points to the line (line of best fit).</p>
<p>8.SP.A.3 Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height.</p>	<p>6.2, 6.3</p>		<p>Association in data (bivariate measurement data)</p> <p>Straight lines are used to model approximately linear relationships between quantitative variables</p>	<ul style="list-style-type: none"> ➤ given the equation for a linear model (line of best fit), interpret the slope and intercept. ➤ given the equation for a linear model, solve problems in the context of measurement data
<p>8.F.A.1 Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.</p>	<p>7.1, 7.2</p>		<p>A function is a rule.</p> <p>If a rule is a function, then for each input there is exactly one output.</p>	<ul style="list-style-type: none"> ➤ use function language. describe a function as providing a single output for each input. ➤ determine whether non-numerical relationships are functions. ➤ describe a function as a set of ordered pairs. ➤ read inputs and outputs from a graph. ➤ describe the ordered pairs as

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				containing an input, and the corresponding output.
8.F.A.2 Compare properties (e.g. rate of change, intercepts, domain and range) of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change	7.3		<p>Functions (quantitative relationships) can be represented in different ways.</p> <p>Functions have properties; properties of linear functions.</p>	<ul style="list-style-type: none"> ➤ analyze functions represented algebraically, as a table of values, and as a graph. ➤ interpret functions represented by a verbal description. ➤ given two functions, each represented in a different way, compare their properties.
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 the points (1,1), (2,4) and (3,9), which are not on a straight line.	7.3, 7.4		<p>A linear function is defined by the equation $y = mx + b$.</p> <p>The graph of a linear function is a straight line.</p>	<ul style="list-style-type: none"> ➤ analyze tables of values, graphs, and equations in order to classify a function as linear or nonlinear. ➤ determine if equations presented in forms other than $y = mx + b$ (for example $3y - 2x = 7$) define a linear function. ➤ give examples of equations that are nonlinear functions. ➤ show that a function is not

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				linear using pairs of points
<p>8.F.B.4 Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.</p>	7.2, 7.3		As with equations, two (x,y) values can be used to construct a function	<ul style="list-style-type: none"> ➤ determine the rate of change and initial value of a function from a description of a relationship. ➤ determine the rate of change and initial value of a function from two (x, y) values by reading from a table of values. ➤ determine the rate of change and initial value of a function from two (x, y) values by reading these from a graph. ➤ construct a function in order to model a linear relationship. ➤ interpret the rate of change and initial value of a linear function in context.
<p>8.F.B.5 Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.</p>	7.5		As with equations, two (x,y) values can be used to construct a function.	<ul style="list-style-type: none"> ➤ analyze a graph. ➤ provide qualitative descriptions of graphs (e.g. where increasing or decreasing, linear or nonlinear). ➤ given a verbal description, sketch a graph of a function based on the qualitative features described

**Unit 2 New Jersey Student Learning Standards: Interdisciplinary Connections
New Jersey Student Learning Standards-ELA**

RI.CR.8.1. Read closely to determine what the text says explicitly and to make logical inferences and relevant connections from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.

SL.PE.8.1. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 8 topics, texts, and issues, building on others' ideas and expressing their own clearly.

L.KL.8.2. Acquire and use accurately a range of general academic and domain-specific words and phrases sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when encountering an unknown term important to comprehension or expression.

W.AW.8.1. Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.

Unit 2 New Jersey Student Learning Standards: Career Readiness, Life Literacies, and Key Skills

Disciplinary Concepts
Credit Profile
Economic and Government Influences
Career Awareness and Planning
Creativity and Innovation
Digital Citizenship

Core Ideas

**Performance Expectations
(Identified with Standard Number and statement)**

There are strategies to build and maintain a good credit history.

Taxes affect one's personal finances.

Early planning can provide more options to pay for postsecondary training and employment.

There are a variety of resources

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

9.1.8.EG.1 Explain how taxes affect disposable income and the difference between net and gross income.

9.2.8.CAP.8: Compare education and training requirements, income potential, and primary duties of at least two jobs of interest.

9.2.8.CAP.11: Analyze potential career opportunities by considering different types of resources, including occupation databases, and state and national labor market statistics.

9.4.8.CI.2: Repurpose an existing resource in an innovative way

9.4.8.CI.3: Examine challenges that may exist in the adoption of new ideas

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<p>available to help navigate the career planning process.</p> <p>Gathering and evaluating knowledge and information from a variety of sources, including global perspectives, fosters creativity and innovative thinking.</p> <p>Digital footprints are publicly accessible, even if only shared with a select group. Appropriate measures such as proper interactions can protect online reputations.</p>	<p>9.4.8.DC.4: Explain how information shared digitally is public and can be searched, copied, and potentially seen by public audiences.</p> <p>9.4.8.DC.5: Manage digital identity and practice positive online behavior to avoid inappropriate forms of self-disclosure.</p> <p>9.4.8.DC.6: Analyze online information to distinguish whether it is helpful or harmful to reputation.</p>
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Unit 2 New Jersey Student Learning Standards: [Computer Science and Design Thinking](#)

**Disciplinary Concepts
Engineering Design**

Core Ideas

**Performance Expectations
(Identified with Standard Number and Statement)**

Engineering design is a systematic, creative, and iterative process used to address local and global problems.

8.2.8.ED.2: Identify the steps in the design process that could be used to solve a problem.

