

Ocean Academy Charter High School
Curriculum Guide
Grade 10



Original Adoption:	August 2025
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Ocean Academy Charter High School Geometry Curriculum	
Content Area: Mathematics	
Course Title: Geometry	
Grade Level: 9-12	
Unit Title	Pacing Guide in Days
Unit 1: Congruence and Constructions	23 Days
Unit 2: Congruence, Similarity, and Proof	22 Days
Unit 3: Trigonometric Ratios and Geometric Equations	23 Days
Unit 4: Geometric Modeling	22 Days

Ocean Academy Charter High School Unit 1 Overview	
Content Area: Geometry Mathematics	
Unit Title: Congruence and Constructions	Duration: 23 Days
Target Course/Grade Level: 9-12	
Introduction/Unit 1 <ul style="list-style-type: none"> ● Experiment with transformations in the plane ● Understand congruence in terms of rigid motions ● Make geometric constructions 	
Disciplinary Concepts for Unit 1 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	

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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.

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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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- (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.”

Infused within the unit are connections to the NJSLS for Mathematics, Language Arts Literacy, Career Readiness, and Computer Science/Technology.

Disciplinary Concepts for Unit 1

Career Readiness, Life Literacies, and Key Skills-

Creativity and Innovation

Critical Thinking

Technology Literacy

Computer Science and Design Thinking

Nature of Technology

Algorithms and Programming

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

Content Standards with Statement	BIM Resource	Suggested Mathematical Practices	Critical Knowledge Concepts	Skills Objectives
HSG.CO.B.6. Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given	4.1-.6	MP.3 Construct viable arguments and critique the	Congruence in terms of rigid motion	➤ predict the outcome of a transformation on a figure.

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<p>rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent.</p>		<p>reasoning of others.</p>		<ul style="list-style-type: none"> ➤ given a description of the rigid motions, transform figures. ➤ given two figures, decide if they are congruent by applying rigid motions.
<p>HSG.CO.A.1 Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.</p>	<p>1.1-.3, 1.5, 1.6, 3.1</p>	<p>MP.6 Attend to precision.</p>	<p>Point, line, plane, distance along a line, and distance around a circular arc as indefinable notions</p>	<ul style="list-style-type: none"> ➤ use point, line, distance along a line and/or distance around a circular arc to give a precise definition of <ul style="list-style-type: none"> ○ angle; ○ circle (the set of points that are the same distance from a single point - the center); ○ perpendicular line (two lines are perpendicular if an angle formed by the two lines at the point of intersection is a right angle); ○ parallel lines (distinct lines that have no point in common); and line segment.
<p>G.CO.A.2 Represent transformations in the plane using, e.g., transparencies</p>	<p>4.1-.3, 4.5</p>	<p>MP.5 Use appropriate</p>	<p>Transformations as functions (e.g. $F(P)$ is</p>	<ul style="list-style-type: none"> ➤ represent transformations with

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<p>and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch).</p>		<p>tools strategically.</p> <p>MP.6 Attend to precision.</p> <p>MP.7 Look for and make use of structure.</p>	<p>the image of point P created by transformation F).</p>	<p>transparencies and geometry software.</p> <ul style="list-style-type: none"> ➤ describe transformations as functions (points defining the pre-image as the input and the points defining the image as the output). ➤ describe a transformation F of the plane as a rule that assigns to each point P in the plane a point F(P) of the plane. ➤ compare rotations, reflections, and translations to a horizontal stretch, vertical stretch and to dilations, distinguishing preserved distances and angles from those that are not preserved.
<p>G.CO.A.3 Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.</p>	<p>4.2, 4.3</p>	<p>MP.5 Use appropriate</p>		<ul style="list-style-type: none"> ➤ identify lines of symmetry when performing rotations

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		<p>tools strategically.</p> <p>MP.6 Attend to precision.</p> <p>MP.7 Look for and make use of structure.</p>		<p>and/or reflections on rectangles, parallelograms, trapezoids and regular polygons.</p> <ul style="list-style-type: none"> ➤ describe the rotations and reflections that carry rectangles, parallelograms, trapezoids and regular polygons onto itself.
G.CO.A.4 Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.	4.1-.3	MP.6 Attend to precision.	Impact of transformations on figures in the plane.	<ul style="list-style-type: none"> ➤ develop formal mathematical definitions of a rotation, reflection, and translation.
G.CO.A.5 Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another	4.1-.4, .6	<p>MP.5 Use appropriate tools strategically.</p> <p>MP.6 Attend to precision.</p> <p>MP.7 Look for and make use of structure.</p>		<ul style="list-style-type: none"> ➤ draw the transformed figure using graph paper, tracing paper, and/or geometry software given a geometric figure and a rotation, reflection, or translation. ➤ identify the sequence of transformations required to carry one figure

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<p>G.CO.D.12 Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.).</p>	<p>1.2, 1.3, 1.5, 3.3, 3.4, 4.4</p>	<p>MP.3 Construct viable arguments and critique the reasoning of others.</p> <p>MP.5 Use appropriate tools strategically.</p> <p>MP.6 Attend to precision.</p>	<p>Congruence underlies formal constructions.</p>	<p>onto another.</p> <ul style="list-style-type: none"> ➤ perform formal constructions using a variety of tools and methods including: <ul style="list-style-type: none"> <input type="checkbox"/> copying a segment; <input type="checkbox"/> copying an angle; <input type="checkbox"/> bisecting a segment; <input type="checkbox"/> bisecting an angle; <input type="checkbox"/> constructing perpendicular lines; <input type="checkbox"/> constructing the perpendicular bisector of a line segment; <input type="checkbox"/> constructing a line parallel to a given line through a point not on the line; <input type="checkbox"/> constructing an equilateral triangle; <input type="checkbox"/> constructing a square; <input type="checkbox"/> and constructing a regular hexagon inscribed in a circle. <input type="checkbox"/> identify the
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				congruences underlying each construction.
G.CO.D.13 Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.	1.5, 3.4	<p>MP.3 Construct viable arguments and critique the reasoning of others.</p> <p>MP.5 Use appropriate tools strategically.</p> <p>MP.6 Attend to precision.</p>	Congruence underlies formal constructions.	<p>➤ perform formal constructions using a variety of tools and methods including:</p> <ul style="list-style-type: none"> <input type="checkbox"/> copying a segment; <input type="checkbox"/> copying an angle; <input type="checkbox"/> bisecting a segment; <input type="checkbox"/> bisecting an angle; <input type="checkbox"/> constructing perpendicular lines; <input type="checkbox"/> constructing the perpendicular bisector of a line segment; <input type="checkbox"/> constructing a line parallel to a given line through a point not on the line; <input type="checkbox"/> constructing an equilateral triangle; <input type="checkbox"/> constructing a square; <input type="checkbox"/> and constructing a regular hexagon inscribed in a circle. <input type="checkbox"/> identify the congruencies

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			underlying each construction.
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Unit 1 New Jersey Student Learning Standards: Interdisciplinary Connections

RI.CR.9-10.1. Cite a range and thorough textual evidence and make clear and relevant connections, to strongly support an analysis of multiple aspects of what an informational text says explicitly and inferentially, as well as interpretations of the text.

L.VL.9-10.3. Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grades 9-10 reading and content, including technical meanings, choosing flexibly from a range of strategies.

- Use context (e.g., the overall meaning of a sentence, paragraph, or text; a word’s position or function in a sentence) as a clue to the meaning of a word or phrase.
- Identify and correctly use patterns of word changes that indicate different meanings or parts of speech (e.g., analyze, analysis, analytical; advocate, advocacy).
- Analyze the cumulative impact of specific word choices on meaning and tone (e.g., how the language of a court opinion differs from that of a newspaper).
- Consult general and specialized reference materials (e.g., dictionaries, glossaries, thesauruses), both print and digital, to find the pronunciation of a word or determine or clarify its precise meaning, its part of speech, or its etymology.
- Verify the preliminary determination of the meaning of a word or phrase (e.g., by checking the inferred meaning in context or in a dictionary).

RI.MF.9-10.6. Analyze, integrate, and evaluate multiple interpretations (e.g., charts, graphs, diagrams, videos) of a single text or text/s presented in different formats (visually, quantitatively) as well as in words in order to address a question or solve a problem.

