KINGSWAY REGIONAL SCHOOL DISTRICT

Committed to Excellence

Course Name: Honors Geometry	**Grade Level(s): 9th and 10th**
Department: Mathematics	**Credits: 1.0**
BOE Adoption Date: October 2017	**Revision Date(s): September 2022**

ABSTRACT

The fundamental purpose of the course in Geometry is to formalize and extend students' geometric experiences from the middle grades. Students explore more complex geometric situations and deepen their explanations of geometric relationships, moving towards formal mathematical arguments. Important differences exist between this Geometry course and the historical approach taken in Geometry classes. For example, transformations are emphasized early in this course. Close attention should be paid to the introductory content for the Geometry conceptual category found in the high school NJSLS. The Mathematical Practice Standards apply throughout each course and, together with the content standards, prescribe that students experience mathematics as a coherent, useful, and logical subject that makes use of their ability to make sense of problem situations. There are six critical areas in which to focus on for Geometry:

Critical Area 1: In previous grades, students were asked to draw triangles based on given measurements. They also have prior experience with rigid motions: translations, reflections, and rotations and have used these to develop notions about what it means for two objects to be congruent. In this unit, students establish triangle congruence criteria, based on analyses of rigid motions and formal constructions. They use triangle congruence as a familiar foundation for the development of formal proof. Students prove theorems—using a variety of formats—and solve problems about triangles, quadrilaterals, and other polygons. They apply reasoning to complete geometric constructions and explain why they work.

Critical Area 2: Students apply their earlier experience with dilations and proportional reasoning to build a formal understanding of similarity. They identify criteria for similarity of triangles, use similarity to solve problems, and apply similarity in right triangles to understand right triangle

trigonometry, with particular attention to special right triangles and the Pythagorean Theorem. Students develop the Laws of Sines and Cosines in order to find missing measures of general (not necessarily right) triangles, building on students' work with quadratic equations done in the first course. They are able to distinguish whether three given measures (angles or sides) define 0, 1, 2, or infinitely many triangles.

Critical Area 3: Students' experience with two-dimensional and three-dimensional objects is extended to include informal explanations of circumference, area and volume formulas. Additionally, students apply their knowledge of two-dimensional shapes to consider the shapes of cross-sections and the result of rotating a two-dimensional object about a line.

Critical Area 4: Building on their work with the Pythagorean theorem in 8th grade to find distances, students use a rectangular coordinate system to verify geometric relationships, including properties of special triangles and quadrilaterals and slopes of parallel and perpendicular lines, which relates back to work done in the first course. Students continue their study of quadratics by connecting the geometric and algebraic definitions of the parabola.

Critical Area 5: In this unit students prove basic theorems about circles, such as a tangent line is perpendicular to a radius, inscribed angle theorem, and theorems about chords, secants, and tangents dealing with segment lengths and angle measures. They study relationships among segments on chords, secants, and tangents as an application of similarity. In the Cartesian coordinate system, students use the distance formula to write the equation of a circle when given the radius and the coordinates of its center. Given an equation of a circle, they draw the graph in the coordinate plane, and apply techniques for solving quadratic equations, which relates back to work done in the first course, to determine intersections between lines and circles or parabolas and between two circles.

Additionally, the Honors level Geometry course will require the students to respond to higher-level questions that apply their conceptual understandings to real-world scenarios. This will enable them to become critical and analytical thinkers. The students will apply a greater depth of knowledge and growing sophistication in their analysis of increasingly challenging problems. The students will also move at an accelerated pace while working with additional mathematical concepts that reach beyond the Geometry level. The Honors level course will explore different types of formative, summative, and performance assessments.

Proficiencies and Pacing:
Course Title: Honors Geometry
Prerequisite(s): Honors Algebra I

Unit Title:	Duration/ Month(s)	Related Standards:	Learning Goals:	Topics and Skills:
Unit 1: Basics of Geometry	14 days September	**Subject Area**: NJSLS.G-CO.A.1 NJSLS.G-CO.D12 NJSLS.G-MG.A.1 MP1 MP2 MP3 MP4 MP5 MP6 MP7 **Interdisciplinary:** ELA: NJSL.SA.L.4 **Technology:** NJSL8.2.12.A.3 **Career Practices:** CRP2 **Career Awareness:** NJSLS.9.3.ST.6	1. Students will understand the basics of geometry. Students will be able to name points, lines, and planes; measure segments and angles; use formulas in the coordinate plane and construct segments and angles.	1. Name points, lines, and planes. 2. Name segments and rays. 3. Sketch intersections of lines and planes. 4. Solve real-life problems involving lines and planes. 5. Use the Ruler Postulate. 6. Copy segments and compare segments for congruence. 7. Use the Segment Addition Postulate. 8. Find segment lengths using midpoints and segment bisectors. 9. Use the Midpoint Formula. 10. Use the Distance Formula. 11. Classify polygons. 12. Find perimeters and areas of polygons in the coordinate plane. 13. Name angles. 14. Measure and classify angles. 15. Identify congruent angles. 16. Use the Angle Addition Postulate to find angle measures. 17. Bisect angles. 18. Identify complementary and supplementary angles. 19. Identify linear pairs and vertical angles
Unit 2: Reasoning and Proofs	11 days	**Subject Area**:	1. Students will understand the concept	1. Apply properties from Algebra and

Unit Title:	Duration/ Month(s)	Related Standards:	Learning Goals:	Topics and Skills:
	October	NJSLS.G-CO.C.9 NJSLS.G-CO.A.1 MP1 MP2 MP3 MP6 MP7 MP8 **Interdisciplinary:** ELA: NJSL.SA.W.1 **Technology:** NJSL8.2.12.A.3 **Career Practices:** CRP4 **Career Awareness:** NJSLS.9.3.ST.ET.5	of deductive reasoning. Students will investigate relationships between angles and define perpendicular lines. Students will also be able to prove that vertical angles are congruent.	congruence in proof. 2. Apply the midpoint theorem and angle bisector theorem. 3. State and apply the definition and theorems about complementary and supplementary angles. 4. State and apply the definition and theorems about perpendicular lines. 5. Write proofs in two-column, flow chart and paragraph form. 6. State, apply and prove the vertical angle theorem.
Unit 3: Parallel Lines	14 days November	**Subject Area**: NJSLS.G-CO.A.1 NJSLS.G-CO.C.9 NJSLS.G-GPE.B.5 NJSLS.G-CO.C.10 MP1 MP2 MP3 MP7	1. Students will understand the precise definition of parallel lines and investigate relationships between these lines and the angles that they form. Students will be able to prove alternate interior angles and corresponding angles are congruent. Students will also be able to prove the sum of the angles of a triangle sum to 180°.	1. Define parallel lines. 2. Identify the angles formed when two lines are cut by a transversal. 3. State and apply the postulates and theorems about parallel lines. 4. State and apply theorems about a parallel and a perpendicular to a given line through a given point. 5. State and apply the theorem and the corollaries about the sum of the measures of the angles of a triangle.

Unit Title:	Duration/ Month(s)	Related Standards:	Learning Goals:	Topics and Skills:
		Interdisciplinary: ELA: NJSL.SA.W.1 **Technology:** NJSL8.2.12.A.3 **Career Practices:** CRP4 **Career Awareness:** NJSLS.9.3.ST.ET.5		6. State and apply the theorem about the measure of an exterior angle of a triangle. 7. Recognize and name convex and regular polygons. 8. Compute measures of interior and exterior angles of convex polygons.
Unit 4: Transformations	13 days December	**Subject Area:** NJSLS.G-SRT.A.1 NJSLS.G-CO.A.2 NJSLS.G-CO.A.3 NJSLS.G-CO.A.4 NJSLS.G-CO.A.5 NJSLS.G.CO.B.6 MP1 MP5 MP6 MP7 **Interdisciplinary:** ELA: NJSL.SA.R.10 **Technology:** NJSL8.2.12.A.3 **Career Practices:**	1. Students will understand the definitions and properties of reflections, translations, rotations and dilations. Students will be able to draw the image figure, given a transformation rule. Students will also be able to write the transformation rule when given two figures.	1. Define rigid motions. 2. Define the four transformations: reflection, translation, rotation and dilation. 3. Use the properties of transformations to locate images of figures. 4. Students will be able to recognize and draw lines of symmetry and rotational symmetries. 5. Write transformation rules for figures. 6. Formulate notation for composition of transformations. 7. Specify a sequence of transformations that will carry a given figure onto itself.

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Unit Title:	Duration/ Month(s)	Related Standards:	Learning Goals:	Topics and Skills:
		CRP4 **Career Awareness:** NJSLS.9.3.ST.ET.5		
Unit 5 Congruent Triangles	13 days January February	**Subject Area**: NJSLS.G-CO.B.6 NJSLS.G-CO.B.7 NJSLS.G-CO.B.8 NJSLS.G-CO.C.9 NJSLS.G-CO.C.10 MP1 MP3 MP6 MP8 **Interdisciplinary:** ELA: NJSL.SA.W.1 ELA: NJSL.SA.W.2 **Technology:** NJSL8.2.12.A.3 **Career Practices:** CRP2 CRP4 CRP8 **Career Awareness:** NJSLS.9.3.ST.ET.5	1. Students will understand the definition of congruence in terms of rigid motions. Students will be able to prove triangles are congruent and explain using the criteria for triangle congruence (ASA, SAS, and SSS). Students will also be able to prove the Isosceles Triangle Theorem and the Perpendicular Bisector Theorem.	1. Use rigid transformations to show triangles are congruent. 2. Recognize and identify the corresponding parts of congruent figures. 3. Prove two triangles are congruent by applying the SSS Postulate, the SAS Postulate, the ASA Postulate, AAS Theorem and the HL Theorem. 4. Apply congruent triangles to prove corresponding segments and angles are congruent. 5. Apply definitions of the median and the altitude of a triangle and the perpendicular bisector of a segment. 6. Recognize and apply the properties of the points of concurrency in triangles. 7. State, apply and prove the Isosceles Triangle Theorem and the Perpendicular Bisector Theorem.
Unit 6: Quadrilaterals and	14 days	**Subject Area:**	1. Students will understand the	1. Apply the definition and properties

Unit Title:	Duration/ Month(s)	Related Standards:	Learning Goals:	Topics and Skills:
Other Polygons	March	NJSLS.G-CO.C.11 NJSLS.G-CO.D.12 NJSLS.G-CO.D13 NJSLS.G.GPE.B.4 MP1 MP2 MP3 MP6 **Interdisciplinary:** ELA: NJSL.SA.L5 **Technology:** NJSL8.2.12.A.3 **Career Practices:** CRP2 CRP4 CRP8 **Career Awareness:** NJSLS.9.3.ST.ET.**5**	properties of each type of quadrilateral and also be able to prove theorems involving parallelograms (10 Days) 2. Students will be able to make formal geometric constructions. *Copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line*. (4 Days)	of parallelograms. 2. Prove certain quadrilaterals are parallelograms. 3. Apply theorems about parallel lines and the segment that joins the midpoints of the triangle. 4. Apply the definitions and identify the special properties of rectangles, rhombus and squares. 5. Determine if a parallelogram is a rectangle, rhombus, square or trapezoid. 6. Use compass and straight edge to construct quadrilaterals.
Unit 7: Similar Polygons	9 days March/April	**Subject Area**: NJSLS.G-SRT.A.2 NJSLS.G-SRT.A.3 NJSLS.G-SRT.B.4 NJSLS.G-SRT.B.5 NJSLS.G-C.A.1 NJSLS.G-CO.C.10 MP1	1. Students will understand the definition of similarity in terms of similarity transformations. Students will be able to prove triangles are similar and explain using the criteria for triangle similarity (AA ~, SAS ~, SSS ~). Students will be able to prove the Triangle Proportionality Theorem and	1. Show polygons are similar by using similarity transformations. 2. Express a given proportion in an equivalent form. 3. State and apply the properties of similar triangles and polygons. 4. Apply the AA Similarity Postulate, the Side-Angle-Side Similarity

