2012-2013 Instructional Curriculum Plan  Grade: 9th  Course: Honors Geometry

Unit 1: Terminology and Fundamental Properties of Geometry

(Sections 1.2, 1.3, 1.4, 1.5, and 1.7)

**Instructional Focus Benchmarks**

The below benchmark(s) is linked to the CPALMS site that contains the Specifications to include the Content limits, Attributes/Stimulus, and additional information.

**MA.912.G.1.1:** Find the lengths and midpoints of line segments in two-dimensional coordinate systems.

**MA.912.G.1.3:** Identify and use the relationships between special pairs of angles formed by parallel lines and transversals.

**MA.912.G.2.5:** Explain the derivation and apply formulas for perimeter and area of polygons (triangles, quadrilaterals, pentagons, etc.)

**EduSoft Mini-Assessment(s):**

[www.edusoft.com](http://www.edusoft.com)

Date Range: Given during the instruction per the outline in this section

**Key Vocabulary:**

Adjacent angles, collinear points, coplanar points, line pair, segments, rays, planes, postulates, distance formula, bisect

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**Learning Goal:**

Students will learn basic terminology and fundamental properties of Geometry.

**Objectives:**

1. Understand basic terms and postulates of geometry.
2. Find and compare lengths of segments and measures of angles.
3. Identify special angle pairs and use their relationships to find angle measures.
4. Find a midpoint of a segment and the distance between two points in the coordinate plane.

**Common Core:**


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**Linked Standards with Access Points:**

**MA.912.G.1.1:** Find the lengths and midpoints of line segments in two-dimensional coordinate systems.

**MA.912.G.1.2:** Construct congruent segments, angles, angle bisectors, and parallel and perpendicular lines using a straight edge and compass or a drawing program, explaining and justifying the process used.

**MA.912.G.1.3:** Identify and use the relationships between special pairs of angles formed by parallel lines and transversals.

**MA.912.G.2.5:** Explain the derivation and apply formulas for perimeter and area of polygons (triangles, quadrilaterals, pentagons, etc.)

**Essential Content & Understanding:**

**A. Points, Lines, and Planes**

1. Explain the concept of undefined terms.
2. Explain collinear and coplanar points.
3. Define segments, lines and rays.
4. Show Intersection of geometric figures.
   a) segments, lines, rays
   b) lines and planes

**B. Segments, Angles and Their Measures**

1. Introduce postulates (axioms)
2. Measurement
   a) Find distance between two points on a number line.
   b) Use Distance Formula – to find distance between two points in the coordinate plane.
   c) Measure angles using protractor
3. Classify angles by their measures:
   a) acute, right, obtuse and straight

**C. Segment and Angle Bisectors:**

1. Find the midpoint of a segment
2. Bisect an angle
3. Use Midpoint Formula
4. Angle Pair Relationships
   1) Introduce vertical angles and linear pairs
   2) Review complementary and supplementary angles

**Essential Questions:**

What are the fundamental properties of geometry and where and how have you seen these concepts used in the real-world?

**Resources/Links:**

**Scope & Sequence**

1. Resources for Prentice Hall Geometry
   Copyright 2011 Pearson Education (including remediation, extra practice, companion notes, enrichment, and projects):
   [https://www.pearsonsuccessnet.com/snpapp/login/login.jsp](https://www.pearsonsuccessnet.com/snpapp/login/login.jsp)

2. Teaching/Learning Strategies:
   a) Kagan Strategies:
      a) Rally Robin
      b) Sage and Scribe
      c) Showdown for review before test
   b) Learning log or exit cards (or post-its) for students to summarize daily/weekly concepts

3. Enrichment Opportunities:
   a) Patty Paper Geometry by Michael Serra
   Copyright 1994 Key Curriculum Press
      a) Intersection of two lines
      b) Folding an angle bisector
      c) Folding a perpendicular bisector of a line segment
2012-2013 Instructional Curriculum Plan  Grade: 9th  Course: Honors Geometry

Unit 2: Reasoning and Proof
(Sections 2.1, 2.2, 2.3, 2.4, 2.5 and 2.6)

**Instructional Focus Benchmarks**
The below benchmark(s) is linked to the CPALMS site that contains the Specifications to include the Content limits, Attributes/Stimulus, and additional information.

- **MA.912.D.6.2**: Find the converse, inverse, and contrapositive of a statement.
- **MA.912.G.8.4**: Make conjectures with justifications about geometric ideas. Distinguish between information that supports a conjecture and the proof of a conjecture.

**EduSoft Mini-Assessment(s):**
www.edusoft.com

**Date Range**: Given during the instruction per the outline in this section

**Key Vocabulary**: conjecture, counterexample, bi-conditional, conclusion, contrapositive, converse, hypothesis, inverse, negation, theorem, deductive reasoning, two-column proof

**Learning Goal:**
Students will learn inductive and deductive reasoning and will be introduced to topics related to reasoning.

**Objectives:**
1. Make predictions based on observations using inductive reasoning.
2. Recognize and analyze conditional statements, and write inverses, converses, and contra-positives.
3. Write bi-conditional statements and recognize good definitions.
4. Write geometric proofs by using two-column and paragraph proofs.
5. Prove segment and angle relationships by reasoning with postulates and theorems.
6. Use the Law of Detachment and Law of Syllogism to develop conclusions.

**Common Core:**

**Linked Standards with Access Points:**

- **MA.912.D.6.2**: Find the converse, inverse, and contrapositive of a statement.
- **MA.912.D.6.3**: Determine whether two propositions are logically equivalent.
- **MA.912.D.6.4**: Use methods of direct and indirect proof and determine whether a short proof is logically valid.
- **MA.912.G.8.1**: Analyze the structure of Euclidean geometry as an axiomatic system. Distinguish between undefined terms, definitions, postulates, and theorems.
- **MA.912.G.8.4**: Make conjectures with justifications about geometric ideas. Distinguish between information that supports a conjecture and the proof of a conjecture.
- **MA.912.G.8.5**: Write geometric proofs, including proofs by contradiction and proofs involving coordinate geometry. Use and compare a variety of ways to present deductive proofs, such as flow charts, paragraphs, two-column, and indirect proofs.