The process includes generating ideas, choosing the best solution, and making, testing, and redesigning models or prototypes

New Jersey Student Learning Standards: [Climate Change Mandate](#)

Core Ideas

Performance Expectations

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(Identified with Standard Number and Statement)	
Multiple solutions often exist to solve a problem.	<p>9.4.8.CT.1: Evaluate diverse solutions proposed by a variety of individuals, organizations, and/or agencies to a local or global problem, such as climate change and use critical thinking skills to predict which one(s) are likely to be effective.</p> <p>9.4.8.CT.2: Develop multiple solutions to a problem and evaluate short- and long-term effects to determine the most plausible option (e.g., MS-ETS1-4, 6.1.8.CivicsDP.1).</p> <p>8.SP.A.1 Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association. Climate Change Example: Students may construct and interpret scatterplots of measurement data to investigate patterns of association in bivariate data involving the amount of a greenhouse gas in the atmosphere and its effect on temperature.</p> <p>8.SP.A.3 Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height. Climate Change Example: Students may use the equation of a linear model to interpret the slope when comparing local and global precipitation rates for rainfall in different regions.</p>

Unit 2 Knowledge and Skills

Unit 2 Learning Targets (Objectives):

- Define a function as a rule that assigns exactly one output to each input, and determine whether a set of data, represented as a graph or table, is a function.
- Classify functions as linear or nonlinear by analyzing their equations, graphs, and tables of values, and interpret the equation $y = mx + b$ as a representation of a linear function.
- Compare two functions represented in different ways (numerically, verbally, graphically, or algebraically), and draw conclusions about their properties such as rate of change and intercepts.
- Graph proportional relationships and interpret the slope as the unit rate. Compare two proportional relationships presented in different forms.
- Derive the equation of a line: $y = mx$ for lines passing through the origin, and $y = mx + b$ for lines intercepting the vertical axis at b . Use similar triangles to explain why the slope (m) remains constant between any two points on a non-vertical line.

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- Model linear relationships by constructing functions from two given (x, y) values. Interpret both the rate of change and the initial value in terms of the context, graph, or table of values.
- Sketch graphs of functions based on qualitative descriptions and provide qualitative descriptions based on the graph of a function.
- Construct and interpret scatter plots for bivariate measurement data, identifying visual patterns such as clusters, outliers, and types of associations (positive, negative, linear, nonlinear, strong, weak, or none).
- For scatter plots suggesting a linear relationship, fit a straight line informally and assess how well the line models the data.
- Use linear models (equations) derived from measurement data to solve problems, interpreting the meaning of slope and intercept in context.
- Solve systems of linear equations in two variables both algebraically and by inspection. Estimate solutions by graphing and explain how the point(s) of intersection satisfy both equations simultaneously. Interpret solutions in real-world contexts.

Unit 2 Enduring Understandings:

Students will know...

- Creating tables of values and writing ordered pairs from linear equations.
- Plotting ordered pairs and graphing linear equations accurately.
- Interpreting and using graphs of linear equations to solve real-world problems.
- Finding the slope of a line and explaining its meaning in context.
- Interpreting slope as a rate of change in real-life situations.
- Identifying, graphing, writing, and comparing proportional relationships.
- Determining the slope and y-intercept of a line to write equations in slope-intercept form.
- Using slope and y-intercept to graph linear equations.
- Converting linear equations from standard form to slope-intercept form.
- Finding x- and y-intercepts of linear equations in standard form.
- Using intercepts to graph linear equations.
- Solving systems of linear equations using graphing, substitution, and elimination methods.
- Analyzing systems of linear equations to determine if they have one solution, no solution, or infinitely many solutions.
- Creating and interpreting scatter plots, identifying features such as outliers, clusters, and gaps.
- Writing, finding, and interpreting a line of best fit to model data trends.
- Representing relations as sets of ordered pairs and determining whether a relation is a function.
- Writing function rules to describe relationships between variables.
- Representing functions using tables and graphs.
- Writing and interpreting linear functions that model real-life situations.
- Recognizing and comparing linear and nonlinear functions by analyzing tables, graphs, and equations.
- Describing relationships between quantities using graphs.
- Sketching graphs based on verbal descriptions of relationships.

Unit 2 Essential Questions:

- How can you recognize a linear equation?
- How can you graph a linear equation using tables and ordered pairs?
- How does the slope describe the steepness and direction of a line?
- How can you interpret the graphs of equations in forms $y = mx$, $y = mx + b$, and $ax + by = c$?
- How do you write the equation of a line when given its slope and y-intercept?
- How can you solve systems of linear equations by graphing, substitution, and elimination?
- Can systems of linear equations have no solution or infinitely many solutions, and how can you tell?
- How do you construct and interpret scatter plots to analyze data patterns?
- How can you use data and lines of best fit to make predictions?
- How do mapping diagrams represent relationships between two data sets?
- How can a function be represented in various ways (tables, graphs, equations)?
- How can functions be used to describe linear patterns in data?
- How do you distinguish between linear and nonlinear patterns in real-life situations?
- How can graphs represent relationships between quantities without using numerical values?