Unit Title:	Duration/ Month(s)	Related Standards:	Learning Goals:	Topics and Skills:
		MP2 MP3 MP6 MP7 **Interdisciplinary:** ELA: NJSL.SA.W1 **Technology:** NJSL8.2.12.A.3 **Career Practices:** CRP2 CRP4 CRP8 **Career Awareness:** NJSLS.9.3.ST.ET.5	the Midsegment Theorem.	Theorem and the Side-Side-Side Similarity Theorem to prove triangles are similar. 5. Apply similar triangles to solve problems involving lengths, distances and angle measures. 6. State, apply and prove the Triangle Proportionality Theorem. 7. Prove the Midsegment Theorem.
Unit 8: Right Triangles	10 days April/May	**Subject Area**: NJSLS.G-SRT.B.4 NJSLS.G-SRT.B.5 NJSLS.G-SRT.C.6 NJSLS.G-SRT.C.7 NJSLS.G-SRT.C.8 MP1 MP2 MP4 MP6 MP7	1. Students will understand and be able to prove the Pythagorean Theorem using triangle similarity. Based on this similarity, students will be able to define and use special triangle relationships and the trigonometric ratios for acute angles.	1. Review radicals. 2. Determine the geometric between two numbers. 3. State and apply the relationships that exist when the altitude is drawn to the hypotenuse of a right triangle. 4. State, apply and prove the Pythagorean Theorem. 5. Apply properties of special right triangles. 6. Define the tangent, sine and cosine ratios for an acute angle. 7. Apply tangent, sine and cosine

Unit Title:	Duration/ Month(s)	Related Standards:	Learning Goals:	Topics and Skills:
		MP8 **Interdisciplinary:** ELA: NJSL.SA.R10 **Technology:** NJSL8.1.12.C.1 NJSL8.2.12.A.3 **Career Practices:** CRP2 CRP8 **Career Awareness:** NJSLS.9.3.ST.ET.5		rations to solve right triangles.
Unit 9: Circles	11 days May	**Subject Area**: NJSLS.G-C.A.1 NJSLS.G-C.A.2 NJSLS.G-C.A.3 NJSLS.G-C.A.4 NJSLS.G-CO.D13 MP1 MP6 **Interdisciplinary:** ELA: NJSL.SA.L6 Technology: NJSL8.2.12.A.3 Career Practices:	1. Students will understand the relationships among radii, chords, inscribed angles, arcs, central angles and circumscribed angles of the circle. Students will be able to prove that all circles are similar.	1. Prove all circles are similar. 2. Define a circle, a sphere and terms related to them. 3. Recognize circumscribed and inscribed polygons and circles. 4. Apply theorems that relate to tangents and radii. 5. Define and apply properties of arcs and central angles. 6. Apply theorems about the chords of a circle. 7. Solve problems and prove statements involving inscribed angles, angles formed by chords, secants and tangents and involving lengths of chords, secant segments and tangent segments.

Unit Title:	Duration/ Month(s)	Related Standards:	Learning Goals:	Topics and Skills:
		CRP2 CRP8 Career Awareness: NJSLS.9.3.ST.ET.5		8. Construct the inscribed and circumscribed circles of a triangle and prove properties of angles for a quadrilateral inscribed in a circle. 9. Construct a tangent line from a point outside a given circle to the circle.
Unit 10: Surface Area and Volume	10 days June	**Subject Area:** NJSLS.G-GMD.A.1 NJSLS.G-GMD.A.2 NJSLS.G-GMD.A.3 NJSLS.G-GMD.B.4 NJSLS.G-MG.A.2 NJSLS.G-MG.A.3 MP1 MP4 MP6 MP7 **Interdisciplinary:** ELA: NJSL.SA.R10 Financial Literacy: NJSLS.9.1.12.A.8 Technology: NJSL8.1.12.C.1 NJSL8.2.12.A.3 Career Practices: CRP2 CRP8	1. Students will understand how to use area and volume formulas for cylinders, pyramids, cones, and spheres to solve problems. Students will be able to apply concepts of density based on area and volume in real life situations.	1. Recognize and use area formulas for solids such as prisms, cones, pyramids, and spheres and apply these concepts to volume. 2. Identify cross sections of solids. 3. Develop an informal argument for Cavalieri's principle. 4. Describe the ratio of mass to area or volume of real life objects. 5. Calculate volume of solid objects in real world problems.

Unit Title:	Duration/ Month(s)	Related Standards:	Learning Goals:	Topics and Skills:
		Career Awareness: NJSLS.9.3.ST.ET.5		

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Unit 1: Basics of Geometry	Recommended Duration: 14 *days*
Unit Description: Students learn about points, lines, planes, and the building blocks of geometry. Students will use postulates and theorems relating to points, lines, and planes. Students use symbols for lines, segments, rays, and distances. Students will find lengths of segments and angle measures. Students will calculate the perimeters, circumference, and area of geometric figures.	

Essential Questions:	Enduring Understandings:
• What are the building blocks of Geometry? • How can you describe the attributes of a segment? • Have you ever noticed that a four-legged chair sometimes wobbles, but a three-legged stool never wobbles? • How do points, lines, and planes exist in nature? • What formulas could be used to find the midpoint	• Geometry is a mathematical system built on accepted facts, basic terms, and definitions. • Number operations can be used to find and compare the length of segments. • The Ruler and Segment Addition Postulates can be used in reasoning about lengths. • Formulas can be used to find the midpoint and length of any segment in the coordinate plane. • The Protractor and Angle Addition Postulates can be used in reasoning about angle measure. • Perimeter and area are different ways of measuring the size of geometric figures.

Relevant Standards:	Learning Goals:	Learning Objectives:
Content Standards: **Primary(Power):** **Secondary(Supportive):** **NJSLS.G-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.	Students will understand the basics of geometry. Students will be able to name points, lines, and planes; measure segments and angles; use formulas in the coordinate plane and construct segments and angles. (14 days)	• Name points, lines, and planes. • Name segments and rays. • Sketch intersections of lines and planes. • Solve real-life problems involving lines and planes. • Use the Ruler Postulate. • Copy segments and compare segments for congruence. • Use the Segment Addition Postulate.

Relevant Standards:	Learning Goals:	Learning Objectives:
NJSLS.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.). **NJSLS.G-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). **Mathematical Practice (Supportive):** **MP1** Make sense of problems and persevere in solving them. **MP2** Reason abstractly and quantitatively. **MP3** Construct viable arguments and critique the reasoning of others. **MP4** Model with mathematics. **MP5** Use appropriate tools strategically. **MP6** Attend to precision. **MP7** Look for and make use of structure.		• Find segment lengths using midpoints and segment bisectors. • Use the Midpoint Formula. • Use the Distance Formula. • Classify polygons. • Find perimeters and areas of polygons in the coordinate plane. • Name angles. • Measure and classify angles. • Identify congruent angles. • Use the Angle Addition Postulate to find angle measures. • Bisect angles. • Identify complementary and supplementary angles. • Identify linear pairs and vertical angles

Formative Assessments	Summative Assessments:	Performance Assessments:	Major Activities/ Assignments (required):
Teacher Observation, Class Participation, Warm ups, Homework, Exit Slips, Learning Goals and Scales, I-clicker responses, Group work	Unit Tests, Quizzes, Graded Homework, open-ended questions, MAP testing,	Scavenger Hunt Constructing geometric representations based on application of definitions.	Pre-Assessment Station Activities Scavenger Hunt G.CO.A.1 Defining Parallel Lines G.CO.A.1 Defining Perpendicular Lines G.GPE.B.7 Triangle Perimeters

Possible Assessment Modifications /Accommodations:			
Special Education	Struggling Learners	ELL	Advanced Learners
• Provide reference sheet with definitions of key geometric terms. • Provide formulas for distance and midpoint. • Simplified test wording – use scaffolding in direction when a term is needed to answer a following question • Preview test procedures	• Provide reference sheet with definitions of key geometric terms. • Provide formulas for distance and midpoint. • Simplified test wording – use scaffolding in direction when a term is needed to answer a following question. • Provide study guide with answer key prior to test • Highlight/Bold key directions	• Provide reference sheet with definitions of key geometric terms with pictures and if available a native language translation to pair with the English terms. • Provide formulas for distance and midpoint • Clarify test directions verbally • Read test questions aloud	• Provide real world application problems relating to distance in the coordinate plane. • Provide extension questions such as the derivation of an equation from a situation. • Provide opportunities for and PSAT practice questions

Instructional Strategies
Providing clear learning goals, celebrating student success, establish classroom routines, identifying critical information, preview new content, chunk content into "digestible bites", reflect on learning, organize students to practice and deepen knowledge, using homework, examine errors in reasoning, practice skills and strategies, revising knowledge, provide resource and guidance

Possible Instructional Modifications /Accommodations/Differentiation:			
Special Education	Struggling Learners	ELL	Advanced Learners
• Graphic organizer of geometric terms and key formulas for	• Graphic organizer of geometric terms and key formulas for	• Graphic organizer of geometric terms and key formulas for	• Real life application project involving distance in coordinate

Possible Instructional Modifications /Accommodations/Differentiation:			
Special Education	**Struggling Learners**	**ELL**	**Advanced Learners**
distance and midpoint. • Preferential seating on a need basis • Limit number of homework questions • Flexible grouping (Heterogeneously to pair a special ed student with a general ed student. Homogenously to encourage collaboration and extensive motivation and remediation to special ed students.) • Visual charts and representations of concepts	distance and midpoint. • Preferential seating on a need basis • Limit number of homework questions • Small group instruction • One-on-one instruction • Flexible grouping (Heterogeneously to pair a struggling learner with a motivated. Homogenously to encourage collaboration and extensive motivation and remediation to struggling learners.) • Positive reinforcement of desired behaviors • Visual charts and representations of concepts	distance and midpoint with a visual representation and native language description as well. • Clarify directions verbally • Simplify directions • Visual charts and representations of concepts • Preferential seating close to another native language speaker so that there can be collaboration and clarification in native language. • Limit number of homework questions • Small group instruction • One-on-one instruction • Flexible grouping (Heterogeneously to immerse ELL student in English/Math vocabulary with students. Homogenously to encourage collaboration and clarification with other ELL students with the aid of technology for the teacher)	plane • Tiered Assignments • Learning stations • Tiered homework assignments

Unit Vocabulary:
Essential: Point, line, plane, undefined terms, collinear, noncollinear, coplanar, noncoplanar, intersection, segment, segment bisector, ray, opposite rays, length, distance, distance formula, midpoint, midpoint formula, directed segment, partitioned segment, circle, circumference, perimeter, area, angle, adjacent angles, bisector of an angle, postulates, theorems **Non-Essential:** N/A

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Interdisciplinary Connections (Applicable Standards):	Integration of Technology:	21st Century Themes:	21st Century Skills:
Interdisciplinary: ELA: NJSL.SA.L.4 - Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, purpose, and audience **Technology:** NJSL8.2.12.A.3 - Research and present information on an existing technological product that has been repurposed for a different function. **Career Practices:** CRP2 - Apply appropriate academic and technical skills. **Career Awareness:** **NJSLS.9.3.ST.6** - Demonstrate technical skills needed in STEM field.	S – Google classroom: students will use google classroom to obtain homework assignments. A – Quizlet: students will use quizlet to explore vocabulary M – Using Google Maps students can use a geometry to explore a route and find the distance from one definition to another. R – Students could use technology to survey the community using specific constraints and then redesign to solve an existing problem	_x___ Global Awareness – cartography and navigation using geometry _x___ Civic Literacy – survey a community geographical using geometry ____ Financial, Economic, Business, & Entrepreneurial Literacy ____ Health Literacy	____ Creativity & Innovation ____ Media Literacy _X_ Critical Thinking and Problem Solving – persevering through problems and applying geometry to real world applications. (Geography) _X_ Life and Career Skills – traffic technicians use lines to model a network of city streets. _x___ Information & Communication Technologies Literacy – Google Classroom, Quizlet, Google Maps, and Google Docs _X_ Communication & Collaboration – Google Docs in cartography, Google Sketch up

Interdisciplinary Connections (Applicable Standards):	Integration of Technology:	21st Century Themes:	21st Century Skills:
			_____ Information Literacy

Resources:
Texts/Materials:
Curricular framework, TI 30 Calculators, rewordify.com, newsela.com, Big Ideas Math: Geometry copyright 2019

Unit 2: Reasoning and Proofs	Recommended Duration: *11 days*

Unit Description: In this unit, students are introduced to the process of deductive reasoning. Students will solve equations giving their reasons for each step and connect this to simple proofs. Students will explore angle relationships, such as complementary, supplementary, adjacent, and vertical angles. Students will apply the definition and theorems about perpendicular lines. Students will prove the vertical angle theorem.