**Essential Content & Understanding:**

**A. Patterns and Inductive Reasoning**
1. Describe visual and number patterns.
2. Use inductive reasoning:
   a) make a conjecture
   b) find a counterexample

**B. Conditional Statements**
1. State in if-then form
2. State the converse
3. State the inverse
4. State the contra-positive
5. Introduce the point, line and plane postulates.

**C. Definitions and Bi-conditionals**
1. Restate a definition into if-then form.
2. Write definitions and postulates as bi-conditional (if-and-only-if form)

**D. Deductive Reasoning – using symbolic notation**
1. Using properties from Algebra
2. Prove statements about segments and angles
   a) write two-column proofs
   b) b. write paragraph proof

**Essential Questions:**
Create a conjecture, write it in if-then form, write its converse, inverse and contra-positive and state the truth value for each statement.

**Resources/Links:**
[Scope & Sequence](https://www.pearsonsuccessnet.com/snpapp/login/login.jsp)

1. **Resources for Prentice Hall Geometry**
   Copyright 2011 Pearson Education (including remediation, extra practice, companion notes, enrichment, activities and projects):
   https://www.pearsonsuccessnet.com/snpapp/login/login.jsp
2. **Teaching/Learning Strategies:**
   a) Kagan Strategies:
      a) Rally Robin
      b) Sage and Scribe
   c) All Write Round Robin for writing conditional, converse, inverse and contrapositive statements
   d) Showdown for review before test
   b) Learning log or exit cards (or post-its) for students to summarize daily/weekly concepts
<table>
<thead>
<tr>
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<tr>
<td><strong>MA.912.G.1.3:</strong> Identify and use the relationships between special pairs of angles formed by parallel lines and transversals.</td>
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<tr>
<td><strong>MA.912.G.2.2:</strong> Determine the measures of interior and exterior angles of polygons, justifying the method used.</td>
</tr>
<tr>
<td><strong>MA.912.G.2.3:</strong> Use properties of congruent and similar polygons to solve mathematical or real-world problems.</td>
</tr>
<tr>
<td><strong>MA.912.G.4.2:</strong> Define, identify, and construct altitudes, medians, angle bisectors, perpendicular bisectors, orthocenter, centroid, in-center, and circum-center.</td>
</tr>
<tr>
<td><strong>MA.912.G.4.5:</strong> Apply theorems involving segments divided proportionally.</td>
</tr>
<tr>
<td><strong>MA.912.G.4.6:</strong> Prove that triangles are congruent or similar and use the concept of corresponding parts of congruent triangles.</td>
</tr>
<tr>
<td><strong>MA.912.G.4.7:</strong> Apply the inequality theorems: triangle inequality, inequality in one triangle, and the Hinge Theorem.</td>
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<tr>
<td><strong>EduSoft Mini-Assessment(s):</strong> <a href="http://www.edusoft.com">www.edusoft.com</a></td>
</tr>
<tr>
<td><strong>Date Range:</strong> Given during the instruction per the outline in this section</td>
</tr>
<tr>
<td><strong>Key Vocabulary:</strong> skew, base angles, congruent triangles, exterior angle, corresponding angles, corresponding sides, circum-center, in-center, centroid, orthocenter</td>
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<table>
<thead>
<tr>
<th>Learning Goal:</th>
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<tbody>
<tr>
<td>Students will expand and refine their knowledge and skills related to parallel and perpendicular lines.</td>
</tr>
<tr>
<td>Students will learn methods to prove triangles are congruent.</td>
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<tr>
<td>Students will learn relationships within triangles.</td>
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<table>
<thead>
<tr>
<th>Objectives:</th>
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<tbody>
<tr>
<td>1. Identify relationships between figures in space.</td>
</tr>
<tr>
<td>2. Identify angles formed by two lines and a transversal.</td>
</tr>
<tr>
<td>3. Use properties of parallel lines to find angle measures and to determine whether two lines are parallel.</td>
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<tr>
<td>4. Relate parallel and perpendicular lines and their slopes.</td>
</tr>
<tr>
<td>5. Classify triangles by their sides and angles.</td>
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<tr>
<td>6. Prove triangles are congruent, given information about their sides and angles (SSS, SAS, ASA, AAS and HL).</td>
</tr>
<tr>
<td>7. Use triangle congruence and corresponding parts to prove other parts of triangles congruent.</td>
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<tr>
<td>8. Use congruent triangles to solve real-world problems.</td>
</tr>
<tr>
<td>9. Use properties of mid-segments, perpendicular bisectors and angles bisectors to solve problems.</td>
</tr>
<tr>
<td>10. Identify points of concurrency in triangles (circum-center, in-center, centroid and orthocenter).</td>
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<tr>
<td>11. Use inequalities involving angles and sides of triangles.</td>
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<tr>
<td>12. Apply inequalities in one and two triangles.</td>
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<thead>
<tr>
<th>Common Core:</th>
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<tbody>
<tr>
<td><a href="http://www.corestandards.org/the-standards/mathematics/high-school-geometry/congruence/">http://www.corestandards.org/the-standards/mathematics/high-school-geometry/congruence/</a></td>
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<th>Linked Standards with Access Points:</th>
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<tr>
<td><strong>MA.912.G.1.2:</strong> Construct congruent segments and angles, angle bisectors, and parallel and perpendicular lines using a straight edge and compass or a drawing program, explaining and justifying the process used.</td>
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<td><strong>MA.912.G.1.3:</strong> Identify and use the relationships between special pairs of angles formed by parallel lines and transversals.</td>
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<td><strong>MA.912.G.2.2:</strong> Determine the measures of interior and exterior angles of polygons, justifying the method used.</td>
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<tr>
<td><strong>MA.912.G.2.3:</strong> Use properties of congruent and similar polygons to solve mathematical or real-world problems</td>
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<tr>
<th>Essential Content &amp; Understanding:</th>
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</thead>
<tbody>
<tr>
<td><strong>A. Lines and Angles</strong></td>
</tr>
<tr>
<td>1. Parallel and skew lines</td>
</tr>
<tr>
<td>2. Angles formed by transversals a) corresponding angles b) alternate exterior angles c) alternate interior angles d) consecutive interior angles e) same-side interior angles</td>
</tr>
<tr>
<td><strong>B. Parallel Lines with transversals</strong></td>
</tr>
<tr>
<td><strong>D. Proving Triangles Congruent</strong></td>
</tr>
<tr>
<td>1. Identify and use the relationships between special pairs of angles formed by parallel lines and transversals.</td>
</tr>
<tr>
<td><strong>E. Applying Congruence and Similarity</strong></td>
</tr>
<tr>
<td>1. Prove characteristics of perpendicular a) Lines</td>
</tr>
</tbody>
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<thead>
<tr>
<th>Essential Questions:</th>
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<tbody>
<tr>
<td>How are special angles formed by a transversal used to prove two lines are parallel?</td>
</tr>
<tr>
<td>How do the postulates and theorem for congruent triangles shorten the time and work involved in proofs?</td>
</tr>
<tr>
<td>Where and how are relationships within triangles used in real-world situations?</td>
</tr>
</tbody>
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<tr>
<th>Time Allowed:</th>
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<tbody>
<tr>
<td>8 days (Block)</td>
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**2012-2013 Instructional Curriculum Plan**  
**Grade: 9th  Course: Honors Geometry**