W.WP.9-10.4. Develop and strengthen writing as needed by planning, revising, editing, rewriting, trying a new approach; sustaining effort to complete complex writing tasks; seeking out feedback and reflecting on personal writing progress; consulting a style manual (such as MLA or APA Style), focusing on addressing what is most significant for a specific purpose and audience.

Unit 1 New Jersey Student Learning Standards: Career Readiness, Life Literacies, and Key Skills

Core Ideas	Performance Expectations (Identified with Standard Number and statement)
With a growth mindset, failure is an important part of success.	9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).
Collaboration with individuals with diverse experiences can aid in the problem-solving process, particularly for global issues where diverse solutions are needed.	9.4.12.CT.1: Identify problem-solving strategies used in the development of an innovative product or practice (e.g., 1.1.12acc.C1b, 2.2.12.PF.3). 9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).

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	9.4.12.CT.4: Participate in online strategy and planning sessions for course-based, school-based, or other project and determine the strategies that contribute to effective outcomes.
Digital tools differ in features, capacities, and styles. Knowledge of different digital tools is helpful in selecting the best tool for a given task.	9.4.12.TL.1: Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task (e.g., W.11-12.6.).
Collaborative digital tools can be used to access, record and share different viewpoints and to collect and tabulate the views of groups of people.	9.4.12.TL.3: Analyze the effectiveness of the process and quality of collaborative environments. 9.4.12.TL.4: Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem (e.g., 7.1.AL.IPERS.6).
Unit 1 New Jersey Student Learning Standards: Computer Science and Design Thinking	
Core Ideas	Performance Expectations (Identified with Standard Number and Statement)
Individuals evaluate and select algorithms based on performance, reusability, and ease of implementation.	8.1.12.AP.1: Design algorithms to solve computational problems using a combination of original and existing algorithms.
Complex programs are designed as systems of interacting modules, each with a specific role, coordinating for a common overall purpose. Modules allow for better management of complex tasks.	8.1.12.AP.5: Decompose problems into smaller components through systematic analysis, using constructs such as procedures, modules, and/or objects. 8.1.12.AP.6: Create artifacts by using procedures within a program, combinations of data and procedures, or independent but interrelated programs.
Engineers use science, mathematics, and other disciplines to improve technology. Increased collaboration among engineers, scientists, and mathematicians can improve their work and designs.	8.2.12.NT.1: Explain how different groups can contribute to the overall design of a product. 8.2.12.NT.2: Redesign an existing product to improve form or function.

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

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Core Ideas	Performance Expectations (Identified with Standard Number and Statement)
Individuals select digital tools and design automated processes to collect, transform, generalize, simplify and present large data sets in different ways to influence how other people interpret and understand the underlying information.	8.1.12.DA.1: Create interactive data visualizations using software tools to help others better understand real world phenomena, including climate change.

Unit 1 Knowledge and Skills

Unit 1: Learning Targets / Objectives

Students will be able to...

- Use the undefined concepts of point, line, and distance (linear and circular) to develop precise definitions of angles, circles, parallel lines, perpendicular lines, and line segments.
- Represent transformations in the coordinate plane using tools such as transparencies and geometry software.
- Describe transformations as functions and distinguish between rigid motions (translations, rotations, reflections) and non-rigid transformations (dilations, horizontal and vertical stretches).
- Identify lines of symmetry and describe the rotational and reflective symmetries of regular polygons, rectangles, parallelograms, and trapezoids.
- Develop and apply formal definitions of rotations, reflections, and translations.
- Use graph paper, tracing paper, or software to draw and describe sequences of transformations that map one figure onto another.
- Use rigid motions to verify and explain the congruence of geometric figures.
- Prove that two triangles are congruent using corresponding sides, angles, and rigid transformations.
- Explain how triangle congruence criteria (SSS, SAS, ASA, AAS, HL) stem from the definition of congruence in terms of rigid motion.

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- Construct geometric figures using a variety of tools and techniques, including compass and straightedge, paper folding, reflective tools, and dynamic geometry software.

Unit 1: Enduring Understandings

Students will know that...

- Coordinate geometry can be used to prove geometric theorems and relationships.
- Trigonometric ratios help solve problems involving right triangles.
- Geometric descriptions of figures can be expressed algebraically through equations (e.g., conic sections).
- Theorems related to circles, such as angles and arc properties, are foundational to understanding circular geometry.
- Arc lengths and sector areas can be calculated using proportional reasoning and formulas involving the radius and angle measure.

Unit 1: Essential Questions

- What are the fundamental elements of geometry?
- How can congruence be established and applied to geometric problems?
- What attributes define a segment or an angle?
- Why is geometric construction a valuable skill in mathematics?
- What are the critical properties of triangles, and how are they used in problem solving?
- What minimum conditions are required to prove that two triangles are congruent?
- What methods can be used to demonstrate triangle congruence?
- What are the special segments of a triangle, and how do they intersect?
- How can coordinate geometry be used to explore and verify relationships within triangles?
- What strategies can be used to solve measurement problems involving triangles?
- How can quadrilaterals be classified based on their properties?

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- In what ways can the properties of polygons be applied to real-world scenarios?
- How can coordinate geometry be used to prove general geometric relationships?
- How is the sum of the interior angles of a polygon determined?
- What are the key characteristics of geometric transformations and symmetry?
- How can transformations be represented algebraically in the coordinate plane?
- How can a figure's position be changed without altering its size or shape?
- How can a figure be resized while maintaining its shape?
- How can proportional reasoning be used to determine side lengths in similar polygons?
- What criteria are used to establish that two triangles are similar?
- How do you identify corresponding sides and angles in similar triangles?

Unit 1: Instructional Plan

In this course, we will begin by reviewing the foundational concepts from Chapter 1, focusing on the basic tools of geometry. This will serve as a springboard into a deeper exploration of lines, specifically parallel and perpendicular lines, along with their equations. Following this, we will move on to Chapter 3, where we will introduce the concept of planes and delve into the study of angles.

As we progress to Chapter 4, students will expand their understanding of transformations, learning how to perform them effectively. This chapter will also introduce key geometric concepts such as symmetry, congruence, and similarity, building on the students' knowledge of transformations and applying it to geometric figures. By the end of these chapters, students will have a well-rounded understanding of lines, planes, angles, and transformations in geometry.

Resources & Text	Suggested Activities
<ul style="list-style-type: none"> ➤ Savvas Platform ➤ enVision Textbook ➤ Graph Paper ➤ Calculator ➤ Geometry Sketchpad ➤ Manipulatives 	<ul style="list-style-type: none"> ➤ IXL ➤ Khan Academy ➤ Desmos ➤ Cool Math ➤ Nearpod ➤ Edpuzzle ➤ Kahoot ➤ Quizizz ➤ Blooket

Unit 1: Evidence of Student Learning

Formative Assessments:

- Observation
- Homework
- Class Participation
- Whiteboards/communicators
- Think-Pair-Share
- Do-Now
- Notebook Checks
- Writing Prompts
- Exit Tickets
- Classroom Games
- Self-assessment

Summative Assessments

- Chapter/Unit Test
- Quizzes
- Presentations
- Unit Projects

Benchmark Assessments:

- State Standardized Assessments
- Quarterly Benchmark Assessment

Alternative Assessments

- Portfolio Project
- Modified assignments

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.