Instructional Plan

Suggested Activities

- Guided Notes
- iReady Interactive Platform
- Task Cards
- Scavenger Hunt
- Videos
- Gallery Walk
- Games
- Whiteboards Practice
- Record and Practice Journal

Resources

- EdPuzzle
- iReady Math
- Kahoot
- Blooket
- IXL
- Nearpod
- Desmos
- LinkIt
- NJSLA Digital Library of Released Items

Evidence of Student Learning

Formative Assessments:

- Observation
- Do-Now/ Quick Check
- Homework
- Notebook/journal
- Class participation
- Whiteboards
- Record and Practice Journals
- Exit passes
- Online platforms: Quizizz, Kahoot!, Quizlet, Quizalize
- IXL

Summative Assessments:

- Chapter Tests
- Quizzes
- Presentations
- Projects
- Final Exams
- National/State/District Wide Assessments

Benchmark Assessments:

- SGO Assessments
- Common Unit Assessments
- Linkit Benchmarks A<B<C

Alternative Assessments:

- Portfolio
- Project

Performance Tasks: (When appropriate) This type of task demonstrates students transfer of learning and application to a performance task. Think about what you want the students to be able to do at the end of the unit.

- iReady Resources - there are performance tasks for multiple standards
- Example Performance Assessment Tasks

Suggested Options for Differentiation and Modifications

Special Education

- Follow all IEP modifications.
- Use scaffolds, leveled texts, and differentiated assignments.
- Provide visuals, graphic organizers, and outlines.
- Pre-teach and review vocabulary/concepts.
- Offer summaries, study guides, and note-taking supports.
- Use small-group or one-on-one instruction as needed.
- Provide peer tutoring or partner support.
- Allow preferential seating.
- Give extra time on tests and assignments.
- Accept oral or dictated responses.
- Modify workload or number of questions when appropriate.
- Provide large-print, Braille, or digital text with audio tools.
- Allow access to scribes or communication devices.
- Use interactive/multimedia content to reinforce skills.

Students with 504 Plans

- Follow the 504 plan.
 - Provide extended time for assignments/tests.
 - Offer small-group or quiet testing settings.
 - Accept oral or dictated responses.
 - Provide large-print, Braille, or digital text with assistive technology.
 - Allow use of scribes or communication devices.
-

Students at Risk of School Failure

- Use visuals, outlines, and step-by-step directions.
 - Pre-teach key vocabulary and provide real-world connections.
 - Offer small-group instruction and frequent check-ins.
 - Model problem-solving processes and think-alouds.
 - Assign peer support when appropriate.
 - Provide preferential seating and structured routines.
 - Break down multi-step tasks into smaller parts.
 - Provide feedback in manageable, frequent intervals.
-

Gifted and Talented

- Ask open-ended and higher-order questions (analyze, evaluate, create).
 - Provide opportunities for discovery and independent research.
 - Offer interest-based extensions and advanced texts.
 - Use flexible grouping for enrichment projects.
 - Provide choice in assignments and assessments.
 - Incorporate simulations, debates, and project-based learning.
 - Encourage cross-curricular connections and problem-solving challenges.
 - Provide opportunities for reflection and presentation.
-

Multilingual Learners

- Collaborate with ESL/MLL specialists.
 - Provide small-group instruction with language scaffolds.
 - Pre-teach and revisit vocabulary using visuals and cognates.
 - Use sentence frames, discussion stems, and guided writing supports.
 - Allow oral responses and extended time.
 - Provide bilingual glossaries and labeled visuals.
 - Use digital supports (translation tools, audio text, captioning).
 - Scaffold academic conversations with structured partner/group activities.
-

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Diversity and Inclusion

- Respect and integrate cultural traditions and perspectives.
- Provide alternative assignment formats when needed.
- Use visuals, outlines, and clear academic language.
- Avoid slang and idioms; speak at an appropriate pace.
- Collaborate with cultural liaisons, language specialists, and support staff.
- Foster an inclusive classroom climate with routines and positive relationships.
- Build strong school-family connections.

Supplemental Resources

- Instructional Materials
 - Guided Notes
 - iReady Interactive Platform
 - Record and Practice Journal
- Supplemental Materials
 - Task cards
 - Scavenger Hunts
 - Gallery Walks
 - Interactive Google Activities
 - Desmos
- Intervention Materials
 - IXL
 - Videos
 - Translated material
 - LinkIt

Unit 2 Teacher Notes

OCEAN ACADEMY CHARTER SCHOOL
Unit 3 Overview

Content Area: Mathematics

Unit 3 Title: Volume and Transformations

Duration: 39 Days

Target Course/Grade Level: 8th Grade

Introduction/Unit 3 Focus:

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Students will be able to solve real-world and mathematical problems involving the volume of cylinders, cones, and spheres by applying appropriate formulas and reasoning. They will understand the concepts of congruence and similarity by using physical models, transparencies, and geometry software to explore and visualize geometric transformations and relationships. Through hands-on activities and digital tools, students will develop a deep understanding of how shapes can be congruent or similar, and apply this knowledge to solve problems involving scale factors, proportional reasoning, and geometric proofs.

Disciplinary Concepts for the Unit

Standard 9.1 Personal Financial Literacy

This standard outlines the important fiscal knowledge, habits, and skills that must be mastered in order for students to make informed decisions about personal finance. Financial literacy is an integral component of a student's college and career readiness, enabling students to achieve fulfilling, financially-secure, and successful careers.