**Unit 3: Geometric Relationships**

(Sections 1.6, 3.1, 3.2, 3.3, 3.4, 3.5, 3.8, 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 5.1, 5.2, 5.3, 5.4, 5.6, 5.7, 6.1)

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### MA.912.G.4.1: Classify, construct, and describe triangles that are right, acute, obtuse, scalene, isosceles, equilateral, and equiangular.

### MA.912.G.4.2: Define, identify, and construct altitudes, medians, angle bisectors, perpendicular bisectors, orthocenter, centroid, in-center, and circum-center.

### MA.912.G.4.3: Construct triangles congruent to given triangles.

### MA.912.G.4.5: Apply theorems involving segments divided proportionally.

### MA.912.G.4.6: Prove that triangles are congruent or similar and use the concept of corresponding parts of congruent triangles.

### MA.912.G.4.7: Apply the inequality theorems: triangle inequality, inequality in one triangle, and the Hinge Theorem.

### MA.912.G.8.5: Write geometric proofs, including proofs by contradiction and proofs involving coordinate geometry. Use and compare a variety of ways to present deductive proofs, such as flow charts, paragraphs, two-column, and indirect proofs.

### D. Lines in The Coordinate Plane:
1. Parallel and Perpendicular
   a) a slope of perpendicular lines

### E. Triangles and Angles:
1. Classify triangles by sides
   a) equilateral
   b) isosceles
   c) scalene
2. Classify triangles by angles
   a) acute
   b) equiangular
   c) right
   d) obtuse
3. Use angle measures of triangles
   a) Triangle sum theorem
   b) Exterior angle theorem

### F. Congruence and Triangles, identify:
1. SSS congruence postulate
2. SAS congruence postulate
3. ASA congruence postulate
4. AAS congruence theorem

### G. Using Congruent Triangles
1. Proving congruent triangles
2. Using CPCTC

### H. Isosceles, Equilateral, and Right Triangles
1. The Base Angle Theorem
2. Proving right triangles congruent with HL

### I. Bisectors in Triangles
1. State and apply the Perpendicular Bisector Theorem and its Converse.
2. Define: a point equidistant from 2 points.
3. State and apply the Angle Bisector Theorem and its Converse by using the definitions:
   a) distance from a point to a line
   b) a point equidistant from 2 lines.

### J. Bisectors in Triangles
1. State and apply the concurrency of the Perpendicular Bisectors Theorem
2. State and apply the concurrency of angle bisectors.

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**Teaching/Learning Strategies:**

- Kagan Strategies:
  a) Rally Robin
  b) Sage and Scribe
  c) Showdown for review before test

- Learning log or exit cards (or post-its) for students to summarize daily/weekly concepts

- Pasta representation: spaghetti for parallel lines and macaroni for angles (hands-on practice and visuals)

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**Enrichment Opportunities**

- Use manipulatives to represent angles and sides of triangles such as angs for students to see congruence.

- **Patty Paper Geometry** by Michael Serra
  Copyright 1994 Key Curriculum Press
  a) Create circum-center with perpendicular bisectors of a triangle
  b) Create in-center with angle bisectors of triangle
  c) Create centroid with medians of a triangle
K. Medians and Altitudes
1. Define and apply: Median of a triangle and the centroid.
2. Define and apply: Altitudes of triangles and the orthocenter.
L. The Mid-segment Theorem
1. Define: The Mid-segment of a triangle.
2. State and apply: Properties of Mid-segments.
M. The Hinge Theorem
1. Apply the Hinge Theorem
**Instructional Focus Benchmarks**

The below benchmark(s) is linked to the CPALMS site that contains the Specifications to include the Content limits, Attributes/Stimulus, and additional information.

- **MA.912.G.1.1:** Find the lengths and midpoints of line segments in two-dimensional coordinate systems.
- **MA.912.G.2.6:** Use co-ordinate geometry to prove properties of congruent, regular and similar polygons, and to perform transformations in the plane.
- **MA.912.G.6.6:** Given the center and the radius, find the equation of a circle in the coordinate plane or given the equation of a circle in center-radius form, state the center and the radius of the circle.

