

# Glen Ridge Public Schools –Mathematics Curriculum



**Course Title: Geometry CP**

**Subject: Mathematics**

**Grade Level: 9-10**

**Duration: 1 year**

**Prerequisite: Algebra I**

**Elective or Required: Elective**

## **Mathematics Mission Statement**

Mathematics is an integral part of our lives. Students must be actively involved in their mathematics education through the use of modeling and demonstrating the ability to persevere through problem solving. The mathematics curricula will emphasize critical thinking skills through a balance of logic and reasoning, attention to precision by utilizing patterns and structure, and bridging these ideas to cross-curricular learning. Students will be engaged and challenged in a student-centered learning environment that is developmentally appropriate and will communicate mathematical ideas, both in a verbal and written form. Through effectively applying hands-on manipulatives, basic computation skills and the use of technical writing to justify their processes, students will critique the work of themselves and others.

## **Course Description:**

The purpose of this full-year course is to provide students with an opportunity to develop the skills and concepts by NJ Core Curriculum Standards and the graduation requirement while building a solid foundation in geometry.

Geometry covers the required concepts of Euclidean geometry including construction, definitions, postulates, and theorems. Areas of study include: angles, parallel & perpendicular lines, congruent & similar triangles, quadrilaterals, polygons, circles and arc, and the Pythagorean Theorem. The process of “proving” theorems is introduced. Special topics include coordinate & spatial geometry and introductory trigonometry.

Students will be expected to develop an understanding of the concepts through explorations, investigations, cooperative learning activities, small groups and large instructions, and use of technologies to model situations, identify patterns and to discover

solutions. Students will be expected to express mathematical ideas orally and in writing, make and justify conjectures, follow and construct logical arguments, apply concepts learned to real-life situations and make connection with other disciplines.

**Author:** Shihong Zhang

**Date Submitted:** Summer 2017

## Topic/Unit: Foundations for Geometry

**Approximate 4 Weeks: 15- 18 days**

### Essential Questions:

- 1) *Why are points, lines, planes, and angles important in the real world?*
- 2) *How are points, lines, and planes represented in real-life objects?*
- 3) *How is knowledge of the geometry concept used every day by scientists as well as ordinary people?*
- 4) *Why are coordinate systems important?*
- 5) *How does finding the midpoint connect algebra to geometry?*
- 6) *How are angle relationships used to find missing angle measurements?*

### Upon completion of this unit students will be able to:

- Understand point, line and plans. (G.CO.1)
- Construct and measure segments and angles. (G.CO.12)
- Apply distance formula and midpoint formula (G.GPE.7\*)
- Define and apply supplementary angles, complementary angles, linear pair, adjacent angles, and vertical angles. (G.CO.1)
- Identify reflections, translations and rotations and graph the basic transformations in the coordinate plane. (G.CO.2, G. CO.6)

### Interdisciplinary Standards (njcccs.org)

- Standard 5.1 – Science Practices
- Standard 6.3 – Active Citizenship in the 21<sup>st</sup> Century
- Standard 8.2 – Technology Education
- Standard 9.1 – 21st - Century Life & Career Skills
- Standard 9.3 Career Awareness, Exploration, and Preparation

### Activities – include 21<sup>st</sup> Century Technologies:

- Smart Board PowerPoint presentations
- Lecture and class discussion
- Khan Academy
- Technology Lab – Explore Properties Associated with Points (use geometry software to measure distances and explore properties of points on segments)
- Technology Lab – Segment and Angle Bisectors (use geometry software to construct segment and angle bisectors)
- Construction – Congruent Segment, Segment Bisector, Congruent Angle, Angle Bisector
- Construction – Reflect, Translate, and Rotate a Figure Using Patty Paper

- Connecting Geometry to Algebra – Unit Conversions (use conversion factors to convert measurements)
- Connecting Geometry to Algebra – Transformations of Functions (reflect and translate functions in the coordinate plane and write a rule for the transformation)
- Online videos from textbook website
- Additional lessons – On Core Mathematics (Houghton Mifflin Harcourt)

**Enrichment Activities:**

- Practice A&B Worksheets (Holt McDougal)
- Problem Solving Worksheets (Holt McDougal)
- Landscape a rectangular patio area.
- Fold paper to find the midpoints and angle bisectors.
- Create a quilt pattern by using basic transformation.
- College Entrance Exam Practice

**Methods of Assessments/Evaluation:**

- Thumb up/down
- Journal reflective
- Verbal Assessment
- Exit Ticket
- Self-Assessment( 4-3-2-1)
- Open Ended Questions
- Homework
- Classwork
- Quizzes
- Written Chapter Test
- Check it Out Problems (questions during lecture)
- Take Poll
- Textbook Activity – Euclidean and Construction Tools (assess students’ ability to apply concepts and skills in a real-world format)
- Textbook Activity – Coordinate and Transformation Tools (assess students’ ability to apply concepts and skills in a real-world format)
- Textbook Activity – Congruence Transformations (assess students’ ability to apply concepts and skills in real-world format)

**Resources/Including Online Resources**

- Online Textbook Information: [my.hrw.com](http://my.hrw.com)
- Geometry Textbook (publisher: Holt McDougal)
- Google Classroom
- Online Khan Academy Class
- Geometers Sketchpad
- On Core Mathematics Geometry (publisher: Houghton Mifflin Harcourt)

### Unit 1 Student Self-Assessment Scale Chart

Level of Learning	Objective	<u>Assessment</u> 4: I can teach others 3: I can pass an assessment on this topic 2: I'm getting there but need more practice 1: I don't understand
1	<ul style="list-style-type: none"> <li>● Identify basic geometric figures</li> <li>● Copy an angle and a segment</li> <li>● Understand distance formula and midpoint formula</li> <li>● Identify angle pairs</li> <li>● Identify basic transformation.</li> </ul>	
2	<ul style="list-style-type: none"> <li>● Name basic geometric figure appropriately</li> <li>● Bisect an angle and a segment</li> <li>● Find a distance and a midpoint in the coordinate plane</li> <li>● Understand the basic theorem of angle pairs</li> <li>● Tell the difference of the three basic transformations.</li> </ul>	
3	<ul style="list-style-type: none"> <li>● Apply the basic geometric figures and theorems to find distance, midpoint, missing angle in an angle pair and perform the basic transformations on a coordinate plane</li> </ul>	
4	<ul style="list-style-type: none"> <li>● In real life situation, students can apply the basic geometric figures and theorems to find distance, midpoint, missing angle in an angle pair and perform the basic transformations on a coordinate plane to do a problem solving and prove the statement</li> </ul>	