Essential Questions:	Enduring Understandings:
- How can you prove a statement is true? - How is mathematical evidence similar to evidence in law? - How are pairs of angles related? - What kinds of angles are formed when streets intersect? - How do scissors illustrate supplementary angles? - How can you prove that tow lines are perpendicular?	- Logical reasoning from one step to another is essential in building a proof. - Reasons in a proof include given information, definitions, properties, postulates, and previously proven theorems.

Relevant Standards:	Learning Goals:	Learning Objectives:
Content Standards: **Primary(Power):** **NJSLS.G-CO.C.9** - Prove theorems about lines and angles. *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 those equidistant from the segment's endpoints.* **Secondary(Supportive):** **NJSLS.G-CO.A.1**- Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined	Students will understand the concept of deductive reasoning. Students will investigate relationships between angles and define perpendicular lines. Students will also be able to prove that vertical angles are congruent. (11 days)	- Apply properties from Algebra and congruence in proof. - Apply the midpoint theorem and angle bisector theorem. - State and apply the definition and theorems about complementary and supplementary angles. - State and apply the definition and theorems about perpendicular lines. - Write proofs in two-column, flow chart and paragraph form. - State, apply and prove the vertical angle theorem.

Relevant Standards:	Learning Goals:	Learning Objectives:
notions of point, line, distance along a line, and distance around a circular arc. **Mathematical Practice (Supportive):** **MP1** Make sense of problems and persevere in solving them. **MP2** Reason abstractly and quantitatively. **MP3** Construct viable arguments and critique the reasoning of others. **MP6** Attend to precision. **MP7** Look for and make use of structure. **MP8** Look for and express regularity in repeated reasoning.		

Formative Assessments	Summative Assessments:	Performance Assessments:	Major Activities/ Assignments (required):
Teacher Observation, Class Participation, Warm ups, Homework, Exit Slips, Learning Goals and Scales, I-clicker responses, Group work	Unit Tests, Quizzes, Graded Homework, open-ended questions, MAP testing	Solve a riddle performance task Power Outage Activity	Zonk Review

Possible Assessment Modifications /Accommodations:			
Special Education	**Struggling Learners**	**ELL**	**Advanced Learners**
• Provide cues for solving problems involving angle pairs	• Provide cues for solving problems involving angle pairs	• Provide cues for solving problems involving angle pairs	• Vary proof formats (include problems involving paragraph and

Possible Assessment Modifications /Accommodations:

(complementary add to 90, supplementary add to 180, etc.) • Provide word bank of theorems and postulates for proofs • Simplified test wording • Extra time on assessments • Provide study guide with answer key prior to test • Highlight/Bold key directions • Clarify test directions verbally • Read test questions aloud • Limited multiple choice • Provide calculator • Preferential seating	(complementary add to 90, supplementary add to 180, etc.) • Provide word bank of theorems and postulates for proofs • Simplified test wording • Extra time on assessments • Provide study guide with answer key prior to test • Highlight/Bold key directions • Clarify test directions verbally • Read test questions aloud • Limited multiple choice • Provide calculator • Preferential seating	(complementary add to 90, supplementary add to 180, etc.) • Provide word bank of theorems and postulates for proofs • Simplify language • Single step directions • Simplified test wording • Extra time on assessments • Provide study guide with answer key prior to test • Highlight/Bold key directions • Allow corrections and retakes to ensure understanding • Clarify test directions verbally • Read test questions aloud • Limited multiple choice • Provide calculator • Preferential seating	T-Chart proofs) • Provide extension questions • Provide opportunities for and PSAT practice questions

Instructional Strategies

Providing clear learning goals, celebrating student success, establish classroom routines, identifying critical information, organize students to interact with new knowledge, preview new content, chunk content into "digestible bites", reflect on learning, using homework, examine errors in reasoning, practice skills and strategies, revising knowledge, provide resource and guidance

Possible Instructional Modifications /Accommodations/Differentiation:

Special Education	Struggling Learners	ELL	Advanced Learners
• Word wall of theorems and postulates • Graphic organizer of angle pair relationships.	• Word wall of theorems and postulates • Graphic organizer of angle pair relationships.	• Word wall of theorems and postulates • Graphic organizer of angle pair relationships.	• Tiered assignments involving more extensive writing and justifying reasoning in a proof • Learning stations

Possible Instructional Modifications /Accommodations/Differentiation:			
Special Education	**Struggling Learners**	**ELL**	**Advanced Learners**
• Preferential seating • Limit number of homework questions • Small group instruction • One-on-one instruction • Flexible grouping • Visual charts and representations of concepts	• Preferential seating • Limit number of homework questions • Small group instruction • One-on-one instruction • Flexible grouping • Visual charts and representations of concepts	• Clarify directions verbally • Simplify directions • Review of directions • Visual charts and representations of concepts • Preferential seating • Limit number of homework questions • Flexible grouping	• Tiered homework assignments

Unit Vocabulary:
Essential: deductive reasoning**,** conditional statements, hypothesis, conclusion, converse, counterexample, biconditional, midpoint theorem, angle bisector theorem, supplementary, complementary, linear pair, vertical angles, perpendicular lines **Non-Essential:** proof, evidence

Interdisciplinary Connections (Applicable Standards):	Integration of Technology:	21st Century Themes:	21st Century Skills:
Interdisciplinary: ELA: NJSL.SA.W.1 - Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence. **Technology:** NJSL8.2.12.A.3 - Research and present information on an existing technological product that has been repurposed for a different function.	S – Google classroom: students will use google classroom to obtain homework assignments. A – Khan Academy: students will use Khan Academy to practice angle pair problems. M – Using Google Docs students can create a tool box of reasons that they will use for their proofs. R – Students can use the Showme app to create a video that shows them working with angle pairs	__X___ Global Awareness Examine weather patterns based on previous weather. _____ Civic Literacy _____ Financial, Economic, Business, & Entrepreneurial Literacy	_____ Creativity & Innovation _____ Media Literacy __X_ Critical Thinking and Problem Solving In writing proofs, students formalize their ability to make viable arguments supported by previously established results and stated assumptions. _X_ Life and Career Skills Deductive reasoning helps students

Interdisciplinary Connections (Applicable Standards):	Integration of Technology:	21st Century Themes:	21st Century Skills:
Career Practices: CRP4 - Communicate clearly and effectively and with reason. **Career Awareness:** NJSLS.9.3.ST.ET.5 - Apply the knowledge learned inSTEM to solve problems		____ Health Literacy	critique the reasoning of others. ____ Information & Communication Technologies Literacy __X__ Communication & Collaboration Google docs, Khan Academy and Showme ____ Information Literacy

Resources:
Texts/Materials:
Curricular framework, TI 30 Calculators **,** rewordify.com, newsela.com, Big Ideas Math: Geometry copyright 2019

Unit 3: Parallel Lines	Recommended Duration: *11 days*

Unit Description: Students will distinguish between intersecting lines, parallel lines, and skew lines. Students will identify special angles formed by lines and transversals. Students will prove that when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent. Students will then use theorems involving parallel lines to prove the sum of the angles of a triangle equal 180. Students will recognize and identify convex polygons. Students will use triangle angle sum to compute interior and exterior angle sum and measures of convex polygons.

Essential Questions:	Enduring Understandings:
- How do you prove that two lines are parallel? - How are parallel lines and planes used in architecture? - How do you know that the sides of a parking space are parallel? - How does the distance between parallel lines relate to hanging new shelves? - What is the sum of the measures of the angles of a triangle? - How can angles and lines be used in art? - How can triangle angle sum help you find angle sum of all convex polygons.	- Not all lines and not all planes intersect. - When a line intersects two or more lines, the angles formed at the intersection points create special angle pairs. - The special angle pairs formed by parallel lines and a transversal are either congruent or supplementary. - Geometric postulates and theorems can be combined with Algebra to find some angle measures. - Certain angle pairs can be used to decide whether two lines are parallel. - The relationships of two lines to a third line can be used to decide whether two lines are parallel or perpendicular to each other. - The sum of the angle measures of a triangle is always the same.

Relevant Standards:	Learning Goals:	Learning Objectives:
Content Standards: **Primary(Power):** **NJSLS.G-CO.C.9 –** Prove theorems about lines and angles. *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 those equidistant from the segment's*	Students will understand the precise definition of parallel lines and investigate relationships between these lines and the angles that they form. Students will be able to prove theorems involving parallel lines and triangle angle sums. (11 days)	- Define parallel lines. - Identify the angles formed when two lines are cut by a transversal. - State and apply the postulates and theorems about parallel lines. - Prove when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent. - State and apply theorems about a parallel and a perpendicular to a given line through a given

Relevant Standards:	Learning Goals:	Learning Objectives:
endpoints. **NJSLS.G-CO.C.10** – *Prove theorems about triangles. 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.* **Secondary(Supportive):** **NJSLS.G-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. **Mathematical Practice (Supportive):** **MP1** Make sense of problems and persevere in solving them. **MP2** Reason abstractly and quantitatively. **MP3** Construct viable arguments and critique the reasoning of others. **MP7** Look for and make use of structure.		point. • Determine whether two lines are parallel or perpendicular by comparing their slopes. • Prove the measures of interior angles of a triangle sum to 180°. • State and apply the theorem about the measure of an exterior angle of a triangle. • Recognize and name convex and regular polygons. • Compute measures of interior and exterior angles of convex polygons.

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Relevant Standards:	Learning Goals:	Learning Objectives:
MP8 Look for and express regularity in repeated reasoning.		

Formative Assessments	Summative Assessments:	Performance Assessments:	Major Activities/ Assignments (required):
Teacher Observation, Class Participation, Warm ups, Homework, Exit Slips, Learning Goals and Scales, I-clicker responses, Group work	Unit Tests, Quizzes, Graded Homework, open-ended questions, MAP testing	Planning the Paths for a Park – students will analyze a complex diagram and identify angles pairs, use theorems related to parallel lines to find angle measures and construct viable arguments to explain their method of finding angle measures.	G.CO.C.9 Congruent Angles made by parallel lines and a transversal Zonk Review

Possible Assessment Modifications /Accommodations:			
Special Education	**Struggling Learners**	**ELL**	**Advanced Learners**
- Clearly label and identify lines that are parallel and lines that are transversals - Provide word bank of theorems and postulates for proofs - Simplified test wording - Provide study guide with answer key prior to test - Highlight/Bold key directions - Clarify test directions verbally - Read test questions aloud - Limited multiple choice - Provide calculator - Preferential seating	- Clearly label and identify lines that are parallel and lines that are transversals - Provide word bank of theorems and postulates for proofs - Simplified test wording - Provide study guide with answer key prior to test - Highlight/Bold key directions - Clarify test directions verbally - Read test questions aloud - Limited multiple choice - Provide calculator - Preferential seating	- Clearly label and identify lines that are parallel and lines that are transversals - Provide word bank of theorems and postulates for proofs - Key words in native language (if available) - Single step directions - Simplified test wording - Extra time on assessments - Provide study guide with answer key prior to test - Highlight/Bold key directions - Clarify test directions verbally - Read test questions aloud	- Choice of assessment - Vary proof formats (include problems involving paragraph and T-Chart proofs) - Provide a choice menu project.