**EduSoft Mini-Assessment(s):**

www.edusoft.com

**Date Range:** Given during the instruction per the outline in this section

**Key Vocabulary:**
- vector
- magnitude
- scalar multiple
- initial point
- terminal point
- midpoint formula
- equation of a circle

**Learning Goal:**
Use Vectors
Write equations of circles

**Objectives:**
1. State and apply the distance, slope, and midpoint formulas.
2. Determine whether two lines are parallel, perpendicular, or neither.
3. Solve problems involving vectors

**Common Core:** (link to common core)

**Linked Standards with Access Points:**

- **MA.912.D.9.3:** Use vectors to model and solve application problems.
- **MA.912.G.1.1:** Find the lengths and midpoints of line segments in two-dimensional coordinate systems.
- **MA.912.G.2.6:** Use co-ordinate geometry to prove properties of congruent, regular and similar polygons, and to perform transformations in the plane.
- **MA.912.G.6.6:** Given the center and the radius, find the equation of a circle in the coordinate plane or given the equation of a circle in center-radius form, state the center and the radius of the circle.

**Essential Content & Understanding:**

**A. Distance and Equation of a Circle**
1. Review: origin, axes, quadrants, coordinate plane.
2. Apply the distance formula to find the distance between two points in a coordinate plane.
3. Use slope to determine if lines in a coordinate plane are parallel, perpendicular, or neither.

**B. Slope**
1. Define slope as a rate of change.
2. Apply the slope formula to a line in a co-ordinate plane.
3. Use slope to determine if lines in a coordinate plane are parallel, perpendicular, or neither.

**C. Midpoint**
1. State and apply the Midpoint Formula

**D. Vectors**
1. Define and apply magnitude and scalar multiple.
2. Show when two vectors are equal.
3. Add vectors

**E. Equation of a Line**
1. Graph lines in the coordinate plane.

**Essential Questions:**
How are vectors used to show direction and magnitude?

**Resources/Links:**

- **Scope & Sequence**

1. Resources for Prentice Hall Geometry
   Copyright 2011 Pearson Education (including remediation, extra practice, companion notes, enrichment, activities and projects):
   https://www.pearsonsuccessnet.com/smpapp/login/login.jsp
2. Teaching/Learning Strategies:
   a) Kagan Strategies:
      a) Rally Robin
      b) Sage and Scribe
      c) Showdown for review before test
   b) Learning log or exit cards (or post-its) for students to summarize daily/weekly concepts
# 2012-2013 Instructional Curriculum Plan  
## Grade: 9th Course: Honors Geometry  
### Unit 5: Quadrilaterals  
(Sections 6.1, 6.2, 6.3, 6.4, 6.6 and 6.7)

<table>
<thead>
<tr>
<th>Instructional Focus Benchmarks</th>
<th>Learning Goal: Students examine properties of quadrilaterals and discern differences.</th>
</tr>
</thead>
</table>
| The below benchmark(s) is linked to the CPALMS site that contains the Specifications to include the Content limits, Attributes/Stimulus, and additional information. | **Objectives:**  
1. Classify quadrilaterals (parallelograms, rectangles, rhombuses, squares, kites, and trapezoids) according to their properties.  
2. Compute interior and exterior angle measures of polygons.  
3. Write proofs about quadrilaterals using their properties as reasons.  
| **Essential Content & Understanding:**  
**A. Angle Measures in Polygons**  
1. Investigate the interior and exterior angles of polygons.  
2. Use the Polygon Interior Angle Theorem to find measures of interior angles of polygons.  
3. Find the number of sides of a polygon.  
4. Use the Polygon Exterior Angles Theorem to find the measures of exterior angles of a polygon.  
5. Apply the above theorems to regular polygons.  
**B. Polygons**  
1. Define convex and non-convex (concave)  
2. Define regular polygons  
3. Identify sides, angles, vertices, and diagonals  
4. Use the interior angles of a quadrilateral theorem.  
**C. Properties of Parallelograms**  
1. Introduce the 5 essential characteristics of a parallelogram  
2. Proving Quadrilaterals are Parallelograms  
3. Learn the 6 ways to prove a quadrilateral is a parallelogram.  
4. Use properties of parallelograms in coordinate geometry  
**Essential Questions:**  
How can you use coordinate geometry, diagonals, slope and distance formula to classify quadrilaterals?  
**Resources/Links:**  
[Scope & Sequence](https://www.pearsonsuccessnet.com/snpapp/login/login.jsp)  
2) Teaching/Learning Strategies:  
   a) Kagan Strategies:  
      a) Rally Robin  
      b) Sage and Scribe  
      c) Showdown for review before test  
   b) Learning log or exit cards (or post-its) for students to summarize daily/weekly concepts  
| **Linked Standards with Access Points:**  
**MA.912.G.2.2:** Determine the measures of interior and exterior angles of polygons, justifying the method used.  
**MA.912.G.3.3:** Use coordinate geometry to prove properties of congruent, regular, and similar quadrilaterals.  
**MA.912.G.3.4:** Prove theorems involving quadrilaterals.  
**EduSoft Mini-Assessment(s):**  
www.edusoft.com  
**Date Range:** Given during the instruction per the outline in this section  
**Key Vocabulary:**  
isosceles, trapezoid, kite, mid-segment of a trapezoid, convex, concave, rhombus, midpoint formula  

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**MA.912.G.2.1:** Identify and describe convex, concave, regular, and irregular polygons.  
**MA.912.G.2.2:** Determine the measures of interior and exterior angles of polygons, justifying the method used.  
**MA.912.G.3.1:** Describe, classify, and compare relationships among quadrilaterals including the square, rectangle, rhombus, parallelogram, trapezoid, and kite.  
**MA.912.G.3.2:** Compare and contrast special quadrilaterals on the basis of their properties.  
**MA.912.G.3.3:** Use coordinate geometry to prove properties of congruent, regular, and similar quadrilaterals.  
**MA.912.G.3.4:** Prove theorems involving quadrilaterals.
### E. Rhombuses, Rectangles, and Squares
1. Distinguish between the 3 special parallelograms
2. Focus on the diagonals of special parallelograms.