Standard 9.2 Career Awareness, Exploration, Preparation and Training

This standard outlines the importance of being knowledgeable about one's interests and talents, and being well informed about postsecondary and career options, career planning, and career requirements.

Standard 9.4 Life Literacies and Key Skills

This standard outline key literacies and technical skills such as critical thinking, global and cultural awareness, and technology literacy* that are critical for students to develop to live and work in an interconnected global economy.

Standard 8.1 Computer Science

Computer Science outlines a comprehensive set of concepts and skills, such as data and analysis, algorithms and programming, and computing systems.

Standard 8.2 Design Thinking

Technology, outlines the technological design concepts and skills essential for technological and engineering literacy. The framework design includes Engineering Design, Ethics and Culture, and the Effects of Technology on the Natural world among the disciplinary concepts

Amistad Law: N.J.S.A. 18A 52:16A-88 Every board of education shall incorporate the information regarding the contributions of African-Americans to our country in an appropriate place in the curriculum of elementary and secondary school students.

Holocaust Law: N.J.S.A. 18A:35-28 Every board of education shall include instruction on the Holocaust and genocide in an appropriate place in the curriculum of all elementary and secondary school pupils. The instruction shall further emphasize the personal responsibility that each citizen bears to fight racism and hatred whenever and wherever it happens.

LGBT and Disabilities Law: N.J.S.A. 18A:35-4.35 A board of education shall include

instruction on the political, economic, and social contributions of persons with disabilities and lesbian, gay, bisexual, and transgender people, in an appropriate place in the curriculum of middle school and high school students as part of the district’s implementation of the New Jersey Student Learning Standards (N.J.S.A.18A:35-4.36) A board of education shall have policies and procedures in place pertaining to the selection of instructional materials to implement the requirements of N.J.S.A. 18A:35-4.35.

Diversity and Inclusion: C.18A:35-4.36a Curriculum to include instruction on diversity and inclusion.

The instruction shall:

- (1) highlight and promote diversity, including economic diversity, equity, inclusion, tolerance, and belonging in connection with gender and sexual orientation, race and ethnicity, disabilities, and religious tolerance;
- (2) examine the impact that unconscious bias and economic disparities have at both an individual level and on society as a whole; and
- (3) encourage safe, welcoming, and inclusive environments for all students regardless of race or ethnicity, sexual and gender identities, mental and physical disabilities, and religious beliefs.

Asian Americans and Pacific Islanders (AAPI)

Ensures that the contributions, history, and heritage of Asian Americans and Pacific Islanders (AAPI) are included in the New Jersey Student Learning Standards (NJSLs) for Social Studies in kindergarten through Grade 12 (P.L.2021, c.416).

21st Century Themes and Skills

“Twenty-first century themes and skills” means themes such as global awareness; financial, economic, business, and entrepreneurial literacy; civic literacy; health literacy; learning and innovation skills, including creativity and innovation, critical thinking and problem solving, and communication and collaboration; information, media, and technology skills; and life and career skills, including flexibility. Career readiness, life literacies, and key skills education provides students with the necessary skills to make informed career and financial decisions, engage as responsible community members in a digital society, and to successfully meet the challenges and opportunities in an interconnected global economy.”

Unit 3 Focus Standards (Major Standards) [New Jersey Student Learning Standards-Mathematics](#)

Content Standards with Statement	iReady Resource	Suggested Mathematical Practices Description of	Critical Knowledge Concepts	Skills Objectives

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		Mathematical Practices		
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.	10.1, 10.2, 10.3	MP.1, MP.2, MP.3, MP.4, MP.5, MP.6, MP.7, MP.8	Exponents as simplified representation of repeated multiplication	<ul style="list-style-type: none"> ➤ apply the formulas for volume of a cone, cylinder, or sphere in a real-world context ➤ calculate the volume of a cone, cylinder, or sphere ➤ find a missing dimension of a cone, cylinder or sphere given its volume
8.G.A.1. Verify experimentally the properties of rotations, reflections, and translations	2.1, 2.2, 2.3		A property of rigid motion transformations (rotation, reflection, and translation) is that the measure of a two-dimensional object under the transformation remains unchanged.	<p>show and explain that performing rotations, reflections, and translations on lines results in a line.</p> <ul style="list-style-type: none"> ➤ show and explain that performing rotations, reflections, and translations on line segments results in a line segment and does not alter the length of the line segment. ➤ show and explain that performing rotations, reflections, and translations on angles results in an angle and does not alter the measure of the angle. ➤ show and explain

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				<p>that performing rotations, reflections, and translations on parallel lines results in parallel lines.</p> <p>➤ explain that a property of rigid motion transformations (rotation, reflection, and translation) is that the measure of a two-dimensional object under the transformation remains unchanged.</p>
<p>8.G.A.2. Understand that a two dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them.</p>	2.4		<p>A two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations.</p>	<p>➤ given two congruent figures, describe a transformation or sequence of transformations that shows the congruence between them.</p>
<p>8.G.A.3. Describe the effect of dilations, translations, rotations, and reflections on two-dimensional</p>	2.1, 2.2, 2.3, 2.5		<p>A two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations,</p>	<p>➤ describe, using coordinates, the resulting two-dimensional figure after applying dilations</p>

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<p>figures using coordinates.</p>			<p>reflections, and translations.</p>	<p>with scale factor greater than, less than, and equal to 1. ➤ describe, using coordinates, the resulting two-dimensional figure after applying translation, rotation, and reflection</p>
<p>8.G.A.4. Understand that a two dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two dimensional figures, describe a sequence that exhibits the similarity between them.</p>	<p>2.6</p>		<p>A two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations. Congruent figures are also similar.</p>	<p>➤ describe a transformation or sequence of transformations that show the similarity between them given two similar two-dimensional figures.</p>

Unit 3 New Jersey Student Learning Standards: Interdisciplinary Connections
[New Jersey Student Learning Standards-ELA](#)

RI.CR.8.1. Read closely to determine what the text says explicitly and to make logical inferences and relevant connections from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.