Possible Assessment Modifications /Accommodations:			
		• Limited multiple choice • Provide calculator • Preferential seating	

Instructional Strategies
Providing clear learning goals, celebrating student success, establish classroom routines, identifying critical information, preview new content, chunk content into "digestible bites", reflect on learning, organize students to practice and deepen knowledge, using homework, examine errors in reasoning, practice skills and strategies, revising knowledge, provide resource and guidance

Possible Instructional Modifications /Accommodations/Differentiation:			
Special Education	Struggling Learners	ELL	Advanced Learners
• Graphic organizer of parallel line and transversal angle pair definitions • Word wall of theorems and postulates • Adjusted assignment • Small group instruction • Encourage participation at SMART review session • Preferential seating • Limit number of homework questions • Visual charts and representations of concepts	• Graphic organizer of parallel line and transversal angle pair definitions • Word wall of theorems and postulates • Preferential seating • Limit number of homework questions • Small group instruction • One-on-one instruction • Flexible grouping • Visual charts and representations of concepts	• Connect to prior knowledge – parallel lines in the classroom • Use manipulatives – work in groups using books and pencils to model parallel and perpendicular lines and planes • Graphic organizer of parallel line and transversal angle pair definitions • Word wall of theorems and postulates • Interactive notebooks • Clarify directions verbally • Simplify directions • Review of directions • Visual charts and representations of concepts • Preferential seating • Limit number of homework questions	• Independent practice. • Choice of problems • Use a jigsaw activity to have students explain concepts to struggling learners.

Unit Vocabulary:
Essential: parallel, skew, transversal, alternate interior, alternate exterior, corresponding, same-side interior, perpendicular, auxiliary line, corollary, polygon, convex, concave, diagonal
Non-Essential: N/A

Interdisciplinary Connections (Applicable Standards):	Integration of Technology:	21st Century Themes:	21st Century Skills:
Interdisciplinary: ELA: NJSL.SA.W.1 – Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence. **Technology:** NJSL8.2.12.A.3 – Research and present information on an existing technological product that has been repurposed for a different function. **Career Practices:** CRP4 – Communicate clearly and effectively and with reason. **Career Awareness:** NJSLS.9.3.ST.ET.5 – Apply the knowledge learned in STEM to solve problems	S – Use GeoGebra to measure angles created by the transversal. Students take screen shots to add to note in Google Docs. A – Khan Academy: students will use Khan Academy to practice angle pair problems. M – Using Google Docs students can add theorems from this unit to their tool box. R – Students will look at maps of cities throughout the world to measure angles created by parallel lines. Students can create a tour using maps and video. They can share these on a class website.	_____ Global Awareness __X__ Civic Literacy Consider how community leaders design public spaces using parallel lines and angle measures. _____ Financial, Economic, Business, & Entrepreneurial Literacy _____ Health Literacy	_____ Creativity & Innovation _____ Media Literacy __X__ Critical Thinking and Problem Solving Analyze paths and roadways for parallel lines. __X__ Life and Career Skills Parallel lines are used to hang shelves that are equidistant. _____ Information & Communication Technologies Literacy __X__ Communication & Collaboration Google docs to share deductive reasoning tool box. _____ Information Literacy

Interdisciplinary Connections (Applicable Standards):	Integration of Technology:	21st Century Themes:	21st Century Skills:

Resources:
Texts/Materials:
Curricular framework, TI 30 Calculators, rewordify.com, newsela.com, Big Ideas Math: Geometry copyright 2019

Unit 4: Transformations	Recommended Duration: *13 days*
Unit Description: Students explore the different types of transformations: reflections, translations, rotations, and dilations. The students will be able to identify the transformation given two images and draw an image given a transformation rule.	

Essential Questions:	Enduring Understandings:
- How can you change a figure's position without changing its size and shape? - How can you change a figure's size without changing its shape? - How can you represent a transformation in the coordinate plane? - Where are transformations found in nature, amusement rides, video games or in a marching band show?	- The location and orientation of a geometric figure can be changed while preserving distance and angle measures. - The distance between any two points, angle measures, and orientation of a geometric figure remain the same when the figure is translated in one direction. - When you reflect a figure across a line, each point of the figure goes to another point the same distance from the line, but on the other side. - Distances, angle measures, and orientation of a geometric figure stay the same when a figure is rotated about a center of rotation. - If two figures can be mapped to each other by a sequence of rigid motions, then the figures are congruent. - A scale factor can be used to make a larger or smaller copy of a figure that is also similar to the original figure. - If there is an isometry that maps a figure to another, then you can map one onto the other by using a composition of reflections.

Relevant Standards:	Learning Goals:	Learning Objectives:
Content Standards: **Primary(Power):** **NJSLS.G-SRT.A.1** – Verify experimentally the properties of dilations given by a center and a scale factor: a. A dilation takes a line not passing through the center of the dilation to a parallel line, and leaves a line passing through the center unchanged. b. The dilation of a line segment is longer or shorter in the ratio given by the scale factor. **Secondary(Supportive):** **NJSLS.G-CO.A.2** – Represent transformations in the plane using, e.g., transparencies 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). **NJSLS.G-CO.A.3** – Given a rectangle,	Students will understand the definitions and properties of reflections, translations, rotations and dilations. Students will be able to draw the image figure, given a transformation rule. Students will also be able to write the transformation rule when given two figures.	• Define rigid motions. • Student will be able to draw reflected images and write the rule for a reflected figure. • Students will be able to recognize and draw lines of symmetry. • Students will be able to specify a reflection that will carry a given figure onto itself. • Student will be able to draw translated images and write the rule for a translated figure. • Students will be able to draw rotated images and write the rule for a rotated figure. • Student will be able to determine if a figure has rotational symmetry. • Student will be able to draw dilated images. • Students will be able to write the rule for a dilated figure. • Student will be able to locate the images of figures by a composite of transformations. • Students will be able to formulate notation for composition of transformations. • Specify a sequence of transformations that will carry a given figure onto itself.

Relevant Standards:	Learning Goals:	Learning Objectives:
parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself. **NJSLS.G-CO.A.4** – Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments. **NJSLS.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. **NJSLS.G.CO.B.6** – Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given 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. **Mathematical Practice (Supportive):** **MP1** Make sense of problems and persevere in solving them.		

Relevant Standards:	Learning Goals:	Learning Objectives:
MP5 Use appropriate tools strategically. **MP6** Attend to precision. **MP7** Look for and make use of structure.		

Formative Assessments	Summative Assessments:	Performance Assessments:	Major Activities/ Assignments (required):
Teacher Observation, Class Participation, Warm ups, Homework, Exit Slips, Learning Goals and Scales, I-clicker responses, Group work	Unit Tests, Quizzes, Graded Homework, open-ended questions, MAP testing	Programming a video game by finding a sequence of transformations that moves the puzzle piece to the target area	G.CO.A.4 Defining Rotations G.CO.A.5 Showing a triangle congruence G.SRT.A.1 Dilating a Line Transformation Project

Possible Assessment Modifications /Accommodations:			
Special Education	Struggling Learners	ELL	Advanced Learners
• Provide reference sheet with visual representations of transformations. • Provide rules for rotations and reflections • Provide Patty Paper to help transform the figures • Provide study guide with answer	• Provide reference sheet with visual representations of transformations. • Provide rules for rotations and reflections • Provide Patty Paper to help transform the figures • Extra time on assessments	• Provide reference sheet with visual representations of transformations. • Provide rules for rotations and reflections • Provide Patty Paper to help transform the figures • Allow additional vocabulary	• Provide real world application problems relating to transformations in the plane. • Provide extension questions • Provide opportunities for and PSAT practice questions

Possible Assessment Modifications /Accommodations:			
key prior to test • Highlight/Bold key directions • Clarify test directions verbally • Limited multiple choice • Provide calculator	• Provide study guide with answer key prior to test • Highlight/Bold key directions • Clarify test directions verbally • Limited multiple choice • Provide calculator	support. • Simplify language • Single step directions • Simplified test wording • Extra time on assessments • Provide study guide with answer key prior to test • Highlight/Bold key directions • Allow corrections and retakes to ensure understanding • Clarify test directions verbally • Read test questions aloud • Limited multiple choice • Provide calculator	

Instructional Strategies
Providing clear learning goals, celebrating student success, establish classroom routines, identifying critical information, preview new content, chunk content into "digestible bites", reflect on learning, organize students to practice and deepen knowledge, using homework, examine errors in reasoning, practice skills and strategies, revising knowledge, provide resource and guidance, organizing/engaging students for cognitively complex tasks involving generating hypothesis and testing

Possible Instructional Modifications /Accommodations/Differentiation:			
Special Education	**Struggling Learners**	**ELL**	**Advanced Learners**
• Use manipulatives – use construction paper or Patty Paper to demonstrate how the figure is transformed.	• Graphic organizer of representations of transformations in the plane. • Use of transparency paper to	• Graphic organizer of representations of transformations in the plane. • Use of transparency paper to	• Real life application project involving transformations in the plane. • Tiered Assignments

Possible Instructional Modifications /Accommodations/Differentiation:			
Special Education	**Struggling Learners**	**ELL**	**Advanced Learners**
• Connect to prior knowledge – have groups work with a mirror and describe how objects relate to their mirror images or reflections. • Graphic organizer of representations of transformations in the plane. • Preferential seating • Limit number of homework questions • Small group instruction • One-on-one instruction • Flexible grouping	visualize transformations. • Preferential seating • Limit number of homework questions • Small group instruction • One-on-one instruction • Flexible grouping • Positive reinforcement of behavior • Visual charts and representations of concepts	visualize transformations. • Interactive notebooks • Clarify directions verbally • Simplify directions • Review of directions • Visual charts and representations of concepts • Preferential seating • Limit number of homework questions • Small group instruction • One-on-one instruction • Flexible grouping • Positive reinforcement of behavior	• Learning stations • Tiered homework assignments

Unit Vocabulary:
Essential: transformation, rigid motions, reflection, translation, rotation, dilation, image, preimage, prime notation, line of symmetry, rotational symmetry, scale factor, isometry **Non-Essential:** counterclockwise, clockwise

Interdisciplinary Connections (Applicable Standards):	Integration of Technology:	21st Century Themes:	21st Century Skills:
Interdisciplinary: ELA: NJSL.SA.R.10 – Read and comprehend complex literary and informational texts independently and proficiently with scaffolding as needed. **Technology:** NJSL8.2.12.A.3 – Research and present information on an existing technological product that has been repurposed for a different function. **Career Practices:** CRP4 – Communicate clearly and effectively and with reason. **Career Awareness:** NJSLS.9.3.ST.ET.5 – Apply the knowledge learned in STEM to solve problems	S – Google classroom: students will use google classroom to obtain homework assignments. A – Geogebra: students will use Geogebra to transform figures M – Students use Geogebra to create their own sequence of transformation and post their results in the Google classroom. R – Students create a tutorial using Geogebra using a screencast which can be posted to the Google classroom for other students to use.	____ Global Awareness ____ Civic Literacy _X_ Financial, Economic, Business, & Entrepreneurial Literacy Investigate how transformations are used in the creating of video games. ____ Health Literacy	____ Creativity & Innovation ____ Media Literacy _X_ Critical Thinking and Problem Solving Connect critical thinking to video game design. Figures on screen are moved using transformation technology. _X_ Life and Career Skills Translations are used by coaches to visually show player where to position themselves for successful play manipulation. Fabric designers geometric transformations to make symmetric patterns. ____ Information & Communication Technologies Literacy

Interdisciplinary Connections (Applicable Standards):	Integration of Technology:	21st Century Themes:	21st Century Skills:
			__X__ Communication & Collaboration Geogebra and Google classroom _____ Information Literacy

Resources:
Texts/Materials: Curricular framework, TI 30 Calculators, rewordify.com, newsela.com, Big Ideas Math: Geometry copyright 2019

Unit 5: Congruent Triangles	Recommended Duration: *13 days*

Unit Description: This unit builds the students' understanding of transformations by using transformations to show triangles are congruent. The students will discover that as long as one triangle may be mapped onto another triangle the triangles are congruent. Students then explore criteria required to prove triangles are congruent They will learn SSS, SAS, ASA, AAS, and HL. By the end of the unit, students will be able to prove the Isosceles Triangle Theorem and the Perpendicular Bisector Theorem using congruent triangles.

Essential Questions:	Enduring Understandings:
- How do you identify corresponding parts of congruent triangles? - How do you show that two triangles are congruent? - Why are triangles important in construction? - How are angles in triangles used to make kites? - Why are triangles used in bridges? - How do land surveyors use congruent triangles? - How are congruent triangles used in construction	- Comparing the corresponding parts of two figures can show whether the figures are congruent. - Two triangles can be proven to be congruent without having to show that all corresponding parts are congruent. - Two ways triangles can be proven to be congruent are by using three pairs of corresponding sides or by using two pairs of corresponding sides and one pair of corresponding angles. - Another way triangles can be proven to be congruent is by using one pair of corresponding sides and two pairs of corresponding angles. - If two triangles are congruent, then every pair of their corresponding part is also congruent.