Differentiation & Inclusive Support Strategies:

Multilingual Learners:

- Provide guided reading and writing in small groups
- Use visuals, labeled classroom materials, and cognates
- Pre-teach academic vocabulary using sentence and speaking frames

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- Integrate WIDA Can Do Descriptors into lesson scaffolding
- Use screen readers, audio tools, and visual glossaries
- Offer extended time and oral/dictated responses
- Integrate culturally relevant texts and technology tools

Students with IEPs or 504 Plans:

- Follow all IEP/504 accommodations and modifications
- Use audio books, large print, or Braille/digital formats
- Provide peer tutoring, scribes, and augmentative communication tools
- Allow oral responses and extended time
- Offer modified assignments, assessments, and guided notes
- Utilize leveled texts and differentiated materials
- Use flexible seating and small group instruction

Students At Risk of Academic Failure:

- Scaffold instruction using visuals, chants, and songs
- Offer modified tasks and flexible grouping
- Use technology to support organization and engagement
- Provide structured routines and clear expectations
- Assign peer mentors and provide goal-setting checklists
- Include culturally relevant content to boost connection
- Embed mini-lessons and tiered intervention strategies

Gifted and Talented Learners:

- Provide open-ended and inquiry-based tasks
- Incorporate Bloom's Taxonomy (analyzing, evaluating, creating)
- Offer choices in content, process, and product
- Use advanced reading lists and tiered assignments

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- Encourage discovery and student-designed projects
- Offer enrichment centers and flexible grouping
- Facilitate problem-solving simulations and debriefing

Diversity and Inclusion:

- Celebrate cultural identity through inclusive texts
- Provide alternative formats for assignments and assessments
- Collaborate with ESL staff and use closed captions when available
- Offer wait time and avoid idioms or slang
- Create a nurturing classroom with visual routines and structured expectations
- Encourage family engagement and home language maintenance
- Use word walls and accessible academic vocabulary tools

Unit 1: Supplemental Resources

Instructional Materials:

- Big Ideas Platform
- Big Ideas Textbook
- Graph Paper
- Calculator
- Geometry Sketchpad
- Manipulatives

Supplemental Materials:

- IXL
- Khan Academy
- Desmos
- Cool Math
- Nearpod
- Edpuzzle
- Kahoot
- Quizizz
- Blooket
- Kuta Software
- Illustrative Math Website Activities:
 - G.CO.A.1 Defining Parallel Lines
 - G.CO.A.1 Defining Perpendicular Lines
 - G.CO.A.2 Horizontal Stretch of the Plane
 - G.CO.A.3 Seven Circles II

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- G.CO.A.3 Symmetries of rectangles
- G.CO.A.4 Defining Rotations
- G.CO.A.5 Showing a triangle congruence
- G.CO.B.7 Properties of Congruent Triangles
- G.CO.B.8 Why does SAS work?
- G.CO.B.8 Why does SSS work?
- G.CO.B.8 Why does ASA work?
- G.CO.D.12 Bisecting an angle
- G.CO.D.12 Angle bisection and midpoints of line segments
- G.CO.D.13 Inscribing an equilateral triangle in a circle

Intervention Materials:

- Flexible grouping
- Homework options
- Choices of review activities
- Think-Pair-Share
- Mini workshops to re-teach or extend skills
- Games to practice mastery of information and skill
- Stations/ Learning Centers
- Note taking Organizers
- Alternative assessments

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Unit 2 Overview

Content Area: Geometry Mathematics

Unit 2 Title: Congruence, Similarity, and Proof

Duration: 22 Days

Target Course/Grade Level: 9-12

Introduction/Unit 2

- Understand similarity in terms of similarity transformations
- Prove geometric theorems.
- Prove theorems involving similarity

Disciplinary Concepts for Unit 2

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

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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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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.

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

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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.

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- (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
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Asian Americans and Pacific Islanders (AAPI)

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Infused within the unit are connections to the NJSLS for Mathematics, Language Arts Literacy, Career Readiness, and Computer Science/Technology.

Disciplinary Concepts for Unit 2.

Career Readiness, Life Literacies, and Key Skills-

Creativity and Innovation

Critical Thinking

Technology Literacy

Computer Science and Design Thinking

Nature of Technology

Algorithms and Programming

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

Content Standards with Statement	BIM Resource	Suggested Mathematical Practices	Critical Knowledge Concepts	Skills Objectives
HSG.CO.C.9. Prove theorems about lines and angles. <i>Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly</i>	2.1-2.6, 6.1	MP.3 Construct viable arguments and critique the reasoning of others. MP.6 Attend to precision.	A formal proof may be represented with a paragraph proof or a two-column proof.	Construct and explain proofs of theorems about lines and angles including: <ul style="list-style-type: none"> ➤ vertical angles are congruent; ➤ congruence of alternate interior

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<p><i>those equidistant from the segment's endpoints.</i></p>				<p>angles;</p> <ul style="list-style-type: none">➤ congruence of corresponding angles;➤ and points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints. <p>Construct and explain proofs of theorems about triangles including:</p> <ul style="list-style-type: none">➤ sum of interior angles of a triangle;➤ congruence of base angles of an isosceles triangle;➤ the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length;➤ and the medians of a triangle meet at a point. <p>Construct and</p>
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				<p>explain proofs of theorems about parallelograms including:</p> <ul style="list-style-type: none"> ➤ opposite sides are congruent; ➤ opposite angles are congruent; ➤ the diagonals of a parallelogram bisect each other; ➤ and rectangles are parallelograms with congruent diagonals.
<p>HSG.CO.C.10. Prove theorems about triangles. <i>Theorems include: measures of interior angles of a triangle sum to 180°; base angles of isosceles triangles are congruent; the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length; the medians of a triangle meet at a point.</i></p>	<p>2.1-.4, 5.1, 5.4, 6.2-.6</p>	<p>MP.3 Construct viable arguments and critique the reasoning of others.</p> <p>MP.6 Attend to precision.</p>	<p>A formal proof may be represented with a paragraph proof or a two-column proof.</p>	<p>Construct and explain proofs of theorems about lines and angles including:</p> <ul style="list-style-type: none"> ➤ vertical angles are congruent; ➤ congruence of alternate interior angles; ➤ congruence of corresponding angles; ➤ and points on a perpendicular bisector of a line segment are exactly those

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				<p>equidistant from the segment's endpoints.</p> <p>Construct and explain proofs of theorems about triangles including:</p> <ul style="list-style-type: none">➤ sum of interior angles of a triangle;➤ congruence of base angles of an isosceles triangle;➤ the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length;➤ and the medians of a triangle meet at a point. <p>Construct and explain proofs of theorems about parallelograms including:</p> <ul style="list-style-type: none">➤ opposite sides are congruent;➤ opposite angles are congruent;➤ the diagonals of a
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				<p>parallelogram bisect each other;</p> <ul style="list-style-type: none"> ➤ and rectangles are parallelograms with congruent diagonals.
<p>HSG.CO.C.11. Prove theorems about parallelograms. <i>Theorems include: opposite sides are congruent, opposite angles are congruent, the diagonals of a parallelogram bisect each other, and conversely, rectangles are parallelograms with congruent diagonals.</i></p>	<p>2.1-2.4</p>	<p>MP.3 Construct viable arguments and critique the reasoning of others.</p> <p>MP.6 Attend to precision.</p>	<p>A formal proof may be represented with a paragraph proof or a two-column proof.</p>	<p>Construct and explain proofs of theorems about lines and angles including:</p> <ul style="list-style-type: none"> ➤ vertical angles are congruent; ➤ congruence of alternate interior angles; ➤ congruence of corresponding angles; ➤ and points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints. <p>Construct and explain proofs of theorems about triangles including:</p> <ul style="list-style-type: none"> ➤ sum of interior angles of a

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				<p>triangle;</p> <ul style="list-style-type: none"> ➤ congruence of base angles of an isosceles triangle; ➤ the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length; ➤ and the medians of a triangle meet at a point. <p>Construct and explain proofs of theorems about parallelograms including:</p> <ul style="list-style-type: none"> ➤ opposite sides are congruent; ➤ opposite angles are congruent; ➤ the diagonals of a parallelogram bisect each other; ➤ and rectangles are parallelograms with congruent diagonals.
<p>HSG.SRT.B.4. Prove theorems about triangles. <i>Theorems include: a line parallel to one side of a</i></p>	<p>2.1-2.4</p>	<p>MP.2 Reason abstractly and quantitatively.</p>		<p>Construct and explain proofs of theorems about triangles including:</p>

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<p><i>triangle divides the other two proportionally, and conversely; the Pythagorean Theorem proved using triangle similarity</i></p>		<p>MP.6 Attend to precision.</p>		<ul style="list-style-type: none"> ➤ a line parallel to one side of a triangle divides the other two sides proportionally; ➤ and the Pythagorean Theorem (using triangle similarity).
<p>HSG.SRT.B.5. Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.</p>	<p>5.7, 6.1, 6.3</p>	<p>MP.7 Look for and make use of structure.</p>	<p>Corresponding parts of congruent triangles are congruent (CPCTC).</p>	<p>Prove geometric relationships in figures using criteria for triangle congruence.</p> <p>Prove geometric relationships in figures using criteria for triangle congruence.</p> <p>Solve problems using triangle congruence criteria (SSS, ASA, SAS, HL).</p> <p>Solve problems using triangle similarity criteria (AA).</p>

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

RI.CR.9-10.1. Cite a range and thorough textual evidence and make clear and relevant connections, to strongly support an analysis of multiple aspects of what an informational text says explicitly and inferentially, as well as interpretations of the text.