SL.PE.8.1. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 8 topics, texts, and issues, building on others' ideas and expressing their own clearly.

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L.KL.8.2. Acquire and use accurately a range of general academic and domain-specific words and phrases sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when encountering an unknown term important to comprehension or expression.

W.AW.8.1. Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.

Unit 3 New Jersey Student Learning Standards: [Career Readiness, Life Literacies, and Key Skills](#)

Disciplinary Concepts
Financial Psychology
Digital Citizenship

Core Ideas

Performance Expectations
(Identified with Standard Number and statement)

Marketing techniques are designed to encourage individuals to purchase items they may not need or want.

Digital footprints are publicly accessible, even if only shared with a select group. Appropriate measures such as proper interactions can protect online reputations.

Digital communities are used by individuals to share information, organize, and engage around issues and topics of interest.

9.1.8.FP.7: Identify the techniques and effects of deceptive advertising.

9.4.8.DC.4: Explain how information shared digitally is public and can be searched, copied, and potentially seen by public audiences.

9.4.8.DC.5: Manage digital identity and practice positive online behavior to avoid inappropriate forms of self-disclosure.

9.4.8.DC.6: Analyze online information to distinguish whether it is helpful or harmful to reputation.

9.4.8.DC.7: Collaborate within a digital community to create a digital artifact using strategies such as crowdsourcing or digital surveys.

Unit 3 New Jersey Student Learning Standards: [Computer Science and Design Thinking](#)

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Disciplinary Concepts	
Core Ideas	Performance Expectations (Identified with Standard Number and Statement)
<p>Engineering design is a systematic, creative, and iterative process used to address local and global problems.</p> <p>The process includes generating ideas, choosing the best solution, and making, testing, and redesigning models or prototypes</p>	<p>8.2.8.ED.2: Identify the steps in the design process that could be used to solve a problem</p>

New Jersey Student Learning Standards: Climate Change Mandate	
Core Ideas	Performance Expectations (Identified with Standard Number and Statement)
<p>Multiple solutions often exist to solve a problem.</p>	<p>9.4.8.CT.1: Evaluate diverse solutions proposed by a variety of individuals, organizations, and/or agencies to a local or global problem, such as climate change and use critical thinking skills to predict which one(s) are likely to be effective.</p> <p>9.4.8.CT.2: Develop multiple solutions to a problem and evaluate short- and long-term effects to determine the most plausible option (e.g., MS-ETS1-4, 6.1.8.CivicsDP.1).</p> <p>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. Climate Change Example: Students may use the formula for the volume of a sphere to approximate the volume of hailstones to consider how climate change may affect the size of hailstones over time.</p>

Unit 3 Knowledge and Skills

Unit 3 Learning Targets (Objectives):

- Apply the formula for the volume of a cone, cylinder, or sphere to solve real-world and mathematical problems, including finding a single unknown dimension.
- Evaluate square roots and cube roots of small perfect squares and cubes, using root symbols to represent solutions to equations such as $x^2 = p$ and $x^3 = p$, where p is a positive rational number; recognize that $\sqrt{2}$ is irrational.
- Describe and model the properties of rotations, reflections, and translations using physical models or geometry software, focusing on pre-images and their resultant images of lines, line segments, and angles.
- Perform and describe sequences of rotations, reflections, and translations on two-dimensional figures to demonstrate congruence between figures.
- Use the coordinate plane to locate images and pre-images of two-dimensional figures and determine the coordinates of resultant images after applying dilations, rotations, reflections, and translations.
- Apply a sequence of transformations to show that figures are similar when corresponding angles are congruent and corresponding sides are proportional, and write similarity statements based on these transformations.

Unit 3 Enduring Understandings:

Students will know...

- Application of formulas to find the volume of cylinders, cones, and spheres.
- The process for using volume formulas to determine missing dimensions of cylinders, cones, and spheres.
- Identification and description of the transformations of translation, rotation, reflection, and dilation.
- The method for finding and using coordinates of figures after translation, rotation, reflection, and dilation.
- Use of coordinate rules to reflect figures across the x - or y -axis.
- The recognition of congruent figures and description of sequences of rigid motions that demonstrate congruence.
- Recognition of similar figures and description of similarity transformations between them.

Unit 3 Essential Questions:

- How can you use formulas to calculate the volume of cylinders, cones, and spheres?
- How do you find a missing dimension using the volume formula for cylinders, cones, and spheres?
- How can you identify translations, rotations, reflections, and dilations in figures?
- How do you find the coordinates of figures after applying translation, rotation, reflection, or dilation?
- How can you use coordinates to reflect a figure across the x - or y -axis?
- How do you determine whether two figures are congruent?
- How can you describe a sequence of rigid motions that show congruence between two figures?
- How do you identify similar figures?