Relevant Standards:	Learning Goals:	Learning Objectives:
Content Standards: **Primary(Power):** **NJSLS.G-CO.B.6**- Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given 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. **NJSLS.G-CO.B.7** – Use the definition of	2. Students will understand the definition of congruence in terms of rigid motions. Students will be able to prove triangles are congruent and explain using the criteria for triangle congruence (ASA, SAS, and SSS). Students will also be able to prove the Isosceles Triangle Theorem and the Perpendicular Bisector Theorem. (13 days)	- Use rigid transformations to show triangles are congruent. - Recognize and identify the corresponding parts of congruent figures. - Prove two triangles are congruent by applying the SSS Postulate, the SAS Postulate, the ASA Postulate, AAS Theorem and the HL Theorem. - Apply congruent triangles to prove corresponding segments and angles are congruent. - Apply definitions of the median and the

Relevant Standards:	Learning Goals:	Learning Objectives:
congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent. **NJSLS.G-CO.B.8** – Explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the definition of congruence in terms of rigid motions. **NJSLS.G-CO.C.9 –** Prove theorems about lines and angles. *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 those equidistant from the segment's endpoints.* ***NJSLS.G-CO.C.10*** *– Prove theorems about triangles. 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.* *Secondary(Supportive):* **Mathematical Practice (Supportive):** **MP1** Make sense of problems and persevere in		altitude of a triangle and the perpendicular bisector of a segment. • Recognize and apply the properties of the points of concurrency in triangles. • State, apply and prove the Isosceles Triangle Theorem and the Perpendicular Bisector Theorem.

Relevant Standards:	Learning Goals:	Learning Objectives:
solving them. **MP3** Construct viable arguments and critique the reasoning of others. **MP6** Attend to precision. **MP8** Look for and express regularity in repeated reasoning.		

Formative Assessments	Summative Assessments:	Performance Assessments:	Major Activities/ Assignments (required):
Teacher Observation, Class Participation, Warm ups, Homework, Exit Slips, Learning Goals and Scales, I-clicker responses, Group work	Unit Tests, Quizzes, Graded Homework, open-ended questions, MAP testing	Estimating the Distance Across a Gorge Performance Task	Zonk Practice Kahoot Activity 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?

Possible Assessment Modifications /Accommodations:			
Special Education	Struggling Learners	ELL	Advanced Learners
• Underline key terms. • Simplify instructions. • Provide function formats and formulas.	• Allow for additional time. • Underline key words within test directions. • Clarify test directions.	• Simplify the language in the directions. • Allow word bank with definitions as a reference. • Provide practice test with the same format as a review.	• Vary proof formats (include problems involving paragraph and T-Chart proofs) • Tiered projects.

Instructional Strategies

Providing clear learning goals, celebrating student success, establish classroom routines, identifying critical information, preview new content, chunk content into "digestible bites", reflect on learning, organize students to practice and deepen knowledge, using homework, examine errors in reasoning, practice skills and strategies, revising knowledge, provide resource and guidance, organizing/engaging students for cognitively complex tasks involving generating hypothesis and testing.

Possible Instructional Modifications /Accommodations/Differentiation:

Special Education	Struggling Learners	ELL	Advanced Learners
• Graphic organizer of triangle congruence criterion (SSS, SAS, AAS, ASA) • Word wall of theorems and postulates • Use of mnemonics • Preferential seating • Limit number of homework questions • Small group instruction • One-on-one instruction • Flexible grouping – pair more proficient students with less proficient students and have them work on matching corresponding parts of congruent triangles. • Visual charts and representations of concepts	• Graphic organizer of triangle congruence criterion (SSS, SAS, AAS, ASA) • Word wall of theorems and postulates • Use of mnemonics • Preferential seating • Limit number of homework questions • Small group instruction • One-on-one instruction • Flexible grouping • Visual charts and representations of concepts	• Use Manipulatives – Use AngLegs to show triangle congruence. • Graphic organizer of triangle congruence criterion (SSS, SAS, AAS, ASA) • Word wall of theorems and postulates • Use of mnemonics • Clarify directions verbally • Simplify and review directions • Visual charts and representations of concepts • Preferential seating • Limit number of homework questions • Flexible grouping	• Tiered assignments involving more extensive writing and justifying reasoning in a proof • Congruent triangles in real life tiered assignment • Learning stations • Tiered homework assignments

Unit Vocabulary:

Essential: congruence statement, SSS, SAS, ASA, AAS, HL, included angle, included side, CPCTC (corresponding parts of congruent triangles are congruent), medians, altitudes, perpendicular bisectors, centroid, orthocenter, circumcenter, incenter.

Unit Vocabulary:
Non-Essential: N/A

Interdisciplinary Connections (Applicable Standards):	Integration of Technology:	21st Century Themes:	21st Century Skills:
Interdisciplinary: ELA: NJSL.SA.W.1 – Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence. **Technology:** NJSL8.2.12.A.3 – Research and present information on an existing technological product that has been repurposed for a different function. **Career Practices:** **CRP2 -** - Apply appropriate academic and technical skills. CRP4 – Communicate clearly and effectively and with reason. CRP8 – Utilize critical thinking to make sense of problems and persevere in solving them. **Career Awareness:** NJSLS.9.3.ST.ET.5 – Apply the knowledge learned in STEM to solve	S – Google classroom: students will use google classroom to obtain homework assignments.. A – Khan Academy: students will use Khan Academy to practice problems involving isosceles and equilateral triangles. M – Using Google Docs students can add theorems from this unit to their toolbox. R – Students can use the Showme app to create a video that shows them working with coordinate proofs.	X__ Global Awareness Investigate how the design of a windmill is used to create clean energy. ____ Civic Literacy ____ Financial, Economic, Business, & Entrepreneurial Literacy ____ Health Literacy	____ Creativity & Innovation ____ Media Literacy _X_ Critical Thinking and Problem Solving In writing proofs, students formalize their ability to make viable arguments supported by previously established results and stated assumptions. _X_ Life and Career Skills In a windmill, the three blades are like the medians of a triangle; they connect at one point, the centroid. Windmills generate clean electricity, so if you think about it points of concurrency are helping to better the earth.

Interdisciplinary Connections (Applicable Standards):	Integration of Technology:	21st Century Themes:	21st Century Skills:
problems			

Resources:
Texts/Materials:
Curricular framework, TI 30 Calculators, rewordify.com, newsela.com, Big Ideas Math: Geometry copyright 2019

Unit 6: Quadrilaterals and Other Polygons	Recommended Duration: 16 days

Unit Description: In this chapter, students explore quadrilaterals. They begin by investigating the properties of a parallelogram and finish by proving the following theorems about parallelograms: opposite angles are congruent; opposite sides are congruent and the diagonals bisect each other. Students' knowledge of parallelograms is extended as they explore rectangles, rhombi, and squares and their special properties. Trapezoids and kites are also explored. Finally, students will use a compass and straight edge to copy a segment and an angle. They will also construct a segment bisector, perpendicular lines, including the perpendicular bisector of a line segment, and a line parallel to a given line through a point not on the line. Finally, the students will combine their knowledge of quadrilaterals and constructions and complete a group project constructing quadrilaterals.

Essential Questions:	Enduring Understandings:
- How can you classify quadrilaterals? - How are parallelograms used to represent data? - How are parallelograms used in architecture? - How are rectangles used in sports? - How are trapezoids used in careers in construction? - How can you use special geometric tools to make a figure that is congruent to an original figure without measuring?	- Parallelograms have special properties regarding their sides, angles, and diagonals. - You can decide whether a quadrilateral is a parallelogram if its sides, angles, and diagonals have certain properties. - Rhombi, rectangles, and squares have basic properties about their sides and angles that help identify them. The diagonals of these parallelograms also have certain properties. - You can determine whether a parallelogram is a rhombus or a rectangle based on the properties of its diagonals. - The angles, sides, and diagonals of a trapezoid have certain properties. - Constructions allow you to copy geometric figures without measuring.

Relevant Standards:	Learning Goals:	Learning Objectives:
Content Standards: **Primary(Power):** **NJSLS.G-CO.C.11** - Prove theorems about parallelograms. *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.*	Students will understand the properties of each type of quadrilateral and be able to construct them using a compass and straight edge. Students will also be able to prove theorems involving parallelograms. *(12 Days)* Students will be able to make formal geometric constructions. *Copying a segment; copying an angle; bisecting a segment; bisecting an angle;*	- Apply the definition and properties of parallelograms. - Prove certain quadrilaterals are parallelograms. - Prove theorems about parallelograms. - Apply theorems about parallel lines and the segment that joins the midpoints of the triangle. - Apply the definitions and identify the special properties of rectangles, rhombus and squares.

Relevant Standards:	Learning Goals:	Learning Objectives:
Mathematical Practice (Supportive): **NJSLS.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.). *Copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line.* **NJSLS.G.CO.D.13 -** Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle. **NJSLS.G.GPE.B.4 -** Use coordinates to prove simple geometric theorems algebraically. *For example, prove or disprove that a figure defined by four given points in the coordinate plane is a rectangle; prove or disprove that the point (1, √3) lies on the circle centered at the origin and containing the point (0, 2).* **MP1** Make sense of problems and persevere in solving them. **MP2** Reason abstractly and quantitatively.	*constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line.* (4 Days)	• Prove that rectangles are parallelograms with congruent diagonals. • Determine if a parallelogram is a rectangle, rhombus, square or trapezoid. • Use compass and straight edge to construct quadrilaterals.

Relevant Standards:	Learning Goals:	Learning Objectives:
MP3 Construct viable arguments and critique the reasoning of others.		

Formative Assessments	Summative Assessments:	Performance Assessments:	Major Activities/ Assignments (required):
Teacher Observation, Class Participation, Warm ups, Homework, Exit Slips, Learning Goals and Scales, I-clicker responses, Group work	Unit Tests, Quizzes, Graded Homework, open-ended questions, MAP testing	Building a kite performance assessment	Eiffel Tower Project Construction Project G.CO.C.11 Is this a parallelogram?

Possible Assessment Modifications /Accommodations:			
Special Education	**Struggling Learners**	**ELL**	**Advanced Learners**
• Provide blank version of graphic organizer of the quadrilateral family • Provide relevant formulas (mid-segment of a trapezoid) • Provide study guide with answer key prior to test • Highlight/Bold key directions • Clarify test directions verbally • Read test questions aloud • Limited multiple choice • Provide calculator • Preferential seating	• Provide blank version of graphic organizer of the quadrilateral family • Provide relevant formulas (mid-segment of a trapezoid) • Simplified test wording • Provide study guide with answer key prior to test • Highlight/Bold key directions • Clarify test directions verbally • Read test questions aloud • Limited multiple choice • Provide calculator • Preferential seating	• Provide blank version of graphic organizer of the quadrilateral family • Provide relevant formulas (mid-segment of a trapezoid) • Simplify language • Single step directions • Simplified test wording • Extra time on assessments • Provide study guide with answer key prior to test • Highlight/Bold key directions • Clarify test directions verbally • Read test questions aloud • Limited multiple choice • Provide calculator • Preferential seating	• Real world application questions • Vary proof formats (include problems involving paragraph and T-Chart proofs) • Provide opportunities for and PSAT practice questions • Tiered projects.