L.VL.9-10.3. Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grades 9-10 reading and content, including technical meanings, choosing flexibly from a range of strategies.

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- Use context (e.g., the overall meaning of a sentence, paragraph, or text; a word’s position or function in a sentence) as a clue to the meaning of a word or phrase.
- Identify and correctly use patterns of word changes that indicate different meanings or parts of speech (e.g., analyze, analysis, analytical; advocate, advocacy).
- Analyze the cumulative impact of specific word choices on meaning and tone (e.g., how the language of a court opinion differs from that of a newspaper).
- Consult general and specialized reference materials (e.g., dictionaries, glossaries, thesauruses), both print and digital, to find the pronunciation of a word or determine or clarify its precise meaning, its part of speech, or its etymology.
- Verify the preliminary determination of the meaning of a word or phrase (e.g., by checking the inferred meaning in context or in a dictionary).

RI.MF.9-10.6. Analyze, integrate, and evaluate multiple interpretations (e.g., charts, graphs, diagrams, videos) of a single text or text/s presented in different formats (visually, quantitatively) as well as in words in order to address a question or solve a problem.

W.WP.9-10.4. Develop and strengthen writing as needed by planning, revising, editing, rewriting, trying a new approach; sustaining effort to complete complex writing tasks; seeking out feedback and reflecting on personal writing progress; consulting a style manual (such as MLA or APA Style), focusing on addressing what is most significant for a specific purpose and audience.

Unit 2 New Jersey Student Learning Standards: [Career Readiness, Life Literacies, and Key Skills](#)

Core Ideas	Performance Expectations (Identified with Standard Number and statement)
With a growth mindset, failure is an important part of success.	9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).
Collaboration with individuals with diverse experiences can aid in the problem-solving process, particularly for global issues where diverse solutions are needed.	9.4.12.CT.1: Identify problem-solving strategies used in the development of an innovative product or practice (e.g., 1.1.12acc.C1b, 2.2.12.PF.3). 9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a). 9.4.12.CT.4: Participate in online strategy and planning sessions for course-based, school-based, or other project and determine the strategies that contribute to effective outcomes.
Digital tools differ in features, capacities, and styles. Knowledge of different digital tools is helpful in selecting the best tool for a given task.	9.4.12.TL.1: Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task (e.g., W.11-12.6.).
Collaborative digital tools can be used to access, record and share different	9.4.12.TL.3: Analyze the effectiveness of the process and quality of collaborative environments.

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viewpoints and to collect and tabulate the views of groups of people.	9.4.12.TL.4: Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem (e.g., 7.1.AL.IPERS.6).
New Jersey Student Learning Standards: Computer Science and Design Thinking	
Core Ideas	Performance Expectations (Identified with Standard Number and statement)
With a growth mindset, failure is an important part of success.	9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).
Collaboration with individuals with diverse experiences can aid in the problem-solving process, particularly for global issues where diverse solutions are needed.	9.4.12.CT.1: Identify problem-solving strategies used in the development of an innovative product or practice (e.g., 1.1.12acc.C1b, 2.2.12.PF.3). 9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a). 9.4.12.CT.4: Participate in online strategy and planning sessions for course-based, school-based, or other project and determine the strategies that contribute to effective outcomes.
Digital tools differ in features, capacities, and styles. Knowledge of different digital tools is helpful in selecting the best tool for a given task.	9.4.12.TL.1: Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task (e.g., W.11-12.6.).
Collaborative digital tools can be used to access, record and share different viewpoints and to collect and tabulate the views of groups of people.	9.4.12.TL.3: Analyze the effectiveness of the process and quality of collaborative environments. 9.4.12.TL.4: Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem (e.g., 7.1.AL.IPERS.6).

New Jersey Student Learning Standards: Climate Change Mandate	
Core Ideas	Performance Expectations (Identified with Standard Number and Statement)
Individuals select digital tools and design automated processes to collect, transform, generalize, simplify and	8.1.12.DA.1: Create interactive data visualizations using software tools to help others better understand real world phenomena, including climate change.

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present large data sets in different ways to influence how other people interpret and understand the underlying information.	
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Unit 2 Knowledge and Skills

Unit 2 Learning Targets / Objectives

Students will be able to...

- Verify the properties of dilations using a given center and scale factor.
 - Determine whether two figures are similar by using similarity transformations, and explain triangle similarity in terms of these transformations.
 - Use similarity transformations to justify the Angle-Angle (AA) criterion for triangle similarity.
 - Construct and present formal proofs of geometric theorems involving lines, angles, triangles, and parallelograms.
 - Prove key theorems about the properties of triangles.
 - Apply triangle congruence and similarity criteria to solve problems and justify relationships within geometric figures.
-

Unit 2 Enduring Understandings

Students will know that...

- Coordinate geometry can be used to prove basic geometric theorems.
- Trigonometric ratios are tools for solving real-world and mathematical problems involving right triangles.
- Geometric figures can be translated into algebraic equations, such as those of conic sections.
- Theorems involving angles, arcs, and segments in circles are essential to understanding circle geometry.

- Arc lengths and sector areas in circles can be found using proportional reasoning and appropriate formulas.
-

Unit 2 Essential Questions

- What are the foundational concepts in geometry?
- How is congruence helpful when solving geometric problems?
- What properties define a segment or angle?
- Why are geometric constructions valuable in problem-solving and reasoning?
- What are the critical properties and relationships within triangles?
- What are the minimum conditions required to prove triangle congruence?
- Which methods can be used to verify that two triangles are congruent?
- What are the special concurrent segments in a triangle, and why are they important?
- How can coordinate geometry be used to explore and justify triangle relationships?
- How can triangle measurements be used to solve real-world problems?
- What characteristics are used to classify quadrilaterals?
- How can the properties of polygons be applied in practical contexts?
- In what ways does coordinate geometry help establish general geometric relationships?
- How is the sum of a polygon's interior angles determined?
- What are the fundamental properties of transformations and symmetry?
- How can geometric transformations be represented in the coordinate plane?
- How can a figure be moved without altering its size or shape?
- How can a figure be resized while maintaining its shape?
- How is proportional reasoning used to calculate side lengths in similar polygons?
- What criteria are used to determine triangle similarity?

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- How do you identify and match corresponding parts in similar triangles?

Unit 2: Instructional Plan

In Chapter 2, students will build their understanding of deductive and inductive reasoning as they begin exploring two-column proofs. This foundation will lead into Chapter 4, where students will learn how to prove triangles congruent. As we move into Chapter 6, students will be introduced to the various segments of a triangle. For Honors students, this chapter will go further, examining the applications of these segments and how they are used in more advanced geometric contexts. This progression will deepen students' understanding of both the theoretical and practical aspects of geometry. By the end of these chapters, students will have a strong grasp of the logical reasoning behind geometric proofs, a deep understanding of triangle congruence, and the ability to apply their knowledge to both theoretical and real-world geometric situations.

Resources & Text

- Big Ideas Platform
- Big Ideas Textbook
- Graph Paper
- Calculator
- Geometry Sketchpad
- Manipulatives

Suggested Activities

- IXL
- Khan Academy
- Desmos
- Cool Math
- Nearpod
- Edpuzzle
- Kahoot
- Quizizz
- Blooket
- Kuta Software

Unit 2 Evidence of Student Learning

Formative Assessments:

- Observation
- Homework
- Class Participation
- Whiteboards/communicators
- Think-Pair-Share
- Do-Now
- Notebook Checks
- Writing Prompts
- Exit Tickets
- Classroom Games

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- Self-assessment

Summative Assessments

- Chapter/Unit Test
- Quizzes
- Presentations
- Unit Projects

Benchmark Assessments:

- State Standardized Assessments
- Quarterly Benchmark Assessment

Alternative Assessments

- Portfolio Project
- Modified assignments

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.

