

<b>Title</b>	<b>Geometry</b>
Type	Essential
Document	Map
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Subject	Mathematics
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Grade(s)	09 , 10
Location	Roxbury High School
Curriculum Writing History	
Notes	
Attachments	

**Title : Geometry**  
**Type : Essential**

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Duration: September/Week 1 - September/Week 3

UNIT NAME: Essentials of Geometry

Enduring Understandings	Essential Questions	Knowledge	Skills	Standards
<ul style="list-style-type: none"> <li>Geometry can be used to represent real-world structures and situations</li> <li>Geometry has a mathematical language to describe the world around us</li> <li>Geometry provides us with common understanding to measure and describe relationships on a plane and in space</li> <li>The foundation of Geometry is four undefined terms from which definitions of terms are derived</li> <li>Constructions are done without measuring</li> </ul>	<ul style="list-style-type: none"> <li>What are the four undefined terms in Geometry?</li> <li>How do you name geometric figures?</li> <li>How can you identify congruent segments?</li> <li>What makes geometry figures congruent?</li> <li>How can you prove that figures are congruent?</li> <li>What makes points collinear, coplanar?</li> <li>How do you find the distance and midpoint between two points on the coordinate plane?</li> <li>How is an angle formed?</li> <li>How do you classify angles?</li> <li>How do you identify whether an angle is acute, right, obtuse, or straight?</li> <li>How do you identify angle pair relationships?</li> <li>How do you classify a polygon?</li> </ul>	<ul style="list-style-type: none"> <li>Key Vocabulary: undefined terms (point, line, plane), defined terms (line segment, endpoints, ray, opposite rays, collinear, and coplanar), angle types (acute, obtuse, straight, and right), angle pairs (complementary, supplementary, vertical, and linear pair), midpoint, vertical angles, convex, concave, n-gon, angle bisector, segment bisector</li> <li>Relate the notational differences between equality and congruency.</li> <li>Define ruler and addition postulates.</li> <li>Define midpoint and segment bisector.</li> <li>Know the distance and midpoint formulas</li> <li>Apply the distance and midpoint formulas.</li> <li>Protractor Postulate and Angle Addition Postulate and apply</li> <li>Classify plane figure by sides.</li> <li>Write the distance formula and identify the variables in the formula</li> <li>Define the formulas for perimeter, circumference, area</li> </ul>	<ul style="list-style-type: none"> <li>Given a diagram identify and label defined and undefined terms.</li> <li>Identify real world figures that model geometric relationships of points, lines, planes</li> <li>Draw a sketch given a description of a term</li> <li>Apply segment postulates in numerical and algebraic examples on number line.</li> <li>Use appropriate geometric notation</li> <li>Use the distance and midpoint formulas to determine the length and midpoint of a segment on a coordinate plane.</li> <li>Find a missing length or angle using the segment addition or angle addition postulate</li> <li>Using a protractor determine the measure of an angle and classify the angle.</li> <li>Use the angle addition postulate to determine the measure of an angle.</li> <li>Write an equation expressing a geometric relationship</li> <li>Copy and bisect segments and angles using a straight edge and protractor.</li> </ul>	<p>A.CED.1-Create equations and inequalities in one variable and use them to solve problems. <i>Include equations arising from linear and quadratic functions, and simple rational and exponential functions.</i> (09-12) [State:New Jersey CCSS]</p> <p>G.CO.1-Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc. (09-12)[State:New Jersey CCSS]</p> <p>G.CO.9-Prove theorems about lines and angles. <i>Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints.</i> (09-12)[State:New Jersey CCSS]</p> <p>G.CO.12-Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). <i>Copying a segment; copying an angle;</i></p>

			<ul style="list-style-type: none"> <li>• Use special angle relationships (complementary, supplementary, vertical, and linear pairs) to determine the measure of angles.</li> <li>• Classify polygons by their number of sides.</li> <li>• Identify equilateral, equiangular, concave, and convex polygons.</li> <li>• Apply the formulas for perimeter, circumference and area given coordinate values</li> </ul>	<p><i>bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line.</i></p> <p>(09-12)[State:New Jersey CCSS]        G.GPE.7-Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula. * (09-12) [State:New Jersey CCSS]        G.MG.1-Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder). * (09-12)[State:New Jersey CCSS]        G.GPE.7-Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula. * (09-12) [State:New Jersey CCSS]</p>
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**Plans:**