### F. Trapezoids and Kites
1. Contrast and compare trapezoids, isosceles trapezoids and kites.
2. Introduce the Mid-segment Theorem for trapezoids.

### G. Polygons in the Coordinate Plane
1. Classify polygons in the coordinate plane using distance, midpoint, and slope formulas.
# 2012-2013 Instructional Curriculum Plan  
**Grade:** 9th  
**Course:** Honors Geometry  

## Unit 6: Transformations  
(Sections 9.1, 9.2, 9.3, 9.5 and 9.6)

### Instructional Focus Benchmarks

The below benchmark(s) is linked to the CPALMS site that contains the Specifications to include the Content limits, Attributes/Stimulus, and additional information.

**MA.912.G.2.4:** Apply transformations (translations, reflections, rotations, dilations, and scale factors) to polygons to determine congruence, similarity, and symmetry. Know that images formed by translations, reflections, and rotations are congruent to the original shape. Create and verify tessellations of the plane using polygons.

### EduSoft Mini-Assessment(s):

[www.edusoft.com](http://www.edusoft.com)

### Date Range:
Given during the instruction per the outline in this section

### Key Vocabulary:
angle of rotation, center of rotation, image, line of reflection, isometry, pre-image,

### Learning Goal:
Learn about transformations and apply them to the real-world.

### Objectives:
1. Students will recognize and describe three different types of transformations of geometric figures in the plane.
2. Students will manipulate real-world situations by applying transformations.

### Common Core:
(link to common core) [http://www.corestandards.org/the-standards/mathematics/high-school-geometry/congruence/](http://www.corestandards.org/the-standards/mathematics/high-school-geometry/congruence/)

### Linked Standards with Access Points:

**MA.912.G.2.4:** Apply transformations (translations, reflections, rotations, dilations, and scale factors) to polygons to determine congruence, similarity, and symmetry. Know that images formed by translations, reflections, and rotations are congruent to the original shape. Create and verify tessellations of the plane using polygons.

**MA.912.G.2.6:** Use coordinate geometry to prove properties of congruent, regular and similar polygons, and to perform transformations in the plane.

### Essential Content & Understanding:

**A. Reflections (flip)**
1. Introduce terms: transformation, isometry, image, and pre-image.
2. Define line of reflection
3. Demonstrate reflection in the coordinate plane.
4. Find lines of symmetry.

**B. Rotations (turn)**
1. Define center and angle of rotation.
2. Demonstrate rotation using protractor and straightedge.
3. Describe and use rotational symmetry.

**C. Translations (slide or glide)**
1. Use the coordinate plane to perform translations.
2. Composites of Mappings
3. Dilation
4. Introduce vectors
   a) Describe initial and terminal points
   b) Define component form of a vector.

### Essential Questions:
Where and how are transformations used in real-life?

### Resources/Links:

**Scope & Sequence**

1. Resources for Prentice Hall Geometry  
   Copyright 2011 Pearson Education (including remediation, extra practice, companion notes, enrichment, activities and projects) :
   [https://www.pearsonsuccessnet.com/snpapp/login/login.jsp](https://www.pearsonsuccessnet.com/snpapp/login/login.jsp)

2. Teaching/Learning Strategies:
   a) Kagan Strategies:
      a) Rally Robin  
      b) Sage and Scribe
      c) Showdown for review before test
   b) Learning log or exit cards (or post-its) for students to summarize daily/weekly concepts
# 2012-2013 Instructional Curriculum Plan

**Grade:** 9th  
**Course:** Honors Geometry  
**Unit 7: Geometric Inequalities**  
(Sections 5.5, 5.6, and 5.7)

## Instructional Focus Benchmarks

The below benchmark(s) is linked to the CPALMS site that contains the Specifications to include the Content limits, Attributes/Stimulus, and additional information.

- **MA.912.G.4.7** Apply the inequality theorems: triangle inequality, inequality in one triangle, and the Hinge Theorem.
- **MA.912.G.4.8** Use coordinate geometry to prove properties of congruent, regular, and similar triangles.
- **MA.912.D.6.3** Determine whether two propositions are logically equivalent.
- **MA.912.D.6.4** Use methods of direct and indirect proof and determine whether a short proof is logically valid.

## EduSoft Mini-Assessment(s):

- [www.edusoft.com](http://www.edusoft.com)

## Date Range: Given during the instruction per the outline in this section

## Key Vocabulary:

- Indirect Proof
- Hinge Theorem

## Learning Goal:

Students will learn and apply concepts of inequalities.

## Objectives:

1. Apply properties of inequality to lengths of segments and measures of angles.
2. State the contra-positive and inverse of an if-then statement.
3. Write indirect proofs.
4. State and apply the inequality theorems for one and two triangles.

## Essential Content & Understanding:

### A. Inequalities

- Review the properties of inequalities from Algebra.
- Introduce and apply the Exterior Angle Inequality Theorem.

### B. Indirect Proof

- Determine which statements are logically equivalent using a Venn diagram.
- List the three steps to writing an indirect proof.

### C. Triangle Inequalities

- Introduce and apply the inequality theorems and corollaries for one triangle.
- Introduce and apply the inequality theorems for two triangles.

### D. Hinge Theorem

## Essential Questions:

1. Is it possible to write different mathematically statements that have the same meaning?

## Resources/Links:

### Scope & Sequence

1. **Resources for Prentice Hall Geometry**  
   Copyright 2011 Pearson Education (including remediation, extra practice, companion notes, enrichment, activities and projects):  
   [https://www.pearsonsuccessnet.com/snpapp/login/login.jsp](https://www.pearsonsuccessnet.com/snpapp/login/login.jsp)

2. **Teaching/Learning Strategies:**
   - **Kagan Strategies:**  
     a) Rally Robin  
     b) Sage and Scribe  
     c) Showdown for review before test
   - **Learning log or exit cards (or post-its) for students to summarize daily/weekly concepts**

3. **Dynamic Paper**  
**2012-2013 Instructional Curriculum Plan**  
**Grade: 9th**  
**Course: Honors Geometry**

**Unit 8: Similarity**

(Sections 7.1, 7.2, and 7.3)

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### Learning Goal:
Students will learn how to prove triangles are similar and how to use similarity between triangles to find missing lengths.