Differentiation & Inclusive Support Strategies:

Multilingual Learners:

- Provide guided reading and writing in small groups
- Use visuals, labeled classroom materials, and cognates
- Pre-teach academic vocabulary using sentence and speaking frames
- Integrate WIDA Can Do Descriptors into lesson scaffolding
- Use screen readers, audio tools, and visual glossaries
- Offer extended time and oral/dictated responses
- Integrate culturally relevant texts and technology tools

Students with IEPs or 504 Plans:

- Follow all IEP/504 accommodations and modifications

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- Use audio books, large print, or Braille/digital formats
- Provide peer tutoring, scribes, and augmentative communication tools
- Allow oral responses and extended time
- Offer modified assignments, assessments, and guided notes
- Utilize leveled texts and differentiated materials
- Use flexible seating and small group instruction

Students At Risk of Academic Failure:

- Scaffold instruction using visuals, chants, and songs
- Offer modified tasks and flexible grouping
- Use technology to support organization and engagement
- Provide structured routines and clear expectations
- Assign peer mentors and provide goal-setting checklists
- Include culturally relevant content to boost connection
- Embed mini-lessons and tiered intervention strategies

Gifted and Talented Learners:

- Provide open-ended and inquiry-based tasks
- Incorporate Bloom's Taxonomy (analyzing, evaluating, creating)
- Offer choices in content, process, and product
- Use advanced reading lists and tiered assignments
- Encourage discovery and student-designed projects
- Offer enrichment centers and flexible grouping
- Facilitate problem-solving simulations and debriefing

Diversity and Inclusion:

- Celebrate cultural identity through inclusive texts
- Provide alternative formats for assignments and assessments

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- Collaborate with ESL staff and use closed captions when available
- Offer wait time and avoid idioms or slang
- Create a nurturing classroom with visual routines and structured expectations
- Encourage family engagement and home language maintenance
- Use word walls and accessible academic vocabulary tools

Unit 2: Supplemental Resources

Instructional Materials:

- Savvas Platform
- enVision Textbook
- Graph Paper
- Calculator
- Geometry Sketchpad
- Manipulatives

Supplemental Materials:

- IXL
- Khan Academy
- Desmos
- Cool Math
- Nearpod
- Edpuzzle
- Kahoot
- Quizizz
- Blooket
- Kuta Software
- Illustrative Math Website Activities:
 - G.CO.A.1 Defining Parallel Lines
 - G.CO.A.1 Defining Perpendicular Lines
 - G.CO.A.2 Horizontal Stretch of the Plane
 - G.CO.A.3 Seven Circles II
 - G.CO.A.3 Symmetries of rectangles
 - G.CO.A.4 Defining Rotations
 - G.CO.A.5 Showing a triangle congruence
 - G.CO.B.7 Properties of Congruent Triangles
 - G.CO.B.8 Why does SAS work?
 - G.CO.B.8 Why does SSS work?
 - G.CO.B.8 Why does ASA work?
 - G.CO.D.12 Bisecting an angle
 - G.CO.D.12 Angle bisection and midpoints of line segments
 - G.CO.D.13 Inscribing an equilateral triangle in a circle

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Intervention Materials:

- Flexible grouping
- Homework options
- Choices of review activities
- Think-Pair-Share
- Mini workshops to re-teach or extend skills
- Games to practice mastery of information and skill
- Stations/ Learning Centers
- Note taking Organizers
- Alternative assessments

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Unit 3 Overview

Content Area: Geometry Mathematics

Unit 3 Title: Trigonometric Ratios and Geometric Equations

Duration: 23 Days

Target Course/Grade Level: 9-12

Introduction/Unit 3 Focus-

- Use coordinates to prove simple geometric theorems
- Define trigonometric ratios and solve problems involving right triangles
- Translate between the geometric description and the equation for a conic section
- Understand and apply theorems about circles
- Find arc lengths and areas of sectors of circles

Disciplinary Concepts for Unit 3

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.

Infused within the unit are connections to the NJSLs for Mathematics, Language Arts Literacy, Career Readiness, and Computer Science/Technology.

Disciplinary Concepts for Unit 3.

Career Readiness, Life Literacies, and Key Skills-

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Creativity and Innovation Critical Thinking Technology Literacy Computer Science and Design Thinking Nature of Technology Algorithms and Programming				
Unit 3 Focus Standards (Major Standards) New Jersey Student Learning Standards-Mathematics				
Content Standards with Statement	BIM Resource	Suggested Mathematical Practices	Critical Knowledge Concepts	Skills Objectives
HSG.GPE.B.5. Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point).	8.3	MP.3 Construct viable arguments and critique the reasoning of others. MP.8 Look for and express regularity in repeated reasoning		Prove the slope criteria for parallel lines (parallel lines have equivalent slopes). Prove the slope criteria for perpendicular lines (the product of the slopes of perpendicular lines equals -1). Solve problems using the slope criteria for parallel and perpendicular lines.
G.GPE.B.6 (+) Find the point on a directed line segment between two given points that partitions the segment in a given ratio.	8.4	MP.1 Make sense of problems and persevere in solving them. MP.2 Reason abstractly and quantitatively. MP.5 Use appropriate tools strategically. MP.6 Attend to precision.		Locate the point on a directed line segment that creates two segments of a given ratio. Find perimeters of polygons using coordinates, the Pythagorean theorem and the distance formula. Find areas of triangle and rectangles using

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				coordinates.
HSG.SRT.C.6. Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles.	9.4, 9.5	MP.7 Look for and make use of structure.	Side ratios in right triangles are properties of the angles in the triangle.	Show and explain that definitions for trigonometric ratios derive from similarity of right triangles.
HSG.SRT.C.7. Explain and use the relationship between the sine and cosine of complementary angles	9.5	MP.1 Make sense of problems and persevere in solving them. MP.2 Reason abstractly and quantitatively. MP.5 Use appropriate tools strategically. MP.6 Attend to precision. MP.7 Look for and make use of structure.	Relationship between sine and cosine of complementary angles	Determine and compare sine and cosine ratios of complementary angles in a right triangle. Solve right triangles (determine all angle measures and all side lengths) using trigonometric ratios and the Pythagorean Theorem.
HSG.SRT.B.5. Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.	7.2-7.5, 8.2-8.4, 9.3	MP.7 Look for and make use of structure.	Corresponding parts of congruent triangles are congruent (CPCTC).	prove geometric relationships in figures using criteria for triangle congruence. Prove geometric relationships in figures using criteria for triangle congruence. Solve problems using triangle congruence criteria (SSS, ASA, SAS,

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				HL). Solve problems using triangle similarity criteria (AA).
HSG.SRT.C.8. Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.	9.1-.2, 9.4-9.6	MP.1 Make sense of problems and persevere in solving them. MP.2 Reason abstractly and quantitatively. MP.5 Use appropriate tools strategically. MP.6 Attend to precision. MP.7 Look for and make use of structure.	Relationship between sine and cosine of complementary angles	Determine and compare sine and cosine ratios of complementary angles in a right triangle. Solve right triangles (determine all angle measures and all side lengths) using trigonometric ratios and the Pythagorean Theorem.

**Unit 3 New Jersey Student Learning Standards: Interdisciplinary Connections
New Jersey Student Learning Standards-ELA**

RI.CR.9-10.1. Cite a range and thorough textual evidence and make clear and relevant connections, to strongly support an analysis of multiple aspects of what an informational text says explicitly and inferentially, as well as interpretations of the text.

L.VL.9-10.3. Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grades 9-10 reading and content, including technical meanings, choosing flexibly from a range of strategies.

- Use context (e.g., the overall meaning of a sentence, paragraph, or text; a word's position or function in a sentence) as a clue to the meaning of a word or phrase.
- Identify and correctly use patterns of word changes that indicate different meanings or parts of speech (e.g., analyze, analysis, analytical; advocate, advocacy).
- Analyze the cumulative impact of specific word choices on meaning and tone (e.g., how the language of a court opinion differs from that of a newspaper).
- Consult general and specialized reference materials (e.g., dictionaries, glossaries, thesauruses), both print and digital, to find the pronunciation of a word or determine or clarify its precise meaning, its part of speech, or its etymology.
- Verify the preliminary determination of the meaning of a word or phrase (e.g., by checking

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the inferred meaning in context or in a dictionary).

RI.MF.9-10.6. Analyze, integrate, and evaluate multiple interpretations (e.g., charts, graphs, diagrams, videos) of a single text or text/s presented in different formats (visually, quantitatively) as well as in words in order to address a question or solve a problem.

W.WP.9-10.4. Develop and strengthen writing as needed by planning, revising, editing, rewriting, trying a new approach; sustaining effort to complete complex writing tasks; seeking out feedback and reflecting on personal writing progress; consulting a style manual (such as MLA or APA Style), focusing on addressing what is most significant for a specific purpose and audience.