- How can you describe a similarity transformation between two similar figures?

Instructional Plan

Suggested Activities

- Guided Notes
- iReady Interactive Platform
- Task Cards
- Scavenger Hunt
- Videos
- Gallery Walk
- Games
- Whiteboards Practice
- Record and Practice Journal

Resources

- EdPuzzle
- iReady Math
- Kahoot
- Blooket
- IXL
- Nearpod
- Desmos
- LinkIt
- NJSLA Digital Library of Released Items

Evidence of Student Learning

Formative Assessments:

- Observation
- Do-Now/ Quick Check
- Homework
- Notebook/journal
- Class participation
- Whiteboards
- Record and Practice Journals
- Exit passes
- Online platforms: Quizizz, Kahoot!, Quizlet, Quizalize
- IXL

Summative Assessments:

- Chapter Tests
- Quizzes
- Presentations
- Projects
- Final Exams
- National/State/District Wide Assessments

Benchmark Assessments:

- SGO Assessments
- Common Unit Assessments
- Linkit Benchmarks A<B<C

Alternative Assessments:

- Portfolio
- Project

Performance Tasks: (When appropriate) This type of task demonstrates students transfer of learning and application to a performance task. Think about what you want the students to be able to do at the end of the unit.

- iReady Resources - there are performance tasks for multiple standards
- Example Performance Assessment Tasks

Suggested Options for Differentiation and Modifications

Special Education

- Follow all IEP modifications.
 - Use scaffolds, leveled texts, and differentiated assignments.
 - Provide visuals, graphic organizers, and outlines.
 - Pre-teach and review vocabulary/concepts.
 - Offer summaries, study guides, and note-taking supports.
 - Use small-group or one-on-one instruction as needed.
 - Provide peer tutoring or partner support.
 - Allow preferential seating.
 - Give extra time on tests and assignments.
 - Accept oral or dictated responses.
 - Modify workload or number of questions when appropriate.
 - Provide large-print, Braille, or digital text with audio tools.
 - Allow access to scribes or communication devices.
 - Use interactive/multimedia content to reinforce skills.
-

Students with 504 Plans

- Follow the 504 plan.
 - Provide extended time for assignments/tests.
 - Offer small-group or quiet testing settings.
 - Accept oral or dictated responses.
 - Provide large-print, Braille, or digital text with assistive technology.
 - Allow use of scribes or communication devices.
-

Students at Risk of School Failure

- Use visuals, outlines, and step-by-step directions.
- Pre-teach key vocabulary and provide real-world connections.
- Offer small-group instruction and frequent check-ins.
- Model problem-solving processes and think-alouds.
- Assign peer support when appropriate.
- Provide preferential seating and structured routines.

- Break down multi-step tasks into smaller parts.
 - Provide feedback in manageable, frequent intervals.
-

Gifted and Talented

- Ask open-ended and higher-order questions (analyze, evaluate, create).
 - Provide opportunities for discovery and independent research.
 - Offer interest-based extensions and advanced texts.
 - Use flexible grouping for enrichment projects.
 - Provide choice in assignments and assessments.
 - Incorporate simulations, debates, and project-based learning.
 - Encourage cross-curricular connections and problem-solving challenges.
 - Provide opportunities for reflection and presentation.
-

Multilingual Learners

- Collaborate with ESL/MLL specialists.
 - Provide small-group instruction with language scaffolds.
 - Pre-teach and revisit vocabulary using visuals and cognates.
 - Use sentence frames, discussion stems, and guided writing supports.
 - Allow oral responses and extended time.
 - Provide bilingual glossaries and labeled visuals.
 - Use digital supports (translation tools, audio text, captioning).
 - Scaffold academic conversations with structured partner/group activities.
-

Diversity and Inclusion

- Respect and integrate cultural traditions and perspectives.
- Provide alternative assignment formats when needed.
- Use visuals, outlines, and clear academic language.
- Avoid slang and idioms; speak at an appropriate pace.
- Collaborate with cultural liaisons, language specialists, and support staff.
- Foster an inclusive classroom climate with routines and positive relationships.
- Build strong school-family connections.

Supplemental Resources

- Instructional Materials
 - Guided Notes
 - iReady Interactive Platform

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- Record and Practice Journal
- Supplemental Materials
 - Task cards
 - Scavenger Hunts
 - Gallery Walks
 - Interactive Google Activities
 - Desmos
- Intervention Materials
 - IXL
 - Videos
 - Translated material
 - LinkIt

Unit 3 Teacher Notes

**OCEAN ACADEMY CHARTER SCHOOL
Unit 4 Overview**

Content Area: Mathematics

Unit 4 Title: Scientific Notation and Angles and Triangles

Duration: 25 Days

Target Course/Grade Level: 8th Grade

Introduction/Unit Focus:

In this unit students will develop an understanding of scientific notation and its practical applications, including reading, writing, and performing operations with numbers expressed in scientific notation. They will explore the relationships between angles, focusing on angle pairs and the properties of angles within polygons. Additionally, students will investigate the concepts of similarity and congruence in geometric figures, using visual models and algebraic reasoning to classify figures and understand transformations that preserve shape and size.