### Objectives:
1. Identify and apply properties of similar polygons.
2. Prove triangles are similar by recognizing given properties.
3. Find and apply relationships in similar right triangles including the geometric mean.

### Essential Content & Understanding:

#### A. Ratio and Proportion
1. Review ratio, including simplifying ratios and writing extended ratios.
2. Use proportions
   a) Means-Extremes property.
   b) Reciprocal property
   c) Solve proportions
3. Introduce and apply the Geometric Mean
4. Visit real-world application of proportions

#### B. Similar Polygons
1. Define similar polygons
2. Introduce symbol of similarity (~)
3. Write a Similarity Statement
4. Compare similar polygons with shrinking and enlargement, such as on a copy machine.

#### C. Proving Triangles are Similar
1. Write a proportionality statement comparing two similar triangles.
2. Use the AA ~ Postulate, SSS ~ Theorem, and SAS ~ Theorem to prove two triangles are similar.
3. Use scale factors
4. Use similar triangles to measure distances indirectly.

#### D. Proportions and Similar Triangles
1. Introduce the Triangle Proportionality Theorem and its Converse.
2. Use similar triangles to determine parallelism
3. Make real-world applications of similar triangles to work such as construction.

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### Linked Standards with Access Points:

**MA.912.G.2.3:** Use properties of congruent and similar polygons to solve mathematical or real-world problems.

**MA.912.G.2.4:** Apply transformations (translations, reflections, rotations, dilations, and scale factors) to polygons to determine congruence, similarity, and symmetry. Know that images formed by translations, reflections, and rotations are congruent to the original shape. Create and verify tessellations of the plane using polygons.

**MA.912.G.4.6:** Prove that triangles are congruent or similar and use the concept of corresponding parts of congruent triangles.

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### Essential Questions:
How would you use similarity in construction, drafting or other real-world situations?

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### Resources/Links:

**Scope & Sequence**

1) Resources for Prentice Hall *Geometry*
   Copyright 2011 Pearson Education (including remediation, extra practice, companion notes, enrichment, activities and projects):
   [https://www.pearsonsuccessnet.com/snpapp/login/login.jsp](https://www.pearsonsuccessnet.com/snpapp/login/login.jsp)

2) Teaching/Learning Strategies:
   a) Kagan Strategies:
      a) Rally Robin
      b) Sage and Scribe
      c) Showdown for review before test
   b) Learning log or exit cards (or post-its) for students to summarize daily/weekly concepts

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### Instructional Focus Benchmarks

The below benchmark(s) is linked to the CPALMS site that contains the Specifications to include the Content limits, Attributes/Stimulus, and additional information.

**MA.912.G.2.3:** Use properties of congruent and similar polygons to solve mathematical or real-world problems.

**MA.912.G.2.4:** Apply transformations (translations, reflections, rotations, dilations, and scale factors) to polygons to determine congruence, similarity, and symmetry. Know that images formed by translations, reflections, and rotations are congruent to the original shape. Create and verify tessellations of the plane using polygons.

**MA.912.G.4.6:** Prove that triangles are congruent or similar and use the concept of corresponding parts of congruent triangles.

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### EduSoft Mini-Assessment(s):

[www.edusoft.com](http://www.edusoft.com)

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### Date Range: Given during the instruction per the outline in this section

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### Key Vocabulary:
means, extremes, geometric mean, dilation, enlargement, reduction,
## Instructional Focus Benchmarks

The below benchmark(s) is linked to the CPALMS site that contains the Specifications to include the Content limits, Attributes/Stimulus, and additional information.

**MA.912.G.5.4:** Solve real-world problems involving right triangles.

**MA.912.T.2.1:** Define and use the trigonometric ratios (sine, cosine, tangent, cotangent, secant, cosecant) in terms of angles of right triangles.

**EduSoft Mini-Assessment(s):**

www.edusoft.com

**Date Range:** Given during the instruction per the outline in this section

**Key Vocabulary:**

geometric mean, Pythagorean triple, trigonometric ratios, sine, cosine, tangent

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### Learning Goal:

Explore concepts related to right triangles, including special conditions and trigonometric functions.

### Objectives:

1. Determine the geometric mean between two numbers.
2. State and apply the Pythagorean Theorem and its converse.
3. Determine the length of the of the remaining sides of a 45-45-90 and 30-60-90 triangle given one side.
4. Define the sine, cosine and tangent ratios for acute angles.
5. Solve problems involving right triangles by using sine, cosine, or tangent.

### Essential Content & Understanding:

#### Essential Questions:

1. How are the relationships in special right triangles useful in solving problems?
2. How do you use trigonometric ratios do solve problems with right triangles?

#### Resources/Links:

**Scope & Sequence**

1. Resources for Prentice Hall *Geometry*
   Copyright 2011 Pearson Education (including remediation, extra practice, companion notes, enrichment, activities and projects): https://www.pearsonsuccessnet.com/snpapp/login/login.jsp

2. Teaching/Learning Strategies:
   a) Kagan Strategies:
      a) Rally Robin
      b) Sage and Scribe
   c) Mix' N' Match game (template in Kagan Geometry resources)
   d) Showdown for review before test
   b) Learning log or exit cards (or post-its) for students to summarize daily/weekly concepts