Duration: September/Week 4 - October/Week 6

UNIT NAME: Reasoning and Proof

Enduring Understandings	Essential Questions	Knowledge	Skills	Standards
<ul style="list-style-type: none"> <li>Inductive and deductive reasoning are used to draw conclusions</li> <li>Limited geometric relationships can be inferred from diagrams</li> <li>A proof is a logical argument supported by evidence</li> </ul>	<ul style="list-style-type: none"> <li>What is the difference between inductive and deductive reasoning?</li> <li>How do you use Inductive reasoning in mathematics?</li> <li>What is a biconditional statement?</li> <li>What is the benefit of a biconditional statement?</li> <li>How do you rewrite a biconditional statement?</li> <li>How do construct a logical argument?</li> <li>How can you represent a logic statement symbolically?</li> <li>How can you recognize postulates illustrated by a diagrams?</li> <li>What are possible formats for a geometric proof?</li> <li>How do you write a two column geometric proof?</li> <li>What is the relationship between vertical angles, two angles that are either complementary or supplementary to the same angle?</li> </ul>	<ul style="list-style-type: none"> <li>Vocabulary: Conjecture, inductive reasoning, deductive reasoning, counterexample, conditional statement (converse, inverse, contrapositive), if-then form (hypothesis, conclusion), negation, equivalent statements, perpendicular lines, biconditional statement, proof, and theorem.</li> <li>Reasoning to draw conclusion.</li> <li>Symbolic logic.</li> <li>Laws of Logic (Detachment and Syllogism).</li> <li>Postulates used to describe the relationships among points, lines, and planes.</li> <li>Algebraic properties (including reflexive, symmetric, and transitive) of equality and congruence</li> <li>Relationships between the measures of angles formed by intersecting lines</li> <li>Special angle relationships</li> </ul>	<ul style="list-style-type: none"> <li>Use counterexamples to disprove conjectures.</li> <li>Use inductive reasoning to describe patterns and make predictions.</li> <li>Compare deductive and inductive reasoning.</li> <li>Determine the hypothesis and conclusion of statements (including hidden conditionals).</li> <li>Write related conditionals in all forms.</li> <li>Determine the validity of related conditionals.</li> <li>Use symbolic logic to represent logic statements.</li> <li>Rewrite definitions as biconditional statements.</li> <li>Apply the laws of logic to determine conclusions.</li> <li>Interpret diagram using the postulates for points, lines, and planes.</li> <li>Create proofs using algebraic properties of equality and congruence.</li> <li>Prove statements about segments and angles</li> <li>Identify and apply Algebraic properties</li> <li>Write and equation and solve using the relationship of angles formed by intersecting lines</li> <li>Apply properties of special pairs of angles</li> </ul>	<p>A.CED.1-Create equations and inequalities in one variable and use them to solve problems. <i>Include equations arising from linear and quadratic functions, and simple rational and exponential functions.</i> (09-12) [State:New Jersey CCSS]</p> <p>G.CO.9-Prove theorems about lines and angles. <i>Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints.</i> (09-12)[State:New Jersey CCSS]</p> <p>G.CO.1-Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc. (09-12)[State:New Jersey CCSS]</p> <p>A.REI.1-Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to</p>

			<ul style="list-style-type: none"><li>• Use inductive reasoning to complete a pattern</li><li>• Use the Law of Detachment to form a valid conclusion</li><li>• Sketch a diagram from given information</li></ul>	justify a solution method. (09-12) [State:New Jersey CCSS] A.REI.3-Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. (09-12)[State:New Jersey CCSS]
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**Plans:**