**Topic/Unit: Geometry Reasoning**

## Approximate 2-3 Weeks ( 13 days)

### Essential Questions:

- 1). *Why are proofs important in the development of geometry concepts?*
- 2). *How does inductive reasoning and conjecturing help you arrive at valid conclusions?*
- 3). *How do If-then statements help you understand (determine) the validity of conclusions?*
- 4). *How do I use data to generate a conjecture? How do I support my conjecture?*

### Upon completion of this unit students will be able to:

- Use inductive reasoning to make conjectures.(Prep G. CO.9)
- Use deductive reasoning to verify conjectures. Prep G. CO.9)
- Write and analyze the true value of conditional statements. (Prep G. CO.9)
- Write the inverse, converse and contrapositive of a conditional statement. ( Prep G. CO.9)
- Write and analyze bi-conditional statements. (Prep G. CO.9)
- Identify properties of equality and congruence.( Prep G. CO.9)
- Design plans for proof (G. CO.9)
- Write justifications for geometric proofs. (G. CO.9)

### Interdisciplinary Standards (njcccs.org)

- Standard 5.1 – Science Practices
- Standard 6.3 – Active Citizenship in the 21<sup>st</sup> Century
- Standard 8.2 – Technology Education
- Standard 9.1 – 21st - Century Life & Career Skills
- Standard 9.3 Career Awareness, Exploration, and Preparation

### Activities – include 21<sup>st</sup> Century Technologies:

- Smart Board PowerPoint presentations
- Lecture and class discussion
- Khan Academy
- Connecting Geometry to Number Theory – Venn Diagrams (applying reasoning skills to drawing Venn diagrams of number sets)
- Geometry Lab – Solve Logic Puzzles (use tables and networks to solve logic puzzles)
- Geometry Lab – Design Plans for Proofs (learn strategies for planning the logical steps of a proof)
- Real-World Connection – The Myrtle Beach Marathon/Would Carolina’s Waterfalls (choose appropriate problem-solving strategies and use them to solve real-world problems)
- Online quizzes from textbook website
- Online videos from textbook website

- Additional lessons – On Core Mathematics (Houghton Mifflin Harcourt)

**Enrichment Activities:**

- Practice A&B Worksheets (Holt McDougal)
- Choose an advertising slogan to analyze its true value and write its converse, inverse, contra-positive and bi-conditional statement.
- Analyze the true value of class rules.
- Solve logic puzzles.
- Problem Solving Worksheets (Holt McDougal)
- College Entrance Exam Practice

**Methods of Assessments/Evaluation:**

- Thumb up/down
- Journal reflective
- Verbal Assessment
- Exit Ticket
- Self-Assessment( 4-3-2-1)
- Open Ended Questions
- Homework
- Classwork
- Quizzes
- Written Chapter Test
- Check it Out Problems (questions during lecture)
- Textbook Activity – Inductive and Deductive Reasoning (assess students' ability to apply concepts and skills in a real-world format)
- Textbook Activity – Mathematical Proof (assess students' ability to apply concepts and skills in a real-world format)

**Resources/Including Online Resources**

- Online Textbook Information: [my.hrw.com](http://my.hrw.com)
- Geometry Textbook (publisher: Holt McDougal)
- Google Classroom
- Online Khan Academy Class
- Geometers Sketchpad
- On Core Mathematics Geometry (publisher: Houghton Mifflin Harcourt)

**Enrichment Activities:**

- Choose an advertising slogan to analyze its true value and write its converse, inverse, contra-positive and bi-conditional statement.
- Analyze the true value of class rules.
- Solve logic puzzles.

**Methods of Assessments/Evaluation:**

- Smart-board lesson

- Thumb up/down
- Journal reflective
- Homework
- Classwork
- Project
- Session Quiz
- Chapter Test

**Resources/Including Online Resources**

- Online Textbook Information: [my.hrw.com](http://my.hrw.com)
- Teacher Webpage
- Geometers Sketchpad
- On Core Mathematics Geometry (publisher: Houghton Mifflin Harcourt)

**Unit 2 Student Self-Assessment Scales Chart**

Level of Learning	Objective	<u>Assessment</u> 4: I can teach others 3: I can pass an assessment on this topic 2: I'm getting there but need more practice 1: I don't understand
1	<ul style="list-style-type: none"> <li>• Understand what a conjecture is.</li> <li>• Understand properties of equality</li> <li>• Solve linear equation</li> </ul>	
2	<ul style="list-style-type: none"> <li>• Write conditional statement, inverse, converse, contrapositive statement and biconditional statement</li> <li>• Write justifications for Algebra proof</li> </ul>	
3	<ul style="list-style-type: none"> <li>• Analyze the true value of each statement</li> <li>• Design plans for proof</li> </ul>	
4	<ul style="list-style-type: none"> <li>• Write justification for geometric proofs.</li> <li>• Apply conjecture and different statement for problem solving.</li> </ul>	

## Topic/Unit 3 Parallel and Perpendicular

**Lines** Approximate 2-3 Weeks (15 days)

### Essential Questions:

- 1). *How are the relationships between lines and planes used in the real world?*
- 2). *What areas in the real world are properties of parallel lines important?*
- 3). *How is proving lines parallel or perpendicular important in the real world?*

### Upon completion of this unit students will be able to:

- Identify parallel and perpendicular lines and skew lines. (G.CO.1)
- Identify the angles formed by two lines and a transversal. (G.CO.9)
- Prove and use theorems about the angles formed by parallel lines and transversal. (G.CO.9)
- Prove and use theorems about the angles formed by perpendicular lines and transversal. (G.CO.9)
- Construct parallel lines and perpendicular lines. (G.CO.12)
- Discover the relationship of the slopes of parallel and perpendicular lines.(G.GPE.5)