Instructional Strategies

Providing clear learning goals, celebrating student success, establish classroom routines, identifying critical information, preview new content, chunk content into "digestible bites", reflect on learning, organize students to practice and deepen knowledge, using homework, examine errors in reasoning, practice skills and strategies, revising knowledge, provide resource and guidance, organizing/engaging students for cognitively complex tasks involving generating hypothesis and testing

Possible Instructional Modifications /Accommodations/Differentiation:

Special Education	Struggling Learners	ELL	Advanced Learners
• Graphic organizers/Frayer Model of quadrilateral definitions and characteristics • Word wall of definitions involving quadrilaterals and quadrilateral theorems • Preferential seating • Limit number of homework questions • Flexible grouping • Positive reinforcement of behavior • Visual charts and representations of concepts	• Graphic organizers/Frayer Model of quadrilateral definitions and characteristics • Word wall of definitions involving quadrilaterals and quadrilateral theorems • Preferential seating • Limit number of homework questions • Flexible grouping • Positive reinforcement of behavior • Visual charts and representations of concepts	• Graphic organizers/Frayer Model of quadrilateral definitions and characteristics • Word wall of definitions involving quadrilaterals and quadrilateral theorems • Clarify directions verbally • Simplify directions • Review of directions • Visual charts and representations of concepts • Preferential seating • Limit number of homework questions • Flexible grouping • Positive reinforcement of behavior	• Tiered assignments involving more extensive writing and justifying reasoning in a proof • Learning stations

Unit Vocabulary:

Essential: parallelogram, consecutive angles, rectangle, rhombus, square, kite, trapezoid, diagonal, isosceles trapezoid, median, constructions

Non-Essential: parallel lines, congruent

Interdisciplinary Connections (Applicable Standards):	Integration of Technology:	21st Century Themes:	21st Century Skills:
Interdisciplinary: ELA: NJSL.SA.L5 - Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations. **Technology:** NJSL8.2.12.A.3 - Research and present information on an existing technological product that has been repurposed for a different function **Career Practices:** CRP2 - Apply appropriate academic and technical skills. CRP4 - Communicate clearly and effectively and with reason. CRP8 - Utilize critical thinking to make sense of problems and persevere in solving them. **Career Awareness:** NJSLS.9.3.ST.ET.**5 -** Apply the knowledge learned in STEM to solve problems	S – Google classroom: students will use google classroom to obtain homework assignments.. A – Khan Academy: students will use Khan Academy to practice problems involving properties of a parallelogram. M – Students will watch a video that summarizes the lesson and answer questions to check for understanding. Once in the classroom students will collaborate with others to complete triangle proofs. R – Students will be able to plot the coordinates needed to design a football field using dynamic software and then share on the google classroom.	____ Global Awareness ____ Civic Literacy __X_ Financial, Economic, Business, & Entrepreneurial Literacy Research the use of quadrilaterals in industrial equipment. ____ Health Literacy	____ Creativity & Innovation ____ Media Literacy _X_ Critical Thinking and Problem Solving In writing proofs, students formalize their ability to make viable arguments supported by previously established results and stated assumptions. _X_ Life and Career Skills A pantograph is an expandable device that is made up of a series of parallelograms. It is used in the television industry for positioning, lighting and other equipment. This shape allows the machine to extend and retract depending on the height needed.

Resources:
Texts/Materials: Curricular framework, TI 30 Calculators, Protractors, Compasses, Rulers, rewordify.com, newsela.com, Big Ideas Math: Geometry copyright 2019

Unit 7: *Similar Polygons*	Recommended Duration: *9 days*

Unit Description: In this unit students learn the definition of similarity by using compositions of rigid motions and dilations to map a preimage to a similar image. Students review their knowledge of ratios and learn new properties of proportions. Students will use ratios and proportions to decide whether two polygons are similar and to find unknown side length of similar figures. Students then explore criteria required to prove triangles are similar. They will learn AA~, SAS~ and SSS~. By the end of the unit, students will be able to prove the Triangle Proportionality Theorem and the Midsegment Theorem.

Essential Questions:	Enduring Understandings:
• How can you use compositions of rigid motions and dilations to help you understand the properties of similarity? • How do you use proportions to find side lengths in similar polygons? • How do you show two triangles are similar? • How do you identify corresponding parts of similar triangles? • How do you utilize similarity and congruence criteria to prove other geometric theorems?	• Dilations use a scale factor to make a larger or smaller copy of a figure that is also similar to the original figure. • Composition of rigid motions and dilations help you understand similarity. • A ratio can be written to compare two quantities. • An equation can be written stating that two ratios are equal. • Ratios and proportions can be used to decide whether two polygons are similar and to find unknown side lengths of similar figures. • Triangles can be shown to be similar based on the relationship of two or three pairs of corresponding parts. • Similar triangles can be used to prove other geometric theorems. • When two or more parallel lines intersect other lines, proportional segments are formed. • The bisector of an angle of a triangle divides the opposite side into two segments with lengths proportional to the sides of the triangle that form the angle.

Relevant Standards:	Learning Goals:	Learning Objectives:
Content Standards: **Primary(Power):** **NJSLS.G-SRT.A.2** - Given two figures, use the	Students will understand the definition of similarity in terms of similarity transformations. (3 days) Students will be able to prove triangles are similar	• Show polygons are similar by using similarity transformations. • Students will be able to write ratios and solve proportions.

Relevant Standards:	Learning Goals:	Learning Objectives:
definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides. **NJSLS.G-SRT.A.3 -** Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar. **NJSLS.G-SRT.B.4** - Prove theorems about triangles. *Theorems include: a line parallel to one side of a triangle divides the other two proportionally, and conversely; the Pythagorean Theorem proved using triangle similarity.* **NJSLS.G-SRT.B.5 -** Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures. **NJSLS.G-C.A.1** - Prove that all circles are similar. **NJSLS.G-CO.C.10** - Prove theorems about triangles. *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.*	and explain using the criteria for triangle similarity (AA ~, SAS ~, SSS ~). (4 days) Students will be able to prove the Triangle Proportionality Theorem and the Midsegment Theorem. (2 days)	• Express a given proportion in an equivalent form. • State and apply the properties of similar triangles and polygons. • Apply the AA Similarity Postulate, the Side-Angle-Side Similarity Theorem and the Side-Side-Side Similarity Theorem to prove triangles are similar. • Apply similar triangles to solve problems involving lengths, distances and angle measures. • State, apply and prove the Triangle Proportionality Theorem. • State, apply and prove the Midsegment Theorem.

Relevant Standards:	Learning Goals:	Learning Objectives:
Secondary(Supportive): **Mathematical Practice (Supportive):** **MP1** Make sense of problems and persevere in solving them. **MP2** Reason abstractly and quantitatively. **MP3** Construct viable arguments and critique the reasoning of others. **MP6** Attend to precision. **MP7** Look for and make use of structure. **MP8** Look for and express regularity in repeated reasoning.		

Formative Assessments	Summative Assessments:	Performance Assessments:	Major Activities/ Assignments (required):
Teacher Observation, Class Participation, Warm ups, Homework, Exit Slips, Learning Goals and Scales, I-clicker responses, Group work	Unit Tests, Quizzes, Graded Homework, open-ended questions, MAP testing	Group work - Why are triangles similar and where is that found in the world?	G.SRT.A.2 Are They Similar? G.SRT.A.2 Similar Triangles G.SRT.A.3 Similar Triangles

Possible Assessment Modifications /Accommodations:			
Special Education	**Struggling Learners**	**ELL**	**Advanced Learners**
• Provide similarity criterion (AA, SAS, and SSS) • Simplified test wording • Extra time on assessments • Provide study guide with answer key prior to test	• Provide similarity criterion (AA, SAS, and SSS) • Simplified test wording • Extra time on assessments • Provide study guide with answer key prior to test	• Provide similarity criterion (AA, SAS, and SSS) • Simplify language • Single step directions • Simplified test wording • Extra time on assessments	• Real world application questions • Vary proof formats (include problems involving paragraph and T-Chart proofs) • Provide extension questions • Provide opportunities for and

Possible Assessment Modifications /Accommodations:			
Special Education	**Struggling Learners**	**ELL**	**Advanced Learners**
• Highlight/Bold key directions • Clarify test directions verbally • Read test questions aloud • Provide calculator • Preferential seating	• Highlight/Bold key directions • Clarify test directions verbally • Read test questions aloud • Provide calculator • Preferential seating	• Provide study guide with answer key prior to test • Highlight/Bold key directions • Clarify test directions verbally • Read test questions aloud • Allow student to write on test • Limited multiple choice • Provide calculator • Preferential seating	PSAT practice questions

Instructional Strategies
Providing clear learning goals, celebrating student success, establish classroom routines, identifying critical information, preview new content, chunk content into "digestible bites", reflect on learning, organize students to practice and deepen knowledge, using homework, examine errors in reasoning, practice skills and strategies, revising knowledge, provide resource and guidance, organizing/engaging students for cognitively complex tasks involving generating hypothesis and testing.

Possible Instructional Modifications /Accommodations/Differentiation:			
Special Education	**Struggling Learners**	**ELL**	**Advanced Learners**
• Graphic organizers of definitions for triangle similarity (AA, SAS, and SSS) • Word wall of definitions involving similarity criterion • Preferential seating • Limit number of homework questions • Flexible grouping • Visual charts and representations of concepts	• Graphic organizers of definitions for triangle similarity (AA, SAS, and SSS) • Word wall of definitions involving similarity criterion • Preferential seating • Limit number of homework questions • Flexible grouping • Visual charts and representations of concepts	• Graphic organizers of definitions for triangle similarity (AA, SAS, and SSS) • Word wall of definitions involving similarity criterion • Clarify directions verbally • Simplify directions • Review of directions • Visual charts and representations of concepts • Preferential seating • Limit number of homework	• Tiered assignments involving more extensive writing and justifying reasoning in a proof • Learning stations • Tiered homework assignments

Possible Instructional Modifications /Accommodations/Differentiation:			
Special Education	**Struggling Learners**	**ELL**	**Advanced Learners**
		questions • Flexible grouping	

Unit Vocabulary:
Essential: ratio, proportion, extremes, means, cross product, similar figures, extended proportion, scale factor, AA similarity, SAS similarity, SSS similarity, proportional, triangle proportionality, triangle-angle-bisector, midsegment, CASTC, CSSTP **Non-Essential:**

Interdisciplinary Connections (Applicable Standards):	Integration of Technology:	21st Century Themes:	21st Century Skills:
Interdisciplinary: ELA: NJSL.SA.W1 – Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence. **Technology:** NJSL8.2.12.A.3 - Research and present information on an existing technological product that has been repurposed for a different function. **Career Practices:** CRP2 - Apply appropriate academic and technical skills. CRP4 – Communicate clearly and effectively and with reason. CRP8 - Utilize critical thinking to make sense of problems and persevere in solving them.	S – Google classroom: students will use google classroom to obtain homework assignments. A – Khan Academy: students will use Khan Academy to practice similar triangles. M – Students will watch a video that summarizes the lesson and answer questions to check for understanding. Once in the classroom students will collaborate with others to solve problems involving similar triangles. R – Students can use the Showme app to create a video that shows them working with similar triangles.	____ Global Awareness ____ Civic Literacy _X_ Financial, Economic, Business, & Entrepreneurial Literacy Explore the use of similar triangles in surveying. ____ Health Literacy	____ Creativity & Innovation ____ Media Literacy ___Critical Thinking and Problem Solving _X_Life and Career Skills Similar triangles can be used to find heights or distances that cannot be easily measured. ____ Information & Communication Technologies Literacy _X_Communication & Collaboration Google classroom, khan academy and flipped classroom

Career Awareness:			_____ Information Literacy
NJSLS.9.3.ST.ET.5 - Apply the knowledge learned in STEM to solve problems			

Resources:
Texts/Materials:
Curricular framework, TI 30, rewordify.com, newsela.com, Big Ideas Math: Geometry copyright 2019

Unit 8: Right Triangles	Recommended Duration: 10 days

Unit Description: In the beginning of this unit the students will discover some proportions that can be set up using similarity in right triangles. Students will then explore the Pythagorean Theorem and its converse. Students utilize proportions from the beginning of the unit to prove the Pythagorean Theorem. Students use Pythagorean Theorem to uncover the rules for 45-45-90 and 30-60-90 triangles. Students then use these special triangles to solve problems. Finally, the trigonometric ratios are taught and students use them to solve application problems.

Essential Questions:	Enduring Understandings:
- What kind of relationship exists in similar right triangles? - What is the geometric mean? - How do you prove the Pythagorean Theorem? - How do you find a side length or angle measure of a right triangle? - How do trigonometric ratios relate to similar right triangles? - How are right triangles used to build suspension bridges? - How is triangle tiling used in wallpaper design? - How can surveyors determine angle measures? - How do airline pilots use angles of elevation and depression?	- If you draw the altitude to the hypotenuse of a right triangle, three pairs of similar right triangles are formed. - If the lengths of any two sides of a right triangle are known, the length of the third side can be found using the Pythagorean Theorem. - If the lengths of all sides of a triangle are known it can be determined whether the triangle is acute, right, or obtuse. - Certain right triangles have properties that allow their side lengths to be determined without using Pythagorean Theorem. - If certain combinations of side lengths and angle measures of a right triangle are known, ratios can be used to find other side lengths and angle measures. - The angles of elevation and depression are the acute angles of right triangles formed by horizontal distance and a vertical height.