Duration: October/Week 7 - November/Week 9

UNIT NAME: Parallel and Perpendicular Lines

Enduring Understandings	Essential Questions	Knowledge	Skills	Standards
<ul style="list-style-type: none"> <li>• Angle pairs are formed by intersecting lines</li> <li>• Angles formed by parallel lines and a transversal are either congruent or supplementary</li> <li>• Lines can be proven parallel or perpendicular using angle relationships and measures</li> <li>• Making connections to lines in algebra</li> </ul>	<ul style="list-style-type: none"> <li>• What angle pairs are formed by a transversal?</li> <li>• What are the relationships among the angles formed by two parallel lines and a transversal?</li> <li>• How are corresponding angles and alternative interior angles related for two parallel lines intersected by a transversal?</li> <li>• How do you prove that lines are parallel?</li> <li>• How do you find the slope of a line given the coordinate points on the line?</li> <li>• How do you write the equation of a line?</li> <li>• How do you find the distance between a point and a line?</li> </ul>	<ul style="list-style-type: none"> <li>• Key Vocabulary: parallel lines, skew lines, parallel planes, transversal, slope.</li> <li>• Angle pair names formed by a transversal (corresponding, alternative interior, alternative exterior, consecutive interior).</li> <li>• Parallel and Perpendicular Postulates (and its converses).</li> <li>• Conditions to prove lines parallel</li> <li>• Slope formula.</li> <li>• Slope intercept form and point-slope form of the equation of a line.</li> </ul>	<ul style="list-style-type: none"> <li>• Identify angles formed when lines are intersected by a transversal.</li> <li>• In a diagram identify parallel, perpendicular, and skew lines.</li> <li>• Apply parallel line theorems and converses numerically and algebraically.</li> <li>• Apply parallel line theorems and converses in proofs.</li> <li>• Determine the slope of a line given a diagram, two points, or an equation of a line.</li> <li>• Write an equation of a line given the slope and y-intercept.</li> <li>• Write an equation of a line given the slope and a point on a line.</li> <li>• Write an equation of a line given a point and a line parallel to the given line.</li> <li>• Write an equation of a line given a point and a line perpendicular to the given line,</li> <li>• Determine if lines are parallel, perpendicular, or neither.</li> <li>• Graph equations of lines.</li> <li>• Apply perpendicular theorems and postulates in proofs.</li> <li>• Construct parallel and perpendicular lines using a straight edge and protractor.</li> </ul>	<p>G.CO.1-Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc. (09-12)[State:New Jersey CCSS]</p> <p>G.CO.9-Prove theorems about lines and angles. <i>Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints.</i> (09-12)[State:New Jersey CCSS]</p> <p>G.GPE.5-Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point). (09-12)[State:New Jersey CCSS]</p> <p>A.CED.2-Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. (09-12)[State:New</p>

			<ul style="list-style-type: none"><li>• Write a paragraph proof</li><li>•</li></ul>	<p>Jersey CCSS] G.CO.12-Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). <i>Copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line.</i> (09-12)[State:New Jersey CCSS] A.CED.1-Create equations and inequalities in one variable and use them to solve problems. <i>Include equations arising from linear and quadratic functions, and simple rational and exponential functions.</i> (09-12) [State:New Jersey CCSS] A.REI.10-Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line). (09-12)[State:New Jersey CCSS]</p>
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Plans:



**Duration: November/Week 10 - December/Week 13**

**UNIT NAME: Congruent Triangles**

Enduring Understandings	Essential Questions	Knowledge	Skills	Standards
<ul style="list-style-type: none"> <li>Classifying triangles by sides and angles</li> <li>Proving triangles congruent</li> <li>Using coordinate geometry to investigate triangle relationships</li> </ul>	<ul style="list-style-type: none"> <li>How can you find the measure of the third angle of a triangle if you know the measure of the other two angles?</li> <li>What are congruent figures?</li> <li>How can you use side lengths to prove triangles congruent?</li> <li>How can you use two sides and an angle to prove triangles are congruent?</li> <li>If a side of one triangle is congruent to the side of another triangle, what information about the angles would allow you to prove the triangles congruent?</li> <li>How can you use congruent triangles to prove angles or sides congruent?</li> <li>How are the sides and angles of a triangle related if there are two or more congruent sides or angles?</li> </ul>	<ul style="list-style-type: none"> <li>Vocabulary: triangle (scalene, isosceles, equilateral, acute, right, obtuse, equiangular), interior angles, exterior angles, congruent figures.</li> <li>Triangle Sum Theorem.</li> <li>Exterior Angle Theorem.</li> <li>Parts of an isosceles triangle (legs, base, vertex and base angles).</li> <li>Parts of a right triangle (legs and hypotenuse).</li> <li>Base Angle Theorem.</li> <li>Third Angles Theorem.</li> <li>Congruent Triangle Theorems (SSS, SAS, AAS, ASA, and HL).</li> <li>Corresponding Parts of Congruent Triangles are Congruent.</li> </ul>	<ul style="list-style-type: none"> <li>Classify triangles by sides and angles.</li> <li>Apply triangle sum theorem to numeric and algebraic examples.</li> <li>Apply exterior angle theorem to numeric and algebraic examples.</li> <li>Identify parts of right and isosceles triangles.</li> <li>Apply base angle theorem(s) to numeric and algebraic examples of isosceles triangles.</li> <li>Identify congruent parts of congruent figures.</li> <li>Prove triangles are congruent using the congruent triangle theorems.</li> <li>Prove corresponding parts of congruent triangles are congruent.</li> <li>Construct an equilateral triangle using a straight edge and protractor.</li> </ul>	<p>G.CO.10-Prove theorems about triangles. <i>Theorems include: measures of interior angles of a triangle sum to 180°; base angles of isosceles triangles are congruent; the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length; the medians of a triangle meet at a point.</i> (09-12)[State:New Jersey CCSS]</p> <p>G.CO.7-Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent. (09-12) [State:New Jersey CCSS]</p> <p>G.CO.8-Explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the definition of congruence in terms of rigid motions. (09-12) [State:New Jersey CCSS]</p> <p>G.CO.13-Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle. (09-12)[State:New Jersey CCSS]</p> <p>G.CO.7-Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent. (09-12)</p>