### Interdisciplinary Standards ([njcccs.org](http://njcccs.org))

- Standard 5.1 – Science Practices
- Standard 6.3 – Active Citizenship in the 21<sup>st</sup> Century
- Standard 8.2 – Technology Education

- Standard 9.1 – 21st - Century Life & Career Skills
- Standard 9.3 Career Awareness, Exploration, and Preparation

**Activities – include 21<sup>st</sup> Century Technologies:**

- Use toothpicks and other materials to create a model of a bridge.
- Connect geometry to data analysis-scatter plots and lines of best fit.
- Smart Board PowerPoint presentations
- Lecture and class discussion
- Khan Academy
- Connecting Geometry to Algebra – Systems of Equations (find angle measures by solving systems of equations)
- Technology Lab – Explore Parallel Lines and Transversals (use geometry software to explore angles formed by parallel lines and transversals)
- Technology Lab – Explore Parallel and Perpendicular Lines (use a graphing calculator to graph parallel and perpendicular lines)
- Geometry Lab - Construct Parallel Lines (use various methods to construct parallel lines)
- Geometry Lab – Construct Perpendicular Lines (construct a line perpendicular to a given line through a given point)
- Connecting Geometry to Data Analysis – Scatter Plots and Lines of Best Fit (apply linear equation skills to graphing and writing equations for lines associated with data sets)
- Online videos from textbook website
- Additional lessons – On Core Mathematics (Houghton Mifflin Harcourt)

**Enrichment Activities:**

- Practice A&B Worksheets (Holt McDougal)
- Ready to Go On Worksheets (Holt McDougal)
- Problem Solving Worksheets (Holt McDougal)
- College Entrance Exam Practice

**Methods of Assessments/Evaluation:**

- Thumb up/down
- Journal reflective
- Verbal Assessment
- Exit Ticket
- Self-Assessment( 4-3-2-1)
- Open Ended Questions
- Homework
- Classwork
- Quizzes
- Written Chapter Test
- Check it Out Problems (questions during lecture)
- Textbook Activity – Parallel and Perpendicular Lines and Transversals (assess students' ability to apply concepts and skills in a real-world format)

- Textbook Activity – Coordinate Geometry (assess students’ ability to apply concepts and skills in a real-world for

**Resources/Including Online Resources**

- Online Textbook Information: my.hrw.com
- Geometry Textbook (publisher: Holt McDougal)
- Google Classroom
- Online Khan Academy Class
- Geometers Sketchpad
- On Core Mathematics Geometry (publisher: Houghton Mifflin Harcourt)
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**Unit 3 Student Self-Assessment Scale Chart**

Level of Learning	Objective	<u>Assessment</u> 4: I can teach others 3: I can pass an assessment on this topic 2: I’m getting there but need more practice 1: I don’t understand
1	<ul style="list-style-type: none"> <li>● Identify parallel lines, perpendicular and skew lines on a graph.</li> <li>● Name the angle pairs formed by two lines and a transversal.</li> <li>● Find the slope of a line.</li> </ul>	
2	<ul style="list-style-type: none"> <li>● Solve an angle formed by two lines and a transversal.</li> <li>● Tell the lines are parallel, intersect, perpendicular or coincide by their slopes.</li> <li>● Write an equation of a line.</li> </ul>	
3	<ul style="list-style-type: none"> <li>● Construct perpendicular and parallel lines by compass and straight edge.</li> <li>● Apply theorems about angle pair formed by two parallel lines and a transversal.</li> <li>● Write an equation for the line that is parallel or perpendicular to a line.</li> </ul>	
4	<ul style="list-style-type: none"> <li>● In real life situation, students can apply theorems about angle pair formed by two parallel lines and a transversal to do problem solve and prove statement</li> <li>● Apply perpendicular line theorems for problem solving.</li> </ul>	

## Topic/Unit 4: Triangle Congruence

**Approximate 4-5 Weeks (20 days)**

### **Essential Questions:**

- 1). *How can you use SSS, SAS, and ASA Postulates to test for Triangle congruence?*
- 2). *Why is it important to be able to identify congruent triangles in every day life?*
- 3). *Where in real life can you use the properties of isosceles and equilateral triangles?*

### **Upon completion of this unit students will be able to:**

- Classify triangles by sides and angles. (G.CO.10)
- Apply angle relationship in Triangles. (G.CO.10)
- Define congruent triangles and match up corresponding sides and angles.(G.SRT.5)
- Define and apply SSS, SAS, ASA, AAS and HL congruency theorem. (G.CO.8)
- Use CPCTC to prove other corresponding parts in congruent triangles. (G.SRT.5)
- Apply theorems and properties of isosceles and equilateral triangles. (G.CO.10)

### **Interdisciplinary Standards (njcccs.org)**

- Standard 5.1 – Science Practices
- Standard 6.3 – Active Citizenship in the 21<sup>st</sup> Century
- Standard 8.2 – Technology Education
- Standard 9.1 – 21st - Century Life & Career Skills
- Standard 9.3 Career Awareness, Exploration, and Preparation

### **Activities – include 21<sup>st</sup> Century Technologies:**

- Smart Board PowerPoint presentations
- Lecture and class discussion
- Khan Academy
- Use straws to display two triangles are not necessary to be congruent by ASS.
- Real-World Connections: Help lazy Lawrence solve the roof problem.