Unit 3 New Jersey Student Learning Standards: Career Readiness, Life Literacies, and Key Skills

Core Ideas	Performance Expectations (Identified with Standard Number and statement)
With a growth mindset, failure is an important part of success.	9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).
Collaboration with individuals with diverse experiences can aid in the problem-solving process, particularly for global issues where diverse solutions are needed.	9.4.12.CT.1: Identify problem-solving strategies used in the development of an innovative product or practice (e.g., 1.1.12acc.C1b, 2.2.12.PF.3). 9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a). 9.4.12.CT.4: Participate in online strategy and planning sessions for course-based, school-based, or other project and determine the strategies that contribute to effective outcomes.
Digital tools differ in features, capacities, and styles. Knowledge of different digital tools is helpful in selecting the best tool for a given task.	9.4.12.TL.1: Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task (e.g., W.11-12.6.).
Collaborative digital tools can be used to access, record and share different viewpoints and to collect and tabulate the views of groups of people.	9.4.12.TL.3: Analyze the effectiveness of the process and quality of collaborative environments. 9.4.12.TL.4: Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem (e.g., 7.1.AL.IPERS.6).

Unit 3 New Jersey Student Learning Standards: Computer Science and Design Thinking

Core Ideas	Performance Expectations (Identified with Standard Number and statement)
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With a growth mindset, failure is an important part of success.	9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).
Collaboration with individuals with diverse experiences can aid in the problem-solving process, particularly for global issues where diverse solutions are needed.	9.4.12.CT.1: Identify problem-solving strategies used in the development of an innovative product or practice (e.g., 1.1.12acc.C1b, 2.2.12.PF.3). 9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a). 9.4.12.CT.4: Participate in online strategy and planning sessions for course-based, school-based, or other project and determine the strategies that contribute to effective outcomes.
Digital tools differ in features, capacities, and styles. Knowledge of different digital tools is helpful in selecting the best tool for a given task.	9.4.12.TL.1: Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task (e.g., W.11-12.6.).
Collaborative digital tools can be used to access, record and share different viewpoints and to collect and tabulate the views of groups of people.	9.4.12.TL.3: Analyze the effectiveness of the process and quality of collaborative environments. 9.4.12.TL.4: Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem (e.g., 7.1.AL.IPERS.6).

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

Core Ideas	Performance Expectations (Identified with Standard Number and Statement)
Individuals select digital tools and design automated processes to collect, transform, generalize, simplify and present large data sets in different ways to influence how other people interpret and understand the underlying information.	8.1.12.DA.1: Create interactive data visualizations using software tools to help others better understand real world phenomena, including climate change.

Unit 3 Knowledge and Skills

Unit 3 Learning Targets / Objectives

Students will be able to...

- Confirm the properties of dilations using a specified center and scale factor.
- Determine if two figures are similar by applying similarity transformations, and explain triangle similarity using these transformations.
- Apply similarity transformations to justify the Angle-Angle (AA) criterion for triangle similarity.
- Construct formal geometric proofs involving lines, angles, triangles, and parallelograms, and explain the reasoning.
- Demonstrate and justify theorems related to triangles.
- Use triangle congruence and similarity criteria to solve problems and prove relationships within geometric figures.

Unit 3 Enduring Understandings

Students will know that...

- Coordinate geometry can be used to verify fundamental geometric theorems.
- Trigonometric ratios are essential tools for solving problems involving right triangles.
- Geometric concepts can be expressed algebraically, as seen in equations of conic sections.
- Theorems about circles help explain and solve problems involving angles, chords, tangents, and arcs.
- Arc length and sector area in a circle can be calculated using proportional reasoning and formulas involving the radius and angle measures.

Unit 3 Essential Questions

- What are the foundational concepts that geometry is built upon?

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- How can congruence be used to analyze and solve geometric problems?
- What characteristics define a segment or an angle?
- Why is it important to understand and perform geometric constructions?
- What key properties define triangles and their relationships?
- What is the minimum set of conditions required to prove triangle congruence?
- What techniques are used to determine triangle congruence?
- What are the special concurrent segments within a triangle, and what do they reveal?
- How can coordinate geometry be applied to explore and justify triangle relationships?
- How are triangle measurements used to solve geometric problems?
- How can quadrilaterals be classified based on their properties?
- In what ways are polygon properties applicable in real-world situations?
- How can coordinate geometry help establish general geometric principles?
- How do you calculate the sum of interior angle measures in a polygon?
- What are the essential properties of geometric transformations and symmetry?
- How can transformations be represented and analyzed in the coordinate plane?
- How can a figure's position be changed without altering its shape or size?
- How can a figure's size be altered without changing its shape?
- How can proportions be used to calculate unknown side lengths in similar polygons?
- What methods are used to prove that two triangles are similar?
- How can corresponding parts of similar triangles be identified and compared?

Unit 3 Instructional Plan

In Chapter 7, students will focus on understanding the properties of quadrilaterals. They will explore the different types of quadrilaterals, such as rectangles, squares, trapezoids, and parallelograms, and

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study their unique properties, including angles, sides, and diagonals. This chapter will provide a solid foundation for understanding more complex shapes and their applications in geometric problems.

Chapter 8 shifts focus to the concept of similarity, examining how polygons and triangles can be similar. Students will learn the criteria for similarity and apply them to solve problems involving proportional relationships, scale factors, and corresponding angles. The chapter will also include real-world applications of similarity, such as in map-making and architectural design.

Students will apply the Pythagorean Theorem in Chapter 9 to solve problems involving right triangles. They will also explore basic trigonometric functions, including sine, cosine, and tangent, to calculate missing side lengths and angles in right triangles. This chapter lays the groundwork for more advanced applications of trigonometry in geometry and other fields. For Honors students, Chapter 9 will extend this knowledge by introducing the Law of Sines and the Law of Cosines, which are used to solve non-right triangles, offering a deeper understanding of trigonometry in more complex geometric contexts.

Throughout these chapters, students will build on their geometric knowledge, moving from basic shapes to more advanced concepts, and gaining valuable problem-solving skills that will apply to real-world situations.

Resources & Text

- Savvas Platform
- enVision Textbook
- Graph Paper
- Calculator
- Geometry Sketchpad
- Manipulatives

Suggested Activities

- IXL
- Khan Academy
- Desmos
- Cool Math
- Nearpod
- Edpuzzle
- Kahoot
- Quizizz
- Blooket
- Kuta Software

Unit 3 Evidence of Student Learning

Formative Assessments:

- Observation
- Homework
- Class Participation
- Whiteboards/communicators
- Think-Pair-Share
- Do-Now
- Notebook Checks
- Writing Prompts
- Exit Tickets
- Classroom Games

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- Self-assessment

Summative Assessments

- Chapter/Unit Test
- Quizzes
- Presentations
- Unit Projects

Benchmark Assessments:

- State Standardized Assessments
- Quarterly Benchmark Assessment

Alternative Assessments

- Portfolio Project
- Modified assignments

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.

Differentiation & Inclusive Support Strategies:

Multilingual Learners:

- Provide guided reading and writing in small groups
- Use visuals, labeled classroom materials, and cognates
- Pre-teach academic vocabulary using sentence and speaking frames
- Integrate WIDA Can Do Descriptors into lesson scaffolding
- Use screen readers, audio tools, and visual glossaries
- Offer extended time and oral/dictated responses
- Integrate culturally relevant texts and technology tools

Students with IEPs or 504 Plans:

- Follow all IEP/504 accommodations and modifications
- Use audio books, large print, or Braille/digital formats

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- Provide peer tutoring, scribes, and augmentative communication tools
- Allow oral responses and extended time
- Offer modified assignments, assessments, and guided notes
- Utilize leveled texts and differentiated materials
- Use flexible seating and small group instruction

Students At Risk of Academic Failure:

- Scaffold instruction using visuals, chants, and songs
- Offer modified tasks and flexible grouping
- Use technology to support organization and engagement
- Provide structured routines and clear expectations
- Assign peer mentors and provide goal-setting checklists
- Include culturally relevant content to boost connection
- Embed mini-lessons and tiered intervention strategies

Gifted and Talented Learners:

- Provide open-ended and inquiry-based tasks
- Incorporate Bloom's Taxonomy (analyzing, evaluating, creating)
- Offer choices in content, process, and product
- Use advanced reading lists and tiered assignments
- Encourage discovery and student-designed projects
- Offer enrichment centers and flexible grouping
- Facilitate problem-solving simulations and debriefing