Disciplinary Concepts for the Unit

Standard 9.1 Personal Financial Literacy

This standard outlines the important fiscal knowledge, habits, and skills that must be mastered in order for students to make informed decisions about personal finance. Financial literacy is an integral component of a student's college and career readiness, enabling students to achieve fulfilling, financially-secure, and successful careers.

Standard 9.2 Career Awareness, Exploration, Preparation and Training

This standard outlines the importance of being knowledgeable about one's interests and talents, and being well informed about postsecondary and career options, career planning, and career requirements.

Standard 9.4 Life Literacies and Key Skills

This standard outline key literacies and technical skills such as critical thinking, global and cultural awareness, and technology literacy* that are critical for students to develop to live and work in an interconnected global economy.

Standard 8.1 Computer Science

Computer Science outlines a comprehensive set of concepts and skills, such as data and analysis, algorithms and programming, and computing systems.

Standard 8.2 Design Thinking

Technology, outlines the technological design concepts and skills essential for technological and engineering literacy. The framework design includes Engineering Design, Ethics and Culture, and the Effects of Technology on the Natural world among the disciplinary concepts

Amistad Law: N.J.S.A. 18A 52:16A-88 Every board of education shall incorporate the information regarding the contributions of African-Americans to our country in an appropriate place in the curriculum of elementary and secondary school students.

Holocaust Law: N.J.S.A. 18A:35-28 Every board of education shall include instruction on the Holocaust and genocide in an appropriate place in the curriculum of all elementary and secondary school pupils. The instruction shall further emphasize the personal responsibility that each citizen bears to fight racism and hatred whenever and wherever it happens.

LGBT and Disabilities Law: N.J.S.A. 18A:35-4.35 A board of education shall include instruction on the political, economic, and social contributions of persons with disabilities and lesbian, gay, bisexual, and transgender people, in an appropriate place in the curriculum of middle school and high school students as part of the district's implementation of the New Jersey Student Learning Standards (N.J.S.A.18A:35-4.36) A board of education shall have policies and procedures in place pertaining to the selection of instructional materials to implement the requirements of N.J.S.A. 18A:35-4.35.

Diversity and Inclusion: C.18A:35-4.36a Curriculum to include instruction on diversity and inclusion.

The instruction shall:

- (1) highlight and promote diversity, including economic diversity, equity, inclusion, tolerance, and belonging in connection with gender and sexual orientation, race and ethnicity, disabilities, and religious tolerance;
- (2) examine the impact that unconscious bias and economic disparities have at both an individual level and on society as a whole; and
- (3) encourage safe, welcoming, and inclusive environments for all students regardless

of race or ethnicity, sexual and gender identities, mental and physical disabilities, and religious beliefs.

Asian Americans and Pacific Islanders (AAPI)

Ensures that the contributions, history, and heritage of Asian Americans and Pacific Islanders (AAPI) are included in the New Jersey Student Learning Standards (NJSLs) for Social Studies in kindergarten through Grade 12 (P.L.2021, c.416).

21st Century Themes and Skills

“Twenty-first century themes and skills” means themes such as global awareness; financial, economic, business, and entrepreneurial literacy; civic literacy; health literacy; learning and innovation skills, including creativity and innovation, critical thinking and problem solving, and communication and collaboration; information, media, and technology skills; and life and career skills, including flexibility. Career readiness, life literacies, and key skills education provides students with the necessary skills to make informed career and financial decisions, engage as responsible community members in a digital society, and to successfully meet the challenges and opportunities in an interconnected global economy.”

Unit 4 Focus Standards (Major Standards)
New Jersey Student Learning Standards-Mathematics

Content Standards with Statement	iReady Resource	Suggested Mathematical Practices Description of Mathematical Practices	Critical Knowledge Concepts	Skills Objectives
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	8.6	MP.1, MP.2, MP.3, MP.4, MP.5, MP.6, MP.7, MP.8	Very large and very small quantities can be approximated with numbers expressed in the form of a single digit times an integer power of 10	<ul style="list-style-type: none"> ➤ estimate very large and very small quantities with numbers expressed in the form of a single digit times an integer power of 10. ➤ compare numbers written in the form of a single digit times an integer power of 10 and express how many times as much one is than the other

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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 per year for seafloor spreading). Interpret scientific notation that has been generated by technology	8.6, 8.7		Very large and very small quantities can be approximated with numbers expressed in the form of a single digit times an integer power of 10.	<ul style="list-style-type: none"> ➤ multiply and divide numbers expressed in scientific notation, including problems in which one number is in decimal form and one is in scientific notation. ➤ add and subtract numbers expressed in scientific notation, including problems in which one number is in decimal form and one is in scientific notation. ➤ use scientific notation and choose units of appropriate size for measurements of very large or very small quantities. ➤ interpret scientific notation that has been generated by technology (e.g. recognize $4.1E-2$ and $4.1e-2$ as 4.1×10^{-2}).
8.G.A.5 Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a	3.1, 3.2, 3.3		Give informal arguments to justify facts about the exterior angles of a triangle, the sum of the measures of the interior angles of a	<ul style="list-style-type: none"> ➤ give informal arguments to establish facts about the angle sum of triangles. ➤ give informal arguments to establish facts about exterior angles of triangles. ➤ give informal arguments to establish

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<p>transversal, and the angle-angle criterion for similarity of triangles. For example, arrange three copies of the same triangle so that the sum of the three angles appears to form a line, and give an argument in terms of transversals why this is so.</p>			<p>triangle, the angle-angle relationship used to determine similar triangles, and the angles created when parallel lines are cut by a transversal.</p>	<p>facts about the angles created when parallel lines are cut by a transversal. ➤ give informal arguments to establish the angle-angle criterion for similarity of triangles.</p>
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Unit 4 New Jersey Student Learning Standards: Interdisciplinary Connections
[New Jersey Student Learning Standards-ELA](#)

RI.CR.8.1. Read closely to determine what the text says explicitly and to make logical inferences and relevant connections from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.