- Geometry Lab – Develop the Triangle Sum Theorem (use patty paper to discover the relationship between the measures of the interior angles of a triangle)
- Geometry Lab – Explore SSS and SAS Triangle Congruence (discover shortcuts for proving triangles are congruent)
- Technology Lab – Predict Other Triangle Congruence Relationships (use geometry software to explore triangle congruence relationships)
- Connecting Geometry to Algebra – Quadratic Equations (solve quadratic equations to find the length of a side of a triangle)
- Online videos from textbook website
- Additional lessons – On Core Mathematics (Houghton Mifflin Harcourt)

**Enrichment Activities:**

- Practice A&B Worksheets (Holt McDougal)
- Ready to Go On Worksheets (Holt McDougal)
- Problem Solving Worksheets (Holt McDougal)
- College Entrance Exam Practice

**Methods of Assessments/Evaluation:**

- Smart-board lesson
- Thumb up/down
- Journal reflective
- Verbal Assessment
- Exit Ticket
- Self-Assessment( 4-3-2-1)
- Open Ended Questions
- Homework
- Classwork
- Quizzes
- Written Chapter Test
- Check it Out Problems (questions during lecture)
- Alternative Assessment

**Resources/Including Online Resources**

- Online Textbook Information: [my.hrw.com](http://my.hrw.com)
- Geometry Textbook (publisher: Holt McDougal)
- Google Classroom
- Online Khan Academy Class
- Geometers Sketchpad
- On Core Mathematics Geometry (publisher: Houghton Mifflin Harcourt)

**Unit 4 Student Self-Assessment Scale Chart**

Level of Learning	Objective	<u>Assessment</u> 4: I can teach others 3: I can pass an assessment on this topic 2: I'm getting there but need more practice 1: I don't understand
1	<ul style="list-style-type: none"> <li>● Classify triangles by sides and angles</li> <li>● Define congruent triangles and match up corresponding parts.</li> </ul>	
2	<ul style="list-style-type: none"> <li>● Solve side lengths or angle measures in isosceles and equilateral triangles.</li> <li>● Understand Triangle Sum Theorem</li> <li>● Understand what SSS, SAS, AAS, ASA, and HL represent.</li> </ul>	
3	<ul style="list-style-type: none"> <li>● Use SSS, SAS, AAS, ASA, and HL to prove triangle congruence.</li> <li>● Apply theorems, triangles, and properties of isosceles and equilateral triangles.</li> </ul>	
4	<ul style="list-style-type: none"> <li>● In real life situation, students can apply the Triangle Sum Theorem, the Third Angle Theorem and Exterior Angle Theorem to do problem solve and prove statement</li> <li>● Use CPCTC to prove other corresponding parts are congruent in congruent triangles.</li> </ul>	

## Topic/Unit 5: Properties and Attributes of Triangles

Approximate 4-5 Weeks ( 23 days )

### Essential Questions:

- 1) *What are the centers of a triangle?*
- 2) *How are the centers related to each other in the triangle?*
- 3) *In what real world situation(s) can you use the triangle inequality to solve problems?*

### Upon completion of this unit students will be able to:

- Construct perpendicular bisectors and angle bisectors of triangles. (G.CO.9)
- Apply theorems and properties about perpendicular bisector and angle bisectors.(G.C.3)
- Define and discover circumcenter, incenter, centroid and orthocenter of triangles. (G.CO.10)
- Define and apply Triangle Midsegment Theorem. (G.CO.10)
- Write assumptions for indirect proofs. (G.CO.10)
- Apply inequalities relationship of in one or more than one triangles. (G.CO.10)
- Prove and apply Pythagorean Theorem and its converse. (G.SRT.4) (G.SRT.8\*)
- Justify and apply properties of special right triangles. (G.SRT.6)

### Interdisciplinary Standards ([njcccs.org](http://njcccs.org))

- Standard 5.1 – Science Practices
- Standard 6.3 – Active Citizenship in the 21<sup>st</sup> Century
- Standard 8.2 – Technology Education
- Standard 9.1 – 21st - Century Life & Career Skills
- Standard 9.3 Career Awareness, Exploration, and Preparation

### Activities – include 21<sup>st</sup> Century Technologies:

- Smart Board PowerPoint presentations
- Lecture and class discussion
- Khan Academy
- Patty Paper Exercise – Perpendicular and Angle Bisectors
- Patty Paper Exercise – Circumcenter and Incenter of a Triangle
- Construction – Centroid and Orthocenter of a Triangle
- Construction – Midsegment of a Triangle
- Technology Lab – Special Points in Triangles (use geometry software and special points in triangles to explore Euler's line)
- Connecting Geometry to Algebra – Solving Compound Inequalities (apply algebra skills to solving compound inequalities)
- Connecting Geometry to Algebra – Simplest Radical Form (apply algebra skills to simplifying radical expressions)
- Geometry Lab – Explore Triangle Inequalities (explore the relationships between side lengths and angle measures in a triangle)
- Geometry Lab – Hands-on Proof of the Pythagorean Theorem (use area to justify the Pythagorean Theorem)

- Geometry Lab – Graph Irrational Numbers (graph irrational numbers on a number line)
- Online videos from textbook website
- Additional lessons – On Core Mathematics (Houghton Mifflin Harcourt)

**Enrichment Activities:**

- Find a centroid of an object to balance it on a tip of a pencil.
- String design.
- Hand-on proof of Pythagorean Theorem
- Practice A&B Worksheets (Holt McDougal)
- Ready to Go On Worksheets (Holt McDougal)
- Problem Solving Worksheets (Holt McDougal)
- College Entrance Exam Practice

**Methods of Assessments/Evaluation:**

- Thumb up/down
- Journal reflective Verbal Assessment
- Verbal Assessment
- Exit Ticket
- Self-Assessment( 4-3-2-1)
- Open Ended Questions
- Homework
- Classwork
- Quizzes
- Written Chapter Test
- Check it Out Problems (questions during lecture)
- Alternative Assessment

**Resources/Including Online Resources**

- Online Textbook Information: [my.hrw.com](http://my.hrw.com)
- Geometry Textbook (publisher: Holt McDougal)
- Google Classroom
- Online Khan Academy Class
- Geometers Sketchpad
- On Core Mathematics Geometry (publisher: Houghton Mifflin Harcourt)