### Instructional Standards with Access Points:

<table>
<thead>
<tr>
<th><strong>Standards</strong></th>
<th><strong>Access Points</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MA.912.G.5.1:</strong></td>
<td>Prove and apply the Pythagorean Theorem and its converse.</td>
</tr>
<tr>
<td><strong>MA.912.G.5.2:</strong></td>
<td>State and apply the relationships that exist when the altitude is drawn to the hypotenuse of a right triangle.</td>
</tr>
<tr>
<td><strong>MA.912.G.5.3:</strong></td>
<td>Use special right triangles (30° - 60° - 90° and 45° - 45° - 90°) to solve problems.</td>
</tr>
<tr>
<td><strong>MA.912.G.5.4:</strong></td>
<td>Solve real-world problems involving right triangles.</td>
</tr>
<tr>
<td><strong>MA.912.T.2.1:</strong></td>
<td>Define and use the trigonometric ratios (sine, cosine, tangent, cotangent, secant, cosecant) in terms of angles of right triangles.</td>
</tr>
</tbody>
</table>

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### Essential Questions:

1. How are the relationships in special right triangles useful in solving problems?
2. How do you use trigonometric ratios do solve problems with right triangles?
## Instructional Focus Benchmarks

The below benchmark(s) is linked to the CPALMS site that contains the Specifications to include the Content limits, Attributes/Stimulus, and additional information.

- **MA.912.G.6.6**: Given the center and the radius, find the equation of a circle in the coordinate plane or given the equation of a circle in center-radius form, state the center and the radius of the circle.

## EduSoft Mini-Assessment(s)

- www.edusoft.com

## Date Range: Given during the instruction per the outline in this section

## Key Vocabulary:
- chord, secant, tangent, inscribed angle, intercepted arc, point of tangency, equation of a circle in center-radius form, concentric circles, central angle, minor arcs, major arcs, inscribed

## Learning Goal:
Apply theorems learned in previous chapters to segments touching circles.

## Objectives:
1. Utilize arcs, angles, and segments in circles to solve real-world problems.

## Common Core:
[Links to Common Core standards]

## Essential Content & Understanding:

### A. Tangents to Circles
1. Define: circle, diameter, radius, chord, secant, and tangent.
2. Contrast tangent lines and tangent circle by defining: point of tangency; common internal and external tangents and concentric circles.

### B. Arcs and Chords
1. Define: central angle, minor and major arc, and semicircle.
2. Find the degree measure of all types of arcs.
3. Use chords of circles to locate the center of a circle.
4. Know and apply the properties and theorems of chords.

### C. Inscribed Angles and Other Angle Relationships
1. Define: intercepted arc and measure of an inscribed angle.
2. Inscribe a polygon in a circle
3. Use tangents and chords to find the measure of arcs and angles of circles.

### D. Segment Lengths in Circles
1. Define: segments of a chord; tangent segment; secant and external segment.
2. Find segment lengths.

### E. Equation of a Circle
1. Write the equation of a circle in center-radius form.

## Essential Questions:
When lines intersect a circle, or within a circle, how do you find the resulting measures of resulting angles, arcs, and segments?

## Resources/Links:

### Scope & Sequence
1. Resources for Prentice Hall Geometry
   - Copyright 2011 Pearson Education (including remediation, extra practice, companion notes, enrichment, activities and projects) :
   - [Link to Prentice Hall Geometry resources]
2. Teaching/Learning Strategies:
   - a) Kagan Strategies:
     - a) Rally Robin
     - b) Sage and Scribe
   - c) Showdown for review before test
   - b) Learning log or exit cards (or post-its) for students to summarize daily/weekly concept
## 2012-2013 Instructional Curriculum Plan  Grade: 9th  Course: Honors Geometry

### Unit 11: Areas of Polygons and Circles

(Sections 10.1, 10.2, 10.3, 10.4, 10.6, and 10.7)

### Instructional Focus Benchmarks

The below benchmark(s) is linked to the CPALMS site that contains the Specifications to include the Content limits, Attributes/Stimulus, and additional information.

**MA.912.G.2.5:** Determine how changes in dimensions affect the perimeter and area of common geometric figures.

### Learning Goal:

Utilize area formulas for polygons and circle, perimeter formula for polygons and circumference formula for circles to solve problems.

### Objectives:

1. Find areas of triangles and quadrilaterals by identifying the appropriate formula.
2. Compare perimeters and areas of similar figures using scale factor and ratio.
3. Calculate circumference and area of circles.
4. Analyze the arc length of a circle and area of a sector of a circle using angle measure and circumference and area formulas.

### Essential Content & Understanding:

**A. Areas of Triangles and Quadrilaterals**

1. Review the area formulas for rectangle, parallelogram, triangle and trapezoid.
2. Introduce the formulas for areas of kites and rhombuses.

**B. Areas of Regular Polygons**

1. Introduce the formula for the area of an equilateral triangle.
2. Define: center, radius, apothem, and central angle of a regular polygon.
3. Know and use the formula for area of a regular polygon (A = \( \frac{1}{2} aP \)).

**C. Perimeters and Areas of Similar Figures**

1. Review perimeter and area of polygons
2. Introduce the Area of Similar Polygons Theorem
   a) Emphasize the relationships between the scale factor and the ratio of the perimeters of the similar polygons.
   b) Emphasize the relationships between the scale factor and the ratio of the areas of the similar polygons.
3. Review circumference of a circle and use circumference to explain arc length in contrast to “arc measure.”
4. Review area of circles and introduce area of sectors.

### Linked Standards with Access Points:

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Access Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>MA.912.G.2.5</td>
<td>Determine how changes in dimensions affect the perimeter and area of common geometric figures.</td>
</tr>
<tr>
<td>MA.912.G.2.7</td>
<td>Determine how changes in dimensions affect the perimeter and area of common geometric figures.</td>
</tr>
<tr>
<td>MA.912.G.4.4</td>
<td>Use properties of congruent and similar triangles to solve problems involving lengths and areas.</td>
</tr>
<tr>
<td>MA.912.G.6.2</td>
<td>Define and identify: circumference, radius, diameter, arc, arc length, chord, secant, tangent and concentric circles.</td>
</tr>
<tr>
<td>MA.912.G.6.4</td>
<td>Determine and use measures of arcs and related angles (central, inscribed, and intersections of secants and tangents).</td>
</tr>
</tbody>
</table>

### Essential Questions:

Explain the relationship between scale factor, perimeter and area of similar polygons.