Diversity and Inclusion:

- Celebrate cultural identity through inclusive texts
- Provide alternative formats for assignments and assessments
- Collaborate with ESL staff and use closed captions when available

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- Offer wait time and avoid idioms or slang
- Create a nurturing classroom with visual routines and structured expectations
- Encourage family engagement and home language maintenance
- Use word walls and accessible academic vocabulary tools

Unit 3 Supplemental Resources

Instructional Materials:

- Big Ideas Platform
- Big Ideas Textbook
- Graph Paper
- Calculator
- Geometry Sketchpad
- Manipulatives

Supplemental Materials:

- IXL
- Khan Academy
- Desmos
- Cool Math
- Nearpod
- Edpuzzle
- Kahoot
- Quizizz
- Blooket
- Kuta Software
- Illustrative Math Website Activities:
 - G.CO.A.1 Defining Parallel Lines
 - G.CO.A.1 Defining Perpendicular Lines
 - G.CO.A.2 Horizontal Stretch of the Plane
 - G.CO.A.3 Seven Circles II
 - G.CO.A.3 Symmetries of rectangles
 - G.CO.A.4 Defining Rotations
 - G.CO.A.5 Showing a triangle congruence
 - G.CO.B.7 Properties of Congruent Triangles
 - G.CO.B.8 Why does SAS work?
 - G.CO.B.8 Why does SSS work?
 - G.CO.B.8 Why does ASA work?
 - G.CO.D.12 Bisecting an angle
 - G.CO.D.12 Angle bisection and midpoints of line segments
 - G.CO.D.13 Inscribing an equilateral triangle in a circle

Intervention Materials:

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- Flexible grouping
- Homework options
- Choices of review activities
- Think-Pair-Share
- Mini workshops to re-teach or extend skills
- Games to practice mastery of information and skill
- Stations/ Learning Centers
- Note taking Organizers
- Alternative assessments

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Unit 4 Overview

Content Area: Geometry Mathematics

Unit 4 Title: Geometric Modeling

Duration: 22 Days

Target Course/Grade Level: 9-12

Introduction/Unit 4

- Explain volume formulas and use them to solve problems.
- Visualize relationships between two dimensional and three-dimensional objects
- Apply geometric concepts in modeling situations

Disciplinary Concepts for Unit 4

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

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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

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community members in a digital society, and to successfully meet the challenges and opportunities in an interconnected global economy.”

Infused within Unit 4 are connections to the NJSLs for Mathematics, Language Arts Literacy, Career Readiness, and Computer Science/Technology.

Disciplinary Concepts for Unit 4
Career Readiness, Life Literacies, and Key Skills-
 Creativity and Innovation
 Critical Thinking
 Technology Literacy
Computer Science and Design Thinking
 Nature of Technology
 Algorithms and Programming

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

Content Standards with Statement	BIM Resource	Suggested Mathematical Practices	Critical Knowledge and Skills Concepts Objectives	
HSG.MG.A.1. Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder.	10.6, 11.5, 11.6, 11.8	MP.1 Make sense of problems and persevere in solving them. MP.2 Reason abstractly and quantitatively. MP.4 Model with mathematics. MP.5 Use appropriate tools strategically. MP.6 Attend to precision. MP.7 Look for and make use of structure.	Real-world objects can be described, approximately, using geometric shapes, their measures, and their properties.	Identify cross-sections of three dimensional objects. Identify three-dimensional objects generated by rotation of two-dimensional objects. Solve problems using volume formulas for cylinders, pyramids, cones, and spheres. Model real-world objects with geometric shapes. Describe the measures and properties of geometric shapes that best represent a real-world object.

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<p>HS G.GMD.A.3. Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.</p>	<p>10.3, 11.5</p>	<p>MP.1 Make sense of problems and persevere in solving them.</p> <p>MP.2 Reason abstractly and quantitatively.</p> <p>MP.4 Model with mathematics.</p> <p>MP.5 Use appropriate tools strategically.</p> <p>MP.6 Attend to precision.</p> <p>MP.7 Look for and make use of structure.</p>		
<p>G.GMD.B.4. Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects.</p>	<p>11.4</p>	<p>MP.1 Make sense of problems and persevere in solving them.</p> <p>MP.2 Reason abstractly and quantitatively.</p> <p>MP.4 Model with mathematics.</p> <p>MP.5 Use appropriate tools strategically.</p> <p>MP.6 Attend to precision.</p>		

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<p>G.MG.A.2. Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).</p>	<p>11.2, 11.54</p>	<p>MP.1 Make sense of problems and persevere in solving them.</p> <p>MP.2 Reason abstractly and quantitatively.</p> <p>MP.4 Model with mathematics.</p> <p>MP.5 Use appropriate tools strategically.</p> <p>MP.6 Attend to precision.</p>		<p>Model real-world situations, applying density concepts based on area.</p> <p>Model real-world situations, applying density concepts based on volume.</p>
<p>G.MG.A.3. Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios)</p>	<p>11.5</p>	<p>MP.1 Make sense of problems and persevere in solving them.</p> <p>MP.2 Reason abstractly and quantitatively.</p> <p>MP.4 Model with mathematics.</p> <p>MP.5 Use appropriate tools strategically.</p> <p>MP.6 Attend to precision</p>		<p>Design objects or structures satisfying physical constraints</p> <p>Design objects or structures to minimize cost.</p> <p>Solve design problems.</p>
<p>G.GMD.A.1. Give an informal argument for the formulas for the circumference of a</p>	<p>11.1, 11.2, 11.5-.7</p>	<p>MP.3 Construct viable arguments and critique the</p>		<p>Construct viable dissection arguments</p>

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<p>circle, area of a circle, volume of a cylinder, pyramid, and cone. Use dissection arguments, Cavalieri's principle, and informal limit arguments.</p>		<p>reasoning of others.</p> <p>MP.6 Attend to precision.</p> <p>MP.7 Look for and make use of structure.</p>		<p>and informal limit arguments.</p> <p>Apply Cavalieri's principle.</p> <p>Construct an informal argument for the formula for the circumference of a circle.</p> <p>Construct an informal argument for the formula for the area of a circle.</p> <p>Construct an informal argument for the formula for the volume of a cylinder, pyramid, and cone.</p>
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**Unit 4 New Jersey Student Learning Standards: Interdisciplinary Connections
New Jersey Student Learning Standards-ELA**

RI.CR.9-10.1. Cite a range and thorough textual evidence and make clear and relevant connections, to strongly support an analysis of multiple aspects of what an informational text says explicitly and inferentially, as well as interpretations of the text.

L.VL.9-10.3. Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grades 9-10 reading and content, including technical meanings, choosing flexibly from a range of strategies.

- Use context (e.g., the overall meaning of a sentence, paragraph, or text; a word's position or function in a sentence) as a clue to the meaning of a word or phrase.
- Identify and correctly use patterns of word changes that indicate different meanings or parts of speech (e.g., analyze, analysis, analytical; advocate, advocacy).
- Analyze the cumulative impact of specific word choices on meaning and tone (e.g., how the

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language of a court opinion differs from that of a newspaper).

- Consult general and specialized reference materials (e.g., dictionaries, glossaries, thesauruses), both print and digital, to find the pronunciation of a word or determine or clarify its precise meaning, its part of speech, or its etymology.
- Verify the preliminary determination of the meaning of a word or phrase (e.g., by checking the inferred meaning in context or in a dictionary).

RI.MF.9-10.6. Analyze, integrate, and evaluate multiple interpretations (e.g., charts, graphs, diagrams, videos) of a single text or text/s presented in different formats (visually, quantitatively) as well as in words in order to address a question or solve a problem.

W.WP.9-10.4. Develop and strengthen writing as needed by planning, revising, editing, rewriting, trying a new approach; sustaining effort to complete complex writing tasks; seeking out feedback and reflecting on personal writing progress; consulting a style manual (such as MLA or APA Style), focusing on addressing what is most significant for a specific purpose and audience.