Relevant Standards:	Learning Goals:	Learning Objectives:
Content Standards: **Primary(Power):** **NJSLS.G-SRT.B.4 –** Prove theorems about triangles. Theorems include: *a line parallel to one side of a triangle divides the other two proportionally, and conversely; the Pythagorean Theorem proved using triangle similarity.*	Students will understand and be able to prove the Pythagorean Theorem using triangle similarity. Based on this similarity, students will be able to define and use special triangle relationships and the trigonometric ratios for acute angles. (10 days)	- Students will be able to apply the Pythagorean Theorem to classify a triangle as obtuse, right, or acute. - Students will be able to apply the properties of 45-45-90 triangles. - The students will be able to apply the properties of 30-60-90 triangles. - Students will be able to find trigonometric ratios using right triangles.

Relevant Standards:	Learning Goals:	Learning Objectives:
NJSLS.G-SRT.B.5 – Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures. **NJSLS.G-SRT.C.6 –** Understand that by similarity, side ratios in right triangles are properties of the angles in a triangle, leading to definitions of trigonometric ratios for acute angles. **NJSLS.G-SRT.C.7** - Explain and use the relationship between the sine and cosine of complementary angles. **NJSLS.G-SRT.C.8** - Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems. **Secondary(Supportive):** **Mathematical Practice (Supportive):** **MP1** Make sense of problems and persevere in solving them. **MP2** Reason abstractly and quantitatively. **MP4** Model with mathematics. **MP6** Attend to precision. **MP7** Look for and make use of structure.		• Students will be able to solve problems using trigonometric ratios. • Students will be able to solve triangles using trigonometric ratios and inverse ratios. • Students will be able to solve problems involving angles of depression and elevation.

Relevant Standards:	Learning Goals:	Learning Objectives:
MP8 Look for and express regularity in repeated reasoning.		

Formative Assessments	Summative Assessments:	Performance Assessments:	Major Activities/ Assignments (required):
Teacher Observation, Class Participation, Warm ups, Homework, Exit Slips, Learning Goals and Scales, I-clicker responses, Group work	Unit Tests, Quizzes, Graded Homework, open-ended questions, MAP testing	Locating a Forest Fire Performance task	Pythagorean Spiral Project G.SRT.C.6 Defining Trigonometric Ratio G.SRT.C.7 Sine and Cosine of Complimentary Angles

Possible Assessment Modifications /Accommodations:			
Special Education	**Struggling Learners**	**ELL**	**Advanced Learners**
• Provide trigonometric ratios rules (SOH-CAH-TOA) • Provide drawings and diagrams for angle of elevation problems • Simplified test wording • Provide study guide with answer key prior to test • Highlight/Bold key directions • Clarify test directions verbally • Read test questions aloud • Limited multiple choice • Provide calculator • Preferential seating	• Provide trigonometric ratios rules (SOH-CAH-TOA) • Provide drawings and diagrams for angle of elevation problems • Simplified test wording • Provide study guide with answer key prior to test • Highlight/Bold key directions • Clarify test directions verbally • Read test questions aloud • Limited multiple choice • Provide calculator • Preferential seating	• Provide trigonometric ratios rules (SOH-CAH-TOA) • Provide drawings and diagrams for angle of elevation problems • Simplify language • Single step directions • Simplified test wording • Extra time on assessments • Provide study guide with answer key prior to test • Highlight/Bold key directions • Clarify test directions verbally • Read test questions aloud • Allow student to write on test • Limited multiple choice • Provide calculator	• Real world application questions (angle of elevation and depression) • Provide extension questions • Provide opportunities for and PSAT practice questions

Instructional Strategies
Providing clear learning goals, celebrating student success, establish classroom routines, identifying critical information, preview new content, chunk content into "digestible bites", reflect on learning, organize students to practice and deepen knowledge, using homework, examine errors in reasoning, practice skills and strategies, revising knowledge, provide resource and guidance, organizing/engaging students for cognitively complex tasks involving generating hypothesis and testing

Possible Instructional Modifications /Accommodations/Differentiation:			
Special Education	Struggling Learners	ELL	Advanced Learners
- Graphic organizers of definitions for trigonometry (sin, cos, and tan) - Word wall of definitions involving trigonometry - Use of mnemonics (SOHCAHTOA) - Preferential seating - Limit number of homework questions - Flexible grouping - Visual charts and representations of concepts	- Graphic organizers of definitions for trigonometry (sin, cos, and tan) - Word wall of definitions involving trigonometry - Use of mnemonics (SOHCAHTOA) - Preferential seating - Limit number of homework questions - Flexible grouping - Visual charts and representations of concepts	- Graphic organizers of definitions for trigonometry (sin, cos, and tan) - Word wall of definitions involving trigonometry - Use of mnemonics (SOHCAHTOA) - Clarify directions verbally - Simplify directions - Review of directions - Visual charts and representations of concepts - Preferential seating - Limit number of homework questions - Flexible grouping - Positive reinforcement of behavior	- Extension project of angle of elevation and depression of a real life building or object - Tiered assignments - Learning stations

Unit Vocabulary:
Essential: Pythagorean Theorem, Pythagorean Triple, trigonometry, trigonometric ratio, sine, cosine, tangent, angle of elevation, angle of depression   **Non-Essential**: angle, vertex, short leg, hypotenuse

Interdisciplinary Connections (Applicable Standards):	Integration of Technology:	21st Century Themes:	21st Century Skills:
Interdisciplinary: ELA: NJSL.SA.R10 - Read and comprehend complex literary and informational text independently and proficiently with scaffolding as needed. **Technology:** NJSL8.1.12.C.1 - Develop an innovative solution to a real world problem or issue in collaboration with peers and experts, and present ideas for feedback through social media or in an online community. NJSL8.2.12.A.3 - Research and present information on an existing technological product that has been repurposed for a different function. **Career Practices:** CRP2 - Apply appropriate academic and technical skills. CRP8 - Utilize critical thinking to make sense of problems and persevere in solving them. **Career Awareness:** NJSLS.9.3.ST.ET.5 - Apply the knowledge learned in STEM to solve problems	S – Google classroom: students will use google classroom to obtain homework assignments. A – Khan Academy: students will use Khan Academy to practice angle pair problems. M – Students find real world examples of right triangles and calculate the sine, cosine and tangent ratios. They work collaboratively to create a presentation using real world examples. R – Students create tutorials using a real world example of similar right triangles and explain the sine, cosine and tangent ratios as they apply to their model.	_____ Global Awareness _____ Civic Literacy __X_ Financial, Economic, Business, & Entrepreneurial Literacy Question how the techniques in trigonometry are used in navigation satellite systems. _____ Health Literacy	_____ Creativity & Innovation _____ Media Literacy _____Critical Thinking and Problem Solving __X_Life and Career Skills The techniques in trigonometry are used for finding relevance in navigation particularly satellite systems and astronomy, naval and aviation industries, oceanography, land surveying, and in cartography (creation of maps). _____ Information & Communication Technologies Literacy __X_Communication & Collaboration Google classroom, google docs and khan academy. _____ Information Literacy

Resources:
Texts/Materials:
Curricular framework, TI 30 Calculators, rewordify.com, newsela.com, Big Ideas Math: Geometry copyright 2019

Unit 9: Circles	Recommended Duration: *11 days*
Unit Description: This unit focuses exclusively on circles and their special properties. A circle is a unique geometric shape in which the angles, arcs, and segments intersecting that circle have special relationships. In this unit, students identify the parts of a circle and use these parts to find arc, angle and segment measures. In addition, students prove that all circles are similar. The unit concludes with constructions of inscribed and circumscribed circles of a triangle. Students also prove properties of angles for a quadrilateral inscribed in a circle	

Essential Questions:	Enduring Understandings:
- How can you prove relationships between angles and arcs in a circle? - When lines intersect a circle or within a circle, how do you find the measures of resulting angles, arcs and segments? - What kinds of angles do the hands on a clock form? - How do the grooves in a Belgian waffle iron model segments in a circle? - How is a socket like an inscribed polygon? - How are tangents related to track and field events? - How is a rainbow formed by segments of a circle? - How are lengths of intersecting chords related?	- A radius of a circle and the tangent that intersects the endpoint of the radius on the circle has a special relationship. - A circle has a special relationship to a triangle whose sides are tangent to the circle. - Information about congruent parts of a circle (or congruent circles) can be used to find information about other parts of the circle (or circles). - Angles formed by intersecting lines have special relationship to the arcs the intersecting lines intercept. - Specifically, arcs intercepted by chords that form inscribed angles are related to the inscribed angles. - Angles formed by intersecting lines have a special relationship to the arcs the intersecting lines intercept. - Arcs formed by lines intersecting either within a circle or outside a circle are related to the angles formed by the lines. - There are special relationships between intersecting chords, intersecting secants, or a secant and tangent that intersect.

Relevant Standards:	Learning Goals:	Learning Objectives:
Content Standards: **Primary(Power):** **N/A** **Secondary(Supportive):** **NJSLS.G-C.A.1** - Prove that all circles are similar. **NJSLS.G-C.A.2** - Identify and describe relationships among inscribed angles, radii, and chords. *Include the relationship between central, inscribed, and circumscribed angles; inscribed angles on a diameter are right angles; the radius of a circle is perpendicular to the tangent where the radius intersects the circle.* **NJSLS.G-C.A.3** - Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle. **Mathematical Practice (Supportive):** **MP1** Make sense of problems and persevere in solving them. **MP6** Attend to precision.	Students will understand the relationships among radii, chords, inscribed angles, arcs, central angles and circumscribed angles of the circle. Students will be able to prove that all circles are similar. (11 days)	• Prove all circles are similar. • Define a circle, a sphere and terms related to them. • Recognize circumscribed and inscribed polygons and circles. • Apply theorems that relate to tangents and radii. • Define and apply properties of arcs and central angles. • Apply theorems about the chords of a circle. • Solve problems and prove statements involving inscribed angles, angles formed by chords, secants and tangents and involving lengths of chords, secant segments and tangent segments. • Construct the inscribed and circumscribed circles of a triangle and prove properties of angles for a quadrilateral inscribed in a circle. • Construct a tangent line from a point outside a given circle to the circle

Formative Assessments	Summative Assessments:	Performance Assessments:	Major Activities/ Assignments (required):
Teacher Observation, Class Participation, Warm ups, Homework, Exit Slips, Learning Goals and Scales, I-clicker responses, Group work	Unit Tests, Quizzes, Graded Homework, open-ended questions, MAP testing	Determining the Dimensions of a Logo Performance Task	Circle unit test Logo rubric

Possible Assessment Modifications /Accommodations:			
Special Education	**Struggling Learners**	**ELL**	**Advanced Learners**
• Simplified test wording • Extra time on assessments • Provide study guide with answer key prior to test • Highlight/Bold key directions • Clarify test directions verbally • Read test questions aloud • Provide calculator • Preferential seating	• Simplified test wording • Extra time on assessments • Provide study guide with answer key prior to test • Highlight/Bold key directions • Clarify test directions verbally • Read test questions aloud • Provide calculator • Preferential seating	• Simplify language • Single step directions • Simplified test wording • Extra time on assessments • Provide study guide with answer key prior to test • Highlight/Bold key directions • Clarify test directions verbally • Read test questions aloud • Provide calculator • Preferential seating	• Provide extension questions • Provide opportunities for and PSAT practice questions

Instructional Strategies
Providing clear learning goals, celebrating student success, establish classroom routines, identifying critical information, preview new content, chunk content into "digestible bites", reflect on learning, organize students to practice and deepen knowledge, using homework, examine errors in reasoning, practice skills and strategies, revising knowledge, provide resource and guidance, organizing/engaging students for cognitively complex tasks involving generating hypothesis and testing