SL.PE.8.1. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 8 topics, texts, and issues, building on others' ideas and expressing their own clearly.

L.KL.8.2. Acquire and use accurately a range of general academic and domain-specific words and phrases sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when encountering an unknown term important to comprehension or expression.

W.AW.8.1. Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.

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Disciplinary Concepts
Digital Citizenship

Core Ideas

Performance Expectations
(Identified with Standard Number and statement)

Digital footprints are publicly accessible, even if only shared with a select group.

9.4.8.DC.4: Explain how information shared digitally is public and can be searched, copied, and potentially seen by public audiences.

9.4.8.DC.5: Manage digital identity and practice positive online behavior to avoid inappropriate forms of self-disclosure.

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Appropriate measures such as proper interactions can protect online reputations.	9.4.8.DC.6: Analyze online information to distinguish whether it is helpful or harmful to reputation.
Unit 4 New Jersey Student Learning Standards: Computer Science and Design Thinking	
Disciplinary Concepts Nature of Technology	
Core Ideas	Performance Expectations (Identified with Standard Number and Statement)
Technology advances through the processes of innovation and invention which relies upon the imaginative and inventive nature of people.	8.2.8.NT.3: Examine a system, consider how each part relates to other parts, and redesign it for another purpose.

New Jersey Student Learning Standards: Climate Change Mandate	
Core Ideas	Performance Expectations (Identified with Standard Number and Statement)
Multiple solutions often exist to solve a problem.	<p>9.4.8.CT.1: Evaluate diverse solutions proposed by a variety of individuals, organizations, and/or agencies to a local or global problem, such as climate change and use critical thinking skills to predict which one(s) are likely to be effective.</p> <p>9.4.8.CT.2: Develop multiple solutions to a problem and evaluate short- and long-term effects to determine the most plausible option (e.g., MS-ETS1-4, 6.1.8.CivicsDP.1).</p>

Unit 4 Knowledge and Skills
<p>Unit Learning Targets (Objectives): <i>Students will be able to...</i></p> <ul style="list-style-type: none"> ➤ Describe and justify the relationships between angles formed when parallel lines are cut by a transversal (e.g., corresponding, alternate interior, alternate exterior, and vertical angles).

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- Use informal reasoning to explain angle relationships within triangles, including the sum of the interior angles and properties of exterior angles.
- Apply the angle-angle criterion to determine if two triangles are similar.
- Use angle relationships to solve real-world and mathematical problems involving polygons and triangles.
- Express very large and very small numbers using scientific notation in the form of a single digit multiplied by an appropriate power of 10.
- Compare numbers written in scientific notation and determine how many times greater or smaller one quantity is than another.
- Perform operations with numbers in scientific notation, including addition, subtraction, multiplication, and division, and interpret the results.
- Solve real-world problems involving scientific notation, including problems that require switching between standard and scientific notation.
- Choose appropriate units for measuring very large or very small quantities in context and interpret outputs involving scientific notation when generated by technology.

Unit Enduring Understandings:

Students will know...

- The relationship between scientific notation and standard form and how to convert between the two.
- Appropriate units of measurement for representing very large or very small quantities.
- Strategies for using scientific notation to represent and solve real-world problems.
- The rules for adding, subtracting, multiplying, and dividing numbers in scientific notation and how to apply them in context.
- The concept of congruent angles created when a transversal intersects parallel lines and how to identify them.
- Ways to calculate angle measures formed by parallel lines and a transversal.
- Methods for using equations to determine missing angle measures in triangles.
- The properties of interior and exterior angles of a triangle and how they relate to real-world situations.
- The relationship between the number of sides in a polygon and the sum of its interior angles.
- Equations that can be used to find individual interior angle measures of regular polygons.

Unit Essential Questions:

- How can numbers be expressed and interpreted using scientific notation in real-world contexts?
- How are operations performed with numbers written in scientific notation, and what do the results mean?
- What angle relationships are formed when parallel lines are intersected by a transversal?
- How are the angles of a triangle related to one another, and how can missing angle measures be found?
- What is the relationship between the number of sides in a polygon and the sums of its interior and exterior angles?

Instructional Plan

Suggested Activities

- Guided Notes
- iReady Interactive Platform
- Task Cards
- Scavenger Hunt
- Videos
- Gallery Walk
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- Whiteboards Practice
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- Collaborate with cultural liaisons, language specialists, and support staff.
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Supplemental Resources

- **Instructional Materials**
 - Guided Notes
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 - Record and Practice Journal

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➤ **Supplemental Materials**

- Task cards
- Scavenger Hunts
- Gallery Walks
- Interactive Google Activities
- Desmos

➤ **Intervention Materials**

- IXL
- Videos
- Translated material
- LinkIt

Unit 4 Teacher Notes