### Unit 5 Student Self-Assessment Scale Chart

Level of Learning	Objective	<u>Assessment</u> 4: I can teach others 3: I can pass an assessment on this topic 2: I'm getting there but need more practice 1: I don't understand
1	<ul style="list-style-type: none"> <li>● Construct perpendicular bisector of a segment</li> <li>● Construct angle bisector of an angle</li> <li>● Find the midpoint of each side of a triangle</li> </ul>	
2	<ul style="list-style-type: none"> <li>● To use the Angle-Side relationships in triangles to order the sides and angles in one triangle</li> <li>● To use the Triangle Inequality Theorem to determine the validity of a triangle</li> <li>● Define and identify circumcenter, incenter, centroid and orthocenter of triangles</li> </ul>	
3	<ul style="list-style-type: none"> <li>● Apply the Perpendicular Bisector Theorem and its converse.</li> <li>● Apply the Angle Bisector Theorem and its converse.</li> <li>● Use circumcenter, incenter, centroid to find missing lengths or angles in triangles.</li> <li>● Apply the Triangle Midsegment Theorem to solve lengths and angles</li> <li>● To use the Hinge Theorem and its converse to compare angles and sides in two triangles.</li> <li>● Find the range of the 3<sup>rd</sup> side length in a triangle.</li> </ul>	
4	<ul style="list-style-type: none"> <li>● In real life situation, students can apply the different centers of triangle to do problem solving and help city design or art application.</li> </ul>	

## Topic/Unit 6: Polygons and Quadrilaterals

**Approximate 2-3 Weeks ( 17 days )**

### **Essential Questions:**

- 1). *How are polygons related? What properties do they share?*
- 2). *How can you use properties of parallelograms to solve real world problems?*
- 3). *What are the properties of special parallelograms ?*
- 4). *How can you use different quadrilaterals to solve real world problems?*

### **Upon completion of this unit students will be able to:**

- Define, construct and classify polygons. (G.CO.11) (G.CO.13)
- Find and use measures of interior angle and exterior angles of polygons. (G.CO.11)
- Define and apply properties of parallelograms. (G.CO.11)
- Prove quadrilaterals are parallelograms. (G.CO.11)
- Prove quadrilaterals are rectangles, rhombuses, and squares. (G.CO.11)
- Using properties of kites and trapezoids to solve problems. (G.SRT.5))

### **Interdisciplinary Standards (njcccs.org)**

- Standard 5.1 – Science Practices
- Standard 6.3 – Active Citizenship in the 21<sup>st</sup> Century
- Standard 8.2 – Technology Education
- Standard 9.1 – 21st - Century Life & Career Skills
- Standard 9.3 Career Awareness, Exploration, and Preparation

### **Activities – include 21<sup>st</sup> Century Technologies:**

- Smart Board PowerPoint presentations
- Lecture and class discussion
- Khan Academy Lecture and class discussion
- Geometry Lab – Construct Regular Polygons (use a compass and straightedge to construct regular polygons)
- Geometry Lab – Explore Properties of Parallelograms (explore properties of parallelograms)
- Connecting Geometry to Algebra – Relations and Functions (apply the polygon formulas to identify relations, functions, domain, and range)
- Construction – Rhombus and Kite (using compass and straightedge)
- Technology Lab – Predict conditions for Special Parallelograms (use geometry software to predict the conditions for rectangles, rhombuses, and squares)
- Technology Lab – Explore Isosceles Trapezoids (use geometry software to investigate the properties and conditions of an isosceles trapezoid)
- Real-World Connections – Handmade Tiles/The Millennium Force Roller Coaster (choose appropriate problem-solving strategies and use them to solve real-world problems)

- Online videos from textbook website
- Additional lessons – On Core Mathematics (Houghton Mifflin Harcourt)

**Enrichment Activities:**

- Find the areas of each piece of Tangram and create figures.
- Predict conditions for special parallelograms
- Practice A&B Worksheets (Holt McDougal)
- Ready to Go On Worksheets (Holt McDougal)
- Problem Solving Worksheets (Holt McDougal)
- College Entrance Exam Practice

**Methods of Assessments/Evaluation:**

- Smart-board lesson
- Thumb up/down
- Journal reflective
- Verbal Assessment
- Exit Ticket
- Self-Assessment( 4-3-2-1)
- Open Ended Questions
- Homework
- Classwork
- Quizzes
- Written Chapter Test
- Check it Out Problems (questions during lecture)
- Alternative Assessment

**Resources/Including Online Resources**

- Online Textbook Information: [my.hrw.com](http://my.hrw.com)
- Geometry Textbook (publisher: Holt McDougal)
- Google Classroom
- Online Khan Academy Class
- Geometers Sketchpad
- On Core Mathematics Geometry (publisher: Houghton Mifflin Harcourt)

### Unit 6 Student Self-Assessment Scale Chart

Level of Learning	Objective	<u>Assessment</u> 4: I can teach others 3: I can pass an assessment on this topic 2: I'm getting there but need more practice 1: I don't understand
1	<ul style="list-style-type: none"> <li>● Classify polygons</li> <li>● Classify quadrilaterals</li> <li>● Classify special parallelograms</li> </ul>	
2	<ul style="list-style-type: none"> <li>● Understand the theorems about parallelograms</li> <li>● Understand the difference between parallelograms, kites, and trapezoids.</li> </ul>	
3	<ul style="list-style-type: none"> <li>● Prove quadrilaterals are parallelogram, rectangle, rhombuses or square on a coordinate plane.</li> </ul>	
4	<ul style="list-style-type: none"> <li>● In real life situation, students can apply the theorems and properties of polygons to do problem solving</li> </ul>	

## Topic/Unit 7: Similarity

**Approximate 3-4 Weeks ( 16 days )**

### **Essential Questions:**

- 1). *How do you use proportions to find side lengths in similar polygons?*
- 2). *How do you show two triangles are similar?*
- 3). *How do you identify corresponding parts of similar triangles?*
- 4). *When will we use similarity in real life?*

### **Upon completion of this unit students will be able to:**

- Define and apply Ratio and proportion in similar polygon. (G.SRT.2)
- Understand similarity and translation. (G.C.1)
- Prove triangles are similar by using AA, SSS, SAS . (G.SRT.5) (G.SRT.5)
- Apply proportionality theorem and triangle angle bisector theorems. (G.SRT.5)

- Apply dilations and in the coordinate plane. (G.CO.2)