Possible Instructional Modifications /Accommodations/Differentiation:			
Special Education	**Struggling Learners**	**ELL**	**Advanced Learners**
• Graphic organizers for circle definitions (radius, diameter,	• Graphic organizers for circle definitions (radius, diameter,	• Graphic organizers for circle definitions (radius, diameter,	• Extension project involving finding dimensions of a real life circle or

Possible Instructional Modifications /Accommodations/Differentiation:			
Special Education	**Struggling Learners**	**ELL**	**Advanced Learners**
chord, secant, tangent, and arc) • Word wall of circle definitions (radius, diameter, chord, secant, tangent, and arc) • Preferential seating • Limit number of homework questions • Small group instruction • One-on-one instruction • Flexible grouping • Positive reinforcement of behavior • Visual charts and representations of concepts	chord, secant, tangent, and arc) • Word wall of circle definitions (radius, diameter, chord, secant, tangent, and arc) • Preferential seating • Limit number of homework questions • Small group instruction • One-on-one instruction • Flexible grouping • Positive reinforcement of behavior • Visual charts and representations of concepts	chord, secant, tangent, and arc) • Word wall of circle definitions (radius, diameter, chord, secant, tangent, and arc) • Clarify directions verbally • Simplify directions • Review of directions • Visual charts and representations of concepts • Preferential seating • Limit number of homework questions • Small group instruction • One-on-one instruction • Flexible grouping • Positive reinforcement of behavior	deriving pi. • Tiered assignments • Learning stations • Tiered homework assignments

Unit Vocabulary:
Essential: circle, center, chord, radius, diameter, circumference, pi, central arc, minor arc, major arc, semicircle, inscribed, circumscribed, intercepted, tangent, point of tangency, secant **Non-Essential:** congruent, center, unit, point

Interdisciplinary Connections (Applicable Standards):	Integration of Technology:	21st Century Themes:	21st Century Skills:
Interdisciplinary: ELA: NJSL.SA.L6 – Adapt speech to a variety of contexts and communicative	S– Google classroom: students will use google classroom to obtain homework assignments.	__X_ Global Awareness Examine how lines tangent to a circle will be used to gather	____ Creativity & Innovation ____ Media Literacy

Interdisciplinary Connections (Applicable Standards):	Integration of Technology:	21st Century Themes:	21st Century Skills:
tasks, demonstrating command of formal English when indicated or appropriate. **Technology:** NJSL8.2.12.A.3 - Research and present information on an existing technological product that has been repurposed for a different function. **Career Practices:** CRP2 - Apply appropriate academic and technical skills. CRP8 - Utilize critical thinking to make sense of problems and persevere in solving them. **Career Awareness:** NJSLS.9.3.ST.ET.5 – Apply the knowledge learned in STEM to solve problems	A – Khan Academy: students will use Khan Academy to practice finding angle measures or segment lengths within a circle. M – Students will watch a video that summarizes the lesson and answer questions to check for understanding. Once in the classroom students will collaborate with others to complete problems involving circles. R – Students find real world examples and create a video tour that identifies circles in everyday objects and places to share on a class website.	information about solar or lunar eclipses. _____ Civic Literacy _____ Financial, Economic, Business, & Entrepreneurial Literacy _____ Health Literacy	_____Critical Thinking and Problem Solving __X__Life and Career Skills Earth Science – the properties of a circle can be applied to find distances along the curvature of the earth's surfaces. Information&Communication Technologies Literacy __X__Communication & Collaboration Google classroom, Khan Academy and Flipped Classroom _____ Information Literacy

Resources:
Texts/Materials: Curricular framework, TI 30 Calculators, rewordify.com, newsela.com, Big Ideas Math: Geometry copyright 2019

Unit 10: Surface Area and Volume	Recommended Duration: *10 days*
Unit Description: In this unit students apply their knowledge of area to three dimensional geometric solids. The basic types of geometric figures are described and their characteristics are discussed. Students find the lateral areas of prisms, cylinders, pyramids, and cones. They also find the surface areas of these figures. Students identify the parts of a sphere and find the surface areas of a sphere. In this unit, students explore volume. They find the volume of prisms, cylinders, pyramids, cones, and spheres. Students will be able to visualize cross sections of geometric figures and determine equivalent volumes of solids using Cavalieri's principle. Students will apply concepts of density based on area and volume in modeling situations.	

Essential Questions:	Enduring Understandings:
- How do you calculate surface area and volume of geometric solids? - How can you determine the intersection of a solid and a plane? - How do cross sections of geometric solids relate to formulas for volumes of solids? - How do the surface areas and volumes of similar solids compare? - How could you describe the shape of a paper towel roll? - Using the volume formulas, how could you find the thickness of a paper towel? - Why is surface area important to car manufacturers? - How are pyramids used in architecture? - How is the lateral area of a cone used to cover a tepee? - How do manufacturers of sports equipment use the surface areas of spheres? - How do architects use volume? - How can you find the volume of the Earth?	- The area of a three-dimensional figure is equal to the sum of the areas of each surface of the figure. - The surface area of a sphere can be found when its radius is known. - The volume of a prism and a cylinder can be found when its height and the area of its base are known. - The volume of a composite space figure is the sum of the volumes of the figures that are combined. - The volume of a pyramid is related to the volume of a prism with the same base and height. - The volume of a cone is related to the volume of a cylinder with the same base and height. - The volume of a sphere can be found when its radius is known. - Ratios can be used to compare the areas and volume of similar solids. - A cross section is the intersection of a three-dimensional figure and a plane.

Relevant Standards:	Learning Goals:	Learning Objectives:
Content Standards: **Primary(Power):** **NJSLS.G-GMD.A.3 -** Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems. **NJSLS.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). **Secondary(Supportive):** **NJSLS.G-GMD.A.1 -** Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone. *Use dissection arguments, Cavalieri's principle, and informal limit arguments*. **NJSLS.G-GMD.A.2 -** Give an informal argument using Cavalieri's principle for the formulas for the volume of a sphere and other solid figures. **NJSLS.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. **NJSLS.G-MG.A.3**- Apply geometric methods to	Students will understand how to use area and volume formulas for cylinders, pyramids, cones, and spheres to solve problems. Students will be able to apply concepts of density based on area and volume in real life situations.	• Recognize and use area formulas for solids such as prisms, cones, pyramids, and spheres and apply these concepts to volume. • Identify cross sections of solids. • Develop an informal argument for Cavalieri's principle. • Describe the ratio of mass to area or volume of real life objects. • Calculate volume of solid objects in real world problems.

Relevant Standards:	Learning Goals:	Learning Objectives:
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).[*] **Mathematical Practice (Supportive):** **MP1** Make sense of problems and persevere in solving them. **MP6** Attend to precision. **MP7** Look for and make use of structure.		

Formative Assessments	Summative Assessments:	Performance Assessments:	Major Activities/ Assignments (required):
Teacher Observation, Class Participation, Warm ups, Homework, Exit Slips, Learning Goals and Scales, I-clicker responses, Group work	Unit Tests, Quizzes, Graded Homework, open-ended questions, MAP testing	Measuring the Immeasurable Performance Task	G.MG.A.1Toilet Roll G.GMD.A.3 The Great Egyptian Pyramids G.GMD.B.4 Tennis Balls in a Can G.MG.A.2 How many cells are in the human body? G.MG.A.3 Ice Cream Cone House Flip Project Soda Can Project

Possible Assessment Modifications /Accommodations:			
Special Education	**Struggling Learners**	**ELL**	**Advanced Learners**
• Remind students that they may use formula sheet or SAT formula sheet • Clearly label dimensions of shapes. • Simplified test wording • Extra time on assessments • Provide study guide with answer key prior to test • Highlight/Bold key directions • Clarify test directions verbally • Read test questions aloud • Provide calculator • Preferential seating	• Remind students that they may use formula sheet or SAT formula sheet • Clearly label dimensions of shapes. • Simplified test wording • Extra time on assessments • Provide study guide with answer key prior to test • Highlight/Bold key directions • Clarify test directions verbally • Read test questions aloud • Provide calculator • Preferential seating	• Remind students that they may use formula sheet or SAT formula sheet • Clearly label dimensions of shapes. • Simplify language • Single step directions • Simplified test wording • Extra time on assessments • Provide study guide with answer key prior to test • Highlight/Bold key directions • Clarify test directions verbally • Read test questions aloud • Provide calculator • Preferential seating	• Real world application questions involving modeling with objects and finding volume. • Provide extension questions • Provide opportunities for and PSAT practice questions

Instructional Strategies
Providing clear learning goals, celebrating student success, establish classroom routines, identifying critical information, preview new content, chunk content into "digestible bites", reflect on learning, organize students to practice and deepen knowledge, using homework, examine errors in reasoning, practice skills and strategies, revising knowledge, provide resource and guidance, organizing/engaging students for cognitively complex tasks involving generating hypothesis and testing

Possible Instructional Modifications /Accommodations/Differentiation:			
Special Education	**Struggling Learners**	**ELL**	**Advanced Learners**
• Graphic organizers for volume and surface area formulas. • Word wall of three dimensional	• Graphic organizers for volume and surface area formulas. • Word wall of three dimensional	• Graphic organizers for volume and surface area formulas. • Word wall of three dimensional	• Extension project involving finding volume and surface area • Tiered assignments

Possible Instructional Modifications /Accommodations/Differentiation:			
Special Education	**Struggling Learners**	**ELL**	**Advanced Learners**
shapes and their properties. • Preferential seating • Limit number of homework questions • Flexible grouping • Positive reinforcement of behavior • Visual charts and representations of concepts	shapes and their properties. • Preferential seating • Limit number of homework questions • Flexible grouping • Positive reinforcement of behavior • Visual charts and representations of concepts	shapes and their properties. • Clarify directions verbally • Simplify directions • Review of directions • Visual charts and representations of concepts • Preferential seating • Limit number of homework questions • Flexible grouping • Positive reinforcement of behavior	• Learning stations

Unit Vocabulary:
Essential: volume, prism, base, height, cylinder, composite figure, cross section, Cavalieri's principle, pyramid, cone sphere, density, population density **Non-Essential:**

Interdisciplinary Connections (Applicable Standards):	Integration of Technology:	21st Century Themes:	21st Century Skills:
Interdisciplinary: ELA: NJSL.SA.R10 – Read and comprehend complex literary and informational text independently and proficiently with scaffolding as needed. **Financial Literacy:** NJSLS.9.1.12.A.8 - Analyze different forms of currency and how currency is	S – Google classroom: students will use google classroom to obtain homework assignments. A – Khan Academy: students will use Khan Academy to practice surface area and volume problems. M – Students will watch a video that summarizes the lesson and	__X__ Global Awareness Know how population density, famine, war, and immigration influence the world.	____ Creativity & Innovation ____ Media Literacy __X_Critical Thinking and Problem Solving Real life problems like calculating materials need to resurface parking lots are used to refine critical thinking.

Interdisciplinary Connections (Applicable Standards):	Integration of Technology:	21st Century Themes:	21st Century Skills:
used to exchange goods and services. **Technology:** NJSL8.1.12.C.1 - Develop an innovative solution to a real world problem or issue in collaboration with peers and experts, and present ideas for feedback through social media or in an online community. NJSL8.2.12.A.3 – Research and present information on an existing technological product that has been repurposed for a different function. **Career Practices:** CRP2 – Apply appropriate academic and technical skills. CRP8 – Utilize critical thinking to make sense of problems and persevere in solving them. **Career Awareness:** NJSLS.9.3.ST.ET.5 – Apply the knowledge used in STEM to solve problems.	answer questions to check for understanding. Once in the classroom students will collaborate with others to complete problems involving solids. R – Students find real world examples and create a video tour that identifies different solids and calculate their surface area and volume to share on a class website.	____ Civic Literacy ____ Financial, Economic, Business, & Entrepreneurial Literacy ____ Health Literacy	__X__Life and Career Skills Surface areas and volumes are used in careers such as manufacturing and architecture. ____ Information & Communication Technologies Literacy __X__Communication & Collaboration Google classroom, khan academy and flipped classroom. ____ Information Literacy

Resources
Texts/Materials:
Curricular framework, TI 30 Calculators, rewordify.com, newsela.com, Big Ideas Math: Geometry copyright 2019