### Resources/Links:

#### Scope & Sequence

1. Resources for Prentice Hall Geometry

2. Teaching/Learning Strategies:
   a) Kagan Strategies:
      a) Rally Robin
      b) Sage and Scribe
   b) Learning log or exit cards (or post-its) for students to summarize daily/weekly concepts
### Instructional Focus Benchmarks

The below benchmark(s) is linked to the CPALMS site that contains the Specifications to include the Content limits, Attributes/Stimulus, and additional information.

- **MA.912.G.7.1:** Describe and make regular, non-regular, and oblique polyhedron, and sketch the net for a given polyhedron and vice versa.
- **MA.912.G.7.5:** Explain and use formulas for lateral area, surface area, and volume of solids.
- **MA.912.G.7.7:** Determine how changes in dimensions affect the surface area and volume of common geometric solids.

### EduSoft Mini-Assessment(s):

- www.edusoft.com

### Date Range: Given during the instruction per the outline in this section

### Key Vocabulary:

- base, cross-section, hemisphere, lateral area, lateral faces,

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### Learning Goal:

Find surface area and volume of three-dimensional figures.

### Objectives:

1. Calculate the surface area and volume of various solids; then apply those techniques to real-world problems.

### Common Core: (link to common core)

http://www.corestandards.org/the-standards/mathematics/high-school-geometry/geometric-measurement-and-dimension/

### Essential Content & Understanding:

**A. Surface Area of:** prisms, cylinders, pyramids, cones, and spheres
   1. Define: prism, base of a prism, lateral face, right prism, oblique prism.
   2. Define: cylinder, right cylinder.
   3. Define pyramid, regular pyramid, slant height.
   4. Define: cone, right cone, lateral surface.
   5. Define: sphere, center and radius of a sphere.

   - A. Distinguish between lateral area and surface area of a prism.
   - B. Use the formulas for volume of the solids.

**B. Volume of:** Prisms, Cylinders, Pyramids, Cones, and Spheres
   1. Define: volume of a solid.
   2. Use the formulas for volume of the solids.
   3. Introduce Cavalieri’s Principle; the Volume Congruence Postulate and the Volume Addition Postulate.
   4. Similar Solids
      1. Find and use the scale factor of similar solids.

### Essential Questions:

What is the relationship between volume of prisms and pyramids, and/or cylinders and cones?

### Resources/Links:

**Scope & Sequence**

1. Resources for Prentice Hall Geometry
   Copyright 2011 Pearson Education (including remediation, extra practice, companion notes, enrichment, activities and projects):
   https://www.pearsonsuccessnet.com/snpapp/login/login.jsp

2. Teaching/Learning Strategies:
   - Kagan Strategies:
     a) Rally Robin
     b) Sage and Scribe
     c) Showdown for review before test
   - Learning log or exit cards (or post-its) for students to summarize daily/weekly concepts
### Instructional Focus Benchmarks

The below benchmark(s) is linked to the CPALMS site that contains the Specifications to include the Content limits, Attributes/Stimulus, and additional information.

- **MA.912.G.5.4**: Solve real-world problems involving right triangles.
- **MA.912.T.2.1**: Define and use the trigonometric ratios (sine, cosine, tangent, cotangent, secant, co-secant) in terms of angles of right triangles.

### Instructional Focus Benchmarks (continued)

**EduSoft Mini-Assessment(s):**
www.edusoft.com

**Date Range:** Given during the instruction per the outline in this section

### Key Vocabulary:
angle of depression, angle of elevation, straightedge, compass, construction,

---

### Learning Goal:

Review for EOC
Use right triangle trigonometry to solve problems of elevation and depression.
Learn basic geometric constructions.

### Objectives:
1. Apply the trigonometry ratios to right triangles to solve real world challenges.
2. Basic Construction

### Common Core:
http://www.corestandards.org/the-standards/mathematics/high-school-geometry/congruence/
http://www.corestandards.org/the-standards/mathematics/high-school-geometry/similarity-right-triangles-and-trigonometry/

### Linked Standards with Access Points:

- **MA.912.G.1.2**: Construct congruent segments and angles, angle bisectors, and parallel and perpendicular lines using a straight edge and compass or a drawing program, explaining and justifying the process used.
- **MA.912.G.2.6**: Use coordinate geometry to prove properties of congruent, regular and similar polygons, and to perform transformations in the plane.
- **MA.912.G.4.1**: Classify, construct, and describe triangles that are right, acute, obtuse, scalene, isosceles, equilateral, and equiangular.
- **MA.912.G.5.4**: Solve real-world problems involving right triangles.
- **MA.912.T.2.1**: Define and use the trigonometric ratios (sine, cosine, tangent, cotangent, secant, co-secant) in terms of angles of right triangles.

### Essential Content & Understanding:

**A. Angles of Elevation and Depression**
1. Define and apply angle of elevation and angle of depression.
2. Apply right triangle trigonometry to real-world situations such as height of a cliff, tower, or airplane.

**B. Construction**
1. Define and use tools of construction
2. **Basic Constructions**
3. Construction of parallel and perpendicular lines
4. Equations of lines in the coordinate plane including slope of parallel and perpendicular lines

### Essential Questions:

**How do constructions help you to understand the principles of geometry?**

**How can you represent a three-dimensional shape in two dimensions?**

### Resources/Links:

**Scope & Sequence**

1. Resources for Prentice Hall *Geometry*
   Copyright 2011 Pearson Education (including remediation, extra practice, companion notes, enrichment, activities and projects):
   https://www.pearsonsuccessnet.com/smpapp/login/login.jsp

2. Teaching/Learning Strategies:
   a) Kagan Strategies:
      a) Rally Robin
      b) Sage and Scribe
   b) Learning log or exit cards (or post-its) for students to summarize daily/weekly concepts