### **Interdisciplinary Standards (njcccs.org)**

- Standard 5.1 – Science Practices
- Standard 6.3 – Active Citizenship in the 21<sup>st</sup> Century
- Standard 8.2 – Technology Education
- Standard 9.1 – 21st - Century Life & Career Skills
- Standard 9.3 Career Awareness, Exploration, and Preparation

### **Activities – include 21<sup>st</sup> Century Technologies:**

- Group outdoor project: Indirectly measure the height of an object by using AA similarity theorem.
- Smart Board PowerPoint presentations
- Lecture and class discussion
- Khan Academy
- Technology Lab – Predict Triangle Similarity Relationships (use geometry software to find ways to determine that triangles are similar)
- Technology Lab – Investigate Angle Bisectors of a Triangle (use geometry software to explore the relationship between the two segments into which an angle bisector divides the opposite side of a triangle)
- Technology Lab – Dilations on a Graphing Calculator (use matrices to perform dilations with scale factor)
- Connecting Geometry to Algebra – Direct Variation (determine whether there is a direct variation between scale factor and perimeter)
- Construction – Triangle Proportionality Theorem
- Construction – Dilate a Figure by a Scale Factor of 2
- Online quizzes from textbook website
- Online videos from textbook website
- Additional lessons – On Core Mathematics (Houghton Mifflin Harcourt)

### **Enrichment Activities:**

- Practice C Worksheets (Holt McDougal)
- Challenge Worksheets (Holt McDougal)
- Problem Solving Worksheets (Holt McDougal)
- College Entrance Exam Practice

### **Methods of Assessments/Evaluation:**

- Smart-board lesson
- Thumb up/down
- Journal reflective
- Verbal Assessment
- Exit Ticket
- Self-Assessment( 4-3-2-1)
- Open Ended Questions
- Homework
- Classwork

- Project
- Session Quiz
- Chapter Test

**Resources/Including Online Resources**

- Online Textbook Information: my.hrw.com
- Geometry Textbook (publisher: Holt McDougal)
- Google Classroom
- Online Khan Academy Class
- Geometers Sketchpad
- On Core Mathematics Geometry (publisher: Houghton Mifflin Harcourt)

**Unit 7 Student Self-Assessment Scale Chart**

Level of Learning	Objective	<u>Assessment</u> 4: I can teach others 3: I can pass an assessment on this topic 2: I'm getting there but need more practice 1: I don't understand
1	<ul style="list-style-type: none"> <li>• Find the ratio of corresponding side lengths of two polygons.</li> <li>• Set up proportions.</li> <li>• Identify similar polygons by definition</li> </ul>	
2	<ul style="list-style-type: none"> <li>• Identify similar triangles by: AA, SSS and SAS.</li> <li>• Identify scale factors between similar polygons.</li> </ul>	
3	<ul style="list-style-type: none"> <li>• Apply the Triangle Proportionality Theorem and Corollaries.</li> <li>• Apply the Triangle Angle Bisector Theorem.</li> <li>• Apply dilation in the coordinate plane.</li> <li>• Verify similarity after a similarity transformation</li> </ul>	
4	<ul style="list-style-type: none"> <li>• In real life situation, students can apply the similarity theorems and properties of polygons to do problem solving</li> </ul>	

## Topic/Unit 8: Right Triangles and Trigonometry

Approximate 3-4 Weeks ( 17-18 days )

### Essential Questions:

- 1). *What is trigonometry and how are right triangles used in it?*
- 2). *How do trig functions relate to triangles?*
- 3). *Why do we need to solve a triangle in real life?*

### Upon completion of this unit students will be able to:

- Apply similarity relationships in right triangles. (G.SRT.6)
- Define and use trigonometric ratios to solve right triangles. (G.SRT.6) (G.SRT.8\*)
- Solve problems involving angles of elevation and depression. (G.SRT.8\*)
- Find the magnitude and direction of vectors.(CC.9-12-.N.VM).
- Add vectors in real life. (CC.9-12-.N.VM).

### Interdisciplinary Standards (njcccs.org)

- Standard 9.1 21st-Century Life & Career Skills
- Standard 9.3 - Career Awareness, Exploration, and Preparation

### Activities – include 21<sup>st</sup> Century Technologies:

- Smart Board PowerPoint presentations
- Lecture and class discussion
- Khan Academy
- Technology Lab – Explore Trigonometric Ratios (use geometry software to explore trigonometric ratios in right triangles)
- Connecting Geometry to Algebra – Inverse Functions (apply properties of inverses to trigonometric functions)

- Geometry Lab – Indirect Measurement Using Trigonometry (make a clinometer and use trigonometry to measure objects indirectly)
- Real World Connections – The John Hancock Center/Ernest Hemingway’s Birthplace (choose appropriate problem-solving strategies and use them to solve real-world problems).
- Project- Indirectly measure the height of an object by using trigonometry ratio.
- Online videos from textbook website
- Additional lessons – On Core Mathematics (Houghton Mifflin Harcourt)

**Enrichment Activities:**

- Practice A&B Worksheets (Holt McDougal)
- Ready to Go On Worksheets (Holt McDougal)
- Problem Solving Worksheets (Holt McDougal)
- College Entrance Exam Practice

**Methods of Assessments/Evaluation:**

- Smart-board lesson
- Thumb up/down
- Journal reflective
- Verbal Assessment
- Exit Ticket
- Self-Assessment( 4-3-2-1)
- Open Ended Questions
- Homework
- Classwork
- Project
- Session Quiz
- Chapter Test

**Resources/Including Online Resources**

- Online Textbook Information: [my.hrw.com](http://my.hrw.com)
- Geometry Textbook (publisher: Holt McDougal)
- Google Classroom
- Online Khan Academy Class
- Geometers Sketchpad
- On Core Mathematics Geometry (publisher: Houghton Mifflin Harcourt)