Unit 4 New Jersey Student Learning Standards: [Career Readiness, Life Literacies, and Key Skills](#)

Core Ideas	Performance Expectations (Identified with Standard Number and statement)
With a growth mindset, failure is an important part of success.	9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).
Collaboration with individuals with diverse experiences can aid in the problem-solving process, particularly for global issues where diverse solutions are needed.	9.4.12.CT.1: Identify problem-solving strategies used in the development of an innovative product or practice (e.g., 1.1.12acc.C1b, 2.2.12.PF.3). 9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a). 9.4.12.CT.4: Participate in online strategy and planning sessions for course-based, school-based, or other project and determine the strategies that contribute to effective outcomes.
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Unit 4 New Jersey Student Learning Standards: [Computer Science and Design Thinking](#)

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New Jersey Student Learning Standards: Climate Change Mandate	
Core Ideas	Performance Expectations (Identified with Standard Number and Statement)
Individuals select digital tools and design automated processes to collect, transform, generalize, simplify and present large data sets in different ways to influence how other people interpret and understand the underlying information.	8.1.12.DA.1: Create interactive data visualizations using software tools to help others better understand real world phenomena, including climate change.

Knowledge and Skills

Unit 4 Learning Targets / Objectives

Students will be able to...

- Validate the properties of dilations using a specific center and scale factor.
 - Determine whether two figures are similar by applying similarity transformations, and explain triangle similarity based on those transformations.
 - Use similarity transformations to justify the Angle-Angle (AA) criterion for triangle similarity.
 - Construct and interpret formal geometric proofs involving lines, angles, triangles, and parallelograms.
 - Demonstrate understanding of triangle theorems through logical proofs.
 - Apply triangle congruence and similarity criteria to solve problems and prove geometric relationships.
-

Unit 4 Enduring Understandings

Students will understand that...

- Coordinate geometry can be used to verify fundamental geometric properties and theorems.
 - Trigonometric ratios are essential for solving real-world problems involving right triangles.
 - Geometric concepts can be translated into algebraic equations, such as those representing conic sections.
 - Circle theorems help explain relationships involving arcs, angles, and chords.
 - Arc length and sector area can be calculated using proportional reasoning and circle geometry.
-

Unit 4 Essential Questions

- What fundamental concepts serve as the building blocks of geometry?
- How does understanding congruence aid in problem solving and reasoning in geometry?

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- How can you describe and analyze the characteristics of a segment or angle?
- Why is mastering geometric construction valuable?
- What key properties define triangles and their internal relationships?
- What are the minimum requirements to prove that two triangles are congruent?
- Which methods are used to verify triangle congruence?
- What are the special segments in a triangle that intersect at a single point, and why are they important?
- How can coordinate geometry be applied to explore triangle properties and relationships?
- What strategies are used to solve problems involving triangle measurements?
- How can quadrilaterals be organized and classified based on their properties?
- How can the properties of polygons be applied in real-world contexts?
- How can coordinate geometry be used to demonstrate general geometric principles?
- What formula or reasoning helps determine the sum of interior angles of a polygon?
- What are the fundamental properties of geometric transformations and symmetry?
- How can transformations be visualized and described in a coordinate plane?
- How can a figure be repositioned without altering its size or shape?
- How can a figure be resized while maintaining its shape?
- How can proportions be applied to determine side lengths in similar polygons?
- What steps are taken to prove that two triangles are similar?
- How can corresponding parts of similar triangles be identified and compared?

Unit 4 Instructional Plan

In Chapter 10, students will explore the properties and applications of circles. They will learn about key elements of circles, such as radii, diameters, chords, tangents, and arcs. Students will study the relationships between these elements and how they can be used to solve problems related to circumference, area, and angles in circles.

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Chapter 11 shifts focus to geometric solids, where students will examine three-dimensional shapes such as spheres, cones, cylinders, prisms, and pyramids. They will learn to calculate surface area and volume, understanding how these formulas apply to real-world structures and objects.

Students will be introduced in Chapter 12 to the concepts of probability and simple events. They will explore how to calculate the likelihood of certain outcomes occurring, using both theoretical and experimental probability. This chapter will also provide an introduction to more complex probability concepts, setting the stage for further study in statistics and data analysis.

These chapters will help students deepen their understanding of geometry by connecting theoretical knowledge to practical applications, preparing them for advanced mathematical concepts and real-world problem-solving.

Resources & Text	Suggested Activities
<ul style="list-style-type: none">➤ Big Ideas Platform➤ Big Ideas Textbook➤ Graph Paper➤ Calculator➤ Geometry Sketchpad➤ Manipulatives	<ul style="list-style-type: none">➤ IXL➤ Khan Academy➤ Desmos➤ Cool Math➤ Nearpod➤ Edpuzzle➤ Kahoot➤ Quizizz➤ Blooket➤ Kuta Software

Unit 4 Evidence of Student Learning

Formative Assessments:

- Observation
- Homework
- Class Participation
- Whiteboards/communicators
- Think-Pair-Share
- Do-Now
- Notebook Checks
- Writing Prompts
- Exit Tickets
- Classroom Games
- Self-assessment

Summative Assessments

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- Chapter/Unit Test
- Quizzes
- Presentations
- Unit Projects

Benchmark Assessments:

- State Standardized Assessments
- Quarterly Benchmark Assessment

Alternative Assessments

- Portfolio Project
- Modified assignments

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.

Differentiation & Inclusive Support Strategies:

Multilingual Learners:

- Provide guided reading and writing in small groups
- Use visuals, labeled classroom materials, and cognates
- Pre-teach academic vocabulary using sentence and speaking frames
- Integrate WIDA Can Do Descriptors into lesson scaffolding
- Use screen readers, audio tools, and visual glossaries
- Offer extended time and oral/dictated responses
- Integrate culturally relevant texts and technology tools

Students with IEPs or 504 Plans:

- Follow all IEP/504 accommodations and modifications
- Use audio books, large print, or Braille/digital formats
- Provide peer tutoring, scribes, and augmentative communication tools
- Allow oral responses and extended time

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- Offer modified assignments, assessments, and guided notes
- Utilize leveled texts and differentiated materials
- Use flexible seating and small group instruction

Students At Risk of Academic Failure:

- Scaffold instruction using visuals, chants, and songs
- Offer modified tasks and flexible grouping
- Use technology to support organization and engagement
- Provide structured routines and clear expectations
- Assign peer mentors and provide goal-setting checklists
- Include culturally relevant content to boost connection
- Embed mini-lessons and tiered intervention strategies

Gifted and Talented Learners:

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- Incorporate Bloom's Taxonomy (analyzing, evaluating, creating)
- Offer choices in content, process, and product
- Use advanced reading lists and tiered assignments
- Encourage discovery and student-designed projects
- Offer enrichment centers and flexible grouping
- Facilitate problem-solving simulations and debriefing

Diversity and Inclusion:

- Celebrate cultural identity through inclusive texts
- Provide alternative formats for assignments and assessments
- Collaborate with ESL staff and use closed captions when available
- Offer wait time and avoid idioms or slang
- Create a nurturing classroom with visual routines and structured expectations

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- Encourage family engagement and home language maintenance
- Use word walls and accessible academic vocabulary tools

Unit 4 Supplemental Resources

Instructional Materials:

- Savvas Platform
- enVision Textbook
- Graph Paper
- Calculator
- Geometry Sketchpad
- Manipulatives

Supplemental Materials:

- IXL
- Khan Academy
- Desmos
- Cool Math
- Nearpod
- Edpuzzle
- Kahoot
- Quizizz
- Blooket
- Kuta Software
- Illustrative Math Website Activities:
 - G.CO.A.1 Defining Parallel Lines
 - G.CO.A.1 Defining Perpendicular Lines
 - G.CO.A.2 Horizontal Stretch of the Plane
 - G.CO.A.3 Seven Circles II
 - G.CO.A.3 Symmetries of rectangles
 - G.CO.A.4 Defining Rotations
 - G.CO.A.5 Showing a triangle congruence
 - G.CO.B.7 Properties of Congruent Triangles
 - G.CO.B.8 Why does SAS work?
 - G.CO.B.8 Why does SSS work?
 - G.CO.B.8 Why does ASA work?
 - G.CO.D.12 Bisecting an angle
 - G.CO.D.12 Angle bisection and midpoints of line segments
 - G.CO.D.13 Inscribing an equilateral triangle in a circle

Intervention Materials:

- Flexible grouping
- Homework options
- Choices of review activities
- Think-Pair-Share
- Mini workshops to re-teach or extend skills
- Games to practice mastery of information and skill

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- Stations/ Learning Centers
- Note taking Organizers
- Alternative assessments