### Unit 8 Student Self-Assessment Scale Chart

Level of Learning	Objective	<u>Assessment</u> 4: I can teach others 3: I can pass an assessment on this topic 2: I'm getting there but need more practice 1: I don't understand
1	<ul style="list-style-type: none"> <li>● Use the Pythagorean Theorem to find missing sides of a right triangle</li> <li>● Write the ratio of any two sides lengths in a triangle.</li> <li>● Write Sine, Cosine, and Tangent of an acute angle in a right triangle.</li> </ul>	
2	<ul style="list-style-type: none"> <li>● Understand what SOHCAHTOA is.</li> <li>● Understand definition of angle of elevation and depression</li> </ul>	
3	<ul style="list-style-type: none"> <li>● Apply basic trigonometric ratios to solve right triangles. Find each missing side length or angle measure.</li> <li>● Use the converse of the Pythagorean Theorem and Pythagorean inequalities to classify triangles</li> <li>● Use the properties of 45-45-90 triangles to find side lengths</li> <li>● Use the properties of 30-60-90 triangles to find side lengths.</li> <li>● Find the magnitude and direction of vectors.</li> </ul>	
4	<ul style="list-style-type: none"> <li>● In real life situation, students can apply the basic trigonometric ratios to do problem solving.</li> <li>● Draw and add vectors in real-life application</li> </ul>	

## Topic/Unit 9: Circles

**Approximate 3-4 Weeks ( 18 days )**

### Essential Questions:

- 1). *How are circle related to real world problems?*
- 2). *How are chords, secant and tangle line related?*
- 3). *What are the relationship amount sectors, arc length and circumference and area?*
- 4). *What are the angle relationship in a circle?*
- 5). *What are the segment relationship in a circle*

### Upon completion of this unit students will be able to:

- Understand and name the lines that intersect circles. (G.C.2)
- Use arcs and chords theorem. (G.C.2)
- Find degree measure of an arc and arc length. (G.C.5)
- Find area of an sector of a circle. (G.C.5)
- Use inscribed angle theorem. (G.C.2)
- Understand and use theorems about angle relationship in circles. (G.C.2)
- Understand and use theorems about segment relationship in circles. (G.C.2)

### Interdisciplinary Standards (njcccs.org)

- Standard 9.1 21st-Century Life & Career Skills
- Standard 9.3 - Career Awareness, Exploration, and Preparation

### Activities – include 21<sup>st</sup> Century Technologies:

- Smart Board PowerPoint presentations
- Lecture and class discussion
- Khan Academy
- Connecting Geometry to Algebra – Literal Equations (apply geometry skills to solving formulas for a variable)
- Connecting Geometry to Probability – Probability (review basic probability concepts in preparations for geometric probability)
- Geometry Lab – Develop Pi (use construction and measurement to develop pi)
- Geometry Lab – Use Geometric Probability to Estimate Pi
- Connecting Geometry to Data Analysis – Circle Graphs (identify circle graphs that represent given data)
- Technology Lab – Explore Angle Relationships in Circles (use geometry software to explore segment relationships in circles)
- Technology Lab – Explore Segment Relationships in Circles (use geometry software to explore angle relationships in circles)
- Online videos from textbook website
- Additional lessons – On Core Mathematics (Houghton Mifflin Harcourt)

**Enrichment Activities:**

- Practice A&B Worksheets (Holt McDougal)
- Ready to Go On Worksheets (Holt McDougal)
- Problem Solving Worksheets (Holt McDougal)
- College Entrance Exam Practice

**Methods of Assessments/Evaluation:**

- Smart-board lesson
- Thumb up/down
- Journal reflective
- Verbal Assessment
- Exit Ticket
- Self-Assessment( 4-3-2-1)
- Open Ended Questions
- Homework
- Classwork
- Session Quiz
- Chapter Test
- Check it Out Problems (questions during lecture)
- Alternative Assessment
- Textbook Activity – Lines and Arcs in Circles (assess students' ability to apply concepts and skills in a real-world format)
- Textbook Activity – Angles and Segments in Circles (assess students' ability to apply concepts and skills in a real-world format)

**Resources/Including Online Resources**

- Online Textbook Information: [my.hrw.com](http://my.hrw.com)
- Geometry Textbook (publisher: Holt McDougal)
- Google Classroom
- Online Khan Academy Class
- Geometers Sketchpad
- On Core Mathematics Geometry (publisher: Houghton Mifflin Harcourt)

**Unit 9 Student Self-Assessment Scale Chart**

Level of Learning	Objective	<u>Assessment</u> 4: I can teach others 3: I can pass an assessment on this topic 2: I'm getting there but need more practice 1: I don't understand
1	<ul style="list-style-type: none"> <li>● Name the lines and segments that intersect circles</li> <li>● Know circumference and area formula.</li> </ul>	
2	<ul style="list-style-type: none"> <li>● Find measure of central angle, semicircle, minor arc and major arc.</li> <li>● Find partial arc length of a circle.</li> <li>● Find sector area of a circle.</li> </ul>	
3	<ul style="list-style-type: none"> <li>● Apply inscribed angle theorem</li> <li>● Apply congruent arc, chord and tangent length theorems</li> <li>● Find the measures of angles formed by lines intersecting in, on, and outside of a circle</li> <li>● Use the Chord-Chord, Secant-Secant, and Secant-Tangent Product Theorems to find the lengths of segments of a circle.</li> <li>● Identify the center and the radius in the equation of a circle.</li> <li>● Graph and write the equation of a circle.</li> </ul>	
4	<ul style="list-style-type: none"> <li>● In real life situation, students can apply the theorems and properties of circle to do problem solving.</li> </ul>	

## Topic/Unit 10: Area of regular polygon

Approximate 1 Weeks ( 5 days )

### Essential Questions:

- 1). *How can we find area of any shape of figure?*
- 2). *How can we find area of a figure in a coordinate plane?*
- 3). *What is the best to find the area of a regular polygon?*

### Upon completion of this unit students will be able to:

- Solve problems involving perimeters and areas of triangles and special quadrilaterals. (CC.9-12.A.CED.4)
- Develop and apply the formula for the area of a regular polygon. (CC.9-12.G.GMD.1)
- Use the Area Addition Postulate to find the areas of composite figures. Use composite figures to estimate the areas of irregular shapes. (CC.9-12.G.MG.3)
- Describe the effect on perimeter and area when one or more dimensions of a figure are changed. (CC.9-12.G.GPE.7)
- Calculate geometric probabilities. Use geometric probability to predict results in real-world situations.. (CC.9-12.S.CP.1)

### Interdisciplinary Standards (njcccs.org)

- Standard 9.1 21st-Century Life & Career Skills
- Standard 9.3 - Career Awareness, Exploration, and Preparation

### Activities – include 21<sup>st</sup> Century Technologies:

- Smart Board PowerPoint presentations
- Lecture and class discussion
- Khan Academy
- Connecting Geometry to Probability – Probability (review basic probability concepts in preparations for geometric probability)
- Online videos from textbook website
- Additional lessons – On Core Mathematics (Houghton Mifflin Harcourt)

### Enrichment Activities:

- Practice A&B Worksheets (Holt McDougal)
- Ready to Go On Worksheets (Holt McDougal)
- Problem Solving Worksheets (Holt McDougal)
- College Entrance Exam Practice

### Methods of Assessments/Evaluation:

- Smart-board lesson

- Thumb up/down
- Journal reflective
- Verbal Assessment
- Exit Ticket
- Self-Assessment( 4-3-2-1)
- Open Ended Questions
- Homework
- Classwork
- Session Quiz
- Chapter Test
- Check it Out Problems (questions during lecture)
- Alternative Assessment
- Textbook Activity – Lines and Arcs in Circles (assess students’ ability to apply concepts and skills in a real-world format)
- Textbook Activity – Angles and Segments in Circles (assess students’ ability to apply concepts and skills in a real-world format)

**Resources/Including Online Resources**

- Online Textbook Information: [my.hrw.com](http://my.hrw.com)
- Geometry Textbook (publisher: Holt McDougal)
- Google Classroom
- Online Khan Academy Class
- Geometers Sketchpad
- On Core Mathematics Geometry (publisher: Houghton Mifflin Harcourt)

### Unit 10 Student Self-Assessment Scale Chart

Level of Learning	Objective	<u>Assessment</u> 4: I can teach others 3: I can pass an assessment on this topic 2: I'm getting there but need more practice 1: I don't understand
1	<ul style="list-style-type: none"> <li>● Find areas of triangles and special quadrilaterals.</li> </ul>	
2	<ul style="list-style-type: none"> <li>● Find the height or base of a triangle by using trigonometry ratios.</li> <li>● Use the properties of 45-45-90 triangles to find side lengths</li> <li>● Use the properties of 30-60-90 triangles to find side lengths.</li> </ul>	
3	<ul style="list-style-type: none"> <li>● Apply the formula for the area of a regular polygon.</li> <li>● Use the Area Addition Postulate to find the areas of composite figures.</li> <li>● Use composite figures to estimate the areas of irregular shapes.</li> <li>● Describe the effect on perimeter and area when one or more dimensions of a figure are changed.</li> </ul>	
4	<ul style="list-style-type: none"> <li>● In real life situation, students can apply the properties to do problem solving or art design.</li> </ul>	

## Topic/Unit11: Spacial Reasoning

Approximate 2 Weeks ( 12 days )

### Essential Questions:

- 1). *How can we name a three dimension figure?*
- 2). *How can we measure the space a three dimension figure occupy?*
- 3). *What is the effect on volume if one dimension has been change?*

### Upon completion of this unit students will be able to:

- Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects. (CC.9-12.G.GMD.4)
- Use volume formulas for cylinders, prisms, pyramids, cones, and spheres to solve problems. (CC.9-12.G.GMD.3)
- Describe the effect on volume when one or more dimensions of a figure are changed. (CC.9-12.G.GPE.7)

### Interdisciplinary Standards (njcccs.org)

- Standard 9.1 21st-Century Life & Career Skills
- Standard 9.3 - Career Awareness, Exploration, and Preparation

### Activities – include 21<sup>st</sup> Century Technologies:

- Smart Board PowerPoint presentations
- Lecture and class discussion
- Khan Academy
- Connecting Geometry to Algebra – Literal Equations (apply geometry skills to solving formulas for a variable)
- Online videos from textbook website
- Additional lessons – On Core Mathematics (Houghton Mifflin Harcourt)

### Enrichment Activities:

- Practice A&B Worksheets (Holt McDougal)
- Ready to Go On Worksheets (Holt McDougal)
- Problem Solving Worksheets (Holt McDougal)
- College Entrance Exam Practice

### Methods of Assessments/Evaluation:

- Smart-board lesson
- Thumb up/down
- Journal reflective
- Verbal Assessment
- Exit Ticket
- Self-Assessment( 4-3-2-1)

- Open Ended Questions
- Homework
- Classwork
- Session Quiz
- Chapter Test
- Check it Out Problems (questions during lecture)
- Alternative Assessment
- Textbook Activity – Lines and Arcs in Circles (assess students’ ability to apply concepts and skills in a real-world format)
- Textbook Activity – Angles and Segments in Circles (assess students’ ability to apply concepts and skills in a real-world format)

**Resources/Including Online Resources**

- Online Textbook Information: my.hrw.com
- Geometry Textbook (publisher: Holt McDougal)
- Google Classroom
- Online Khan Academy Class
- Geometers Sketchpad
- On Core Mathematics Geometry (publisher: Houghton Mifflin Harcourt)

**Unit 11 Student Self-Assessment Scale Chart**

Level of Learning	Objective	<u>Assessment</u> 4: I can teach others 3: I can pass an assessment on this topic 2: I’m getting there but need more practice 1: I don’t understand
1	<ul style="list-style-type: none"> <li>• Find areas of triangles and special quadrilaterals.</li> </ul>	
2	<ul style="list-style-type: none"> <li>• Find the height or base of a triangle by using trigonometry ratios.</li> <li>• Use the properties of 45-45-90 triangles to find side lengths</li> <li>• Use the properties of 30-60-90 triangles to find side lengths.</li> </ul>	
3	<ul style="list-style-type: none"> <li>• Apply the formula for the volume of a cylinder, prism, pyramid, and a sphere</li> <li>• Describe the effect on volume when one or more dimensions of a figure are changed.</li> </ul>	
4	<ul style="list-style-type: none"> <li>• In real life situation, students can apply the properties to do problem solving or art design.</li> </ul>	