**Title : Geometry**  
**Type : Essential**

				<p>[State:New Jersey CCSS] A.CED.1-Create equations and inequalities in one variable and use them to solve problems. <i>Include equations arising from linear and quadratic functions, and simple rational and exponential functions. (09-12)</i> [State:New Jersey CCSS]</p>
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**Plans:**

Duration: December/Week 14 - January/Week 17

UNIT NAME: Relationships with Triangles

Enduring Understandings	Essential Questions	Knowledge	Skills	Standards
<ul style="list-style-type: none"> <li>Using properties of special segments in triangles</li> <li>Using triangle inequalities to determine what triangles are possible</li> <li>Constructing points of concurrency</li> </ul>	<ul style="list-style-type: none"> <li>How do you write a coordinate proof?</li> <li>How do you find the point of concurrency of the perpendicular bisectors of the sides of a triangle?</li> <li>When can you conclude that a point is on the bisector of an angle?</li> <li>How do you find the centroid of a triangle?</li> <li>How do you find the possible lengths of the third side of a triangle if you know the lengths of the two sides?</li> </ul>	<ul style="list-style-type: none"> <li>Vocabulary: equidistant, point of concurrency.</li> <li>Midsegment Theorem.</li> <li>Perpendicular Bisector Theorem and its Converse.</li> <li>Special segments in triangles (perpendicular bisectors, angle bisectors, medians, and altitudes).</li> <li>Points of Concurrency Theorems (circumcenter, incenter, centroid, and orthocenter).</li> <li>Triangle Inequality Theorem.</li> <li>Hinge Theorem and its Converse.</li> </ul>	<ul style="list-style-type: none"> <li>Apply the midsegment theorem to numeric, algebraic, and coordinate proof examples.</li> <li>Use the midsegment theorem to determine angle congruence.</li> <li>Determine the perimeter of a triangle formed by its midsegments.</li> <li>Construct special segments and determine the points of concurrency in, on, or outside a triangle.</li> <li>Apply the special segment theorems to numerical and algebraic examples.</li> <li>Determine if a triangle can be created given three side lengths.</li> <li>Order the sides and angles of a triangle.</li> <li>Write a triangle inequality.</li> </ul>	<p>G.GPE.4-Use coordinates to prove simple geometric theorems algebraically. <i>For example, prove or disprove that a figure defined by four given points in the coordinate plane is a rectangle; prove or disprove that the point <math>(1, -3)</math> lies on the circle centered at the origin and containing the point <math>(0, 2)</math>.</i> (09-12)[State:New Jersey CCSS]</p> <p>G.C.3-Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle. (09-12) [State:New Jersey CCSS]</p> <p>G.CO.9-Prove theorems about lines and angles. <i>Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints.</i> (09-12)[State:New Jersey CCSS]</p> <p>G.CO.10-Prove theorems about triangles. <i>Theorems include: measures of interior angles of a triangle sum to <math>180^\circ</math>; base angles of isosceles triangles are congruent; the segment joining midpoints of two sides of a</i></p>

				<p><i>triangle is parallel to the third side and half the length; the medians of a triangle meet at a point. (09-12)[State:New Jersey CCSS]</i></p> <p>A.CED.1-Create equations and inequalities in one variable and use them to solve problems. <i>Include equations arising from linear and quadratic functions, and simple rational and exponential functions. (09-12) [State:New Jersey CCSS]</i></p> <p>G.CO.12-Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). <i>Copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line. (09-12)[State:New Jersey CCSS]</i></p>
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Plans:

Duration: January/Week 18 - January/Week 19

**UNIT NAME: Similarity**

Enduring Understandings	Essential Questions	Knowledge	Skills	Standards
<ul style="list-style-type: none"> <li>• Using ratios and proportions to solve geometry problems</li> <li>• Showing that triangles are similar</li> <li>• Using indirect measurement and similarity</li> </ul>	<ul style="list-style-type: none"> <li>• If two figures are similar, how do you find the length of a missing side?</li> <li>• How can you show that two triangles are similar?</li> <li>• How do you prove that two triangles are similar by using SSS Similarity Theorem?</li> <li>• What proportion can you write if a line is parallel to one side of a triangle?</li> </ul>	<ul style="list-style-type: none"> <li>• Definitions: Similarity, scale factor.</li> <li>• Similarity Postulates for Triangles ( Angle-Angle, Side-Side-Side, Side-Angle-Side).</li> <li>• Triangle Proportionality Theorems.</li> </ul>	<ul style="list-style-type: none"> <li>• Write similarity statements.</li> <li>• Determine scale factors of similar figures.</li> <li>• Apply scale factor to find missing sides, perimeter, and area of similar figures.</li> <li>• Determine angle measures of similar polygons.</li> <li>• Prove triangles similar using similarity postulates.</li> <li>• Show the lines are parallel using proportionality theorem.</li> <li>• Apply proportionality theorem to numeric and algebraic examples.</li> </ul>	<p>G.SRT.2-Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides. (09-12)[State:New Jersey CCSS]</p> <p>G.SRT.3-Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar. (09-12) [State:New Jersey CCSS]</p> <p>G.SRT.4-Prove theorems about triangles. <i>Theorems include: a line parallel to one side of a triangle divides the other two proportionally, and conversely; the Pythagorean Theorem proved using triangle similarity</i> (09-12)[State:New Jersey CCSS]</p> <p>G.SRT.5-Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures. (09-12)[State:New Jersey CCSS]</p> <p>A.CED.1-Create equations and inequalities in one variable and use them to solve problems. <i>Include equations arising from linear and quadratic functions,</i></p>

				<i>and simple rational and exponential functions. (09-12)</i> [State:New Jersey CCSS] G.SRT.1-Verify experimentally the properties of dilations given by a center and a scale factor: (09-12)[State:New Jersey CCSS]
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**Plans:**

Duration: January/Week 20 - February/Week 23

UNIT NAME: Right Triangles and Trigonometry

Enduring Understandings	Essential Questions	Knowledge	Skills	Standards
<ul style="list-style-type: none"> <li>Using the Pythagorean Theorem and its converse</li> <li>Using special relationships in right triangles</li> <li>Using trigonometric ratios to solve right triangles</li> </ul>	<ul style="list-style-type: none"> <li>If you know the lengths of two sides of a right triangle, how do you find the length of the third side?</li> <li>How can you use the sides of a triangle to determine if it is right?</li> <li>How can you find the length of the altitude to the hypotenuse of a right triangle?</li> <li>How do you find the lengths of a 30-60-90 triangle and a 45-45-90 triangle?</li> <li>How can you find a leg of a right triangle when you know the other leg and one acute angle?</li> <li>How can you find the lengths of the sides of a right triangle when you are given the length of the hypotenuse and one acute angle?</li> <li>In a right triangle, how can you find all the sides and angles of the triangle?</li> </ul>	<ul style="list-style-type: none"> <li>Definitions:: Pythagorean Triple, geometric mean, angle of elevation, angle of depression, solve a right triangle.</li> <li>Pythagorean Theorem and its Converse.</li> <li>Similar Right Triangle Theorems.</li> <li>Special Right Triangle Theorems.</li> <li>Trigonometric Ratios (sine, cosine, and tangent).</li> <li>Inverse Trigonometric Ratios.</li> </ul>	<ul style="list-style-type: none"> <li>Determine the missing sides of a right triangle.</li> <li>Determine if the sides of a right triangle form a pythagorean triple.</li> <li>Classify the triangle as right, acute, or obtuse.</li> <li>Determine the geometric mean between two numbers.</li> <li>Use proportions to determine the lengths of sides of similar right triangles.</li> <li>Use special right triangle theorems to find exact values of the lengths of missing sides.</li> <li>Use trigonometric ratios to find missing sides and angles of a right triangle.</li> <li>Apply angle of elevation and angle of depression in real world applications.</li> </ul>	<p>G.SRT.8-Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems. * (09-12) [State:New Jersey CCSS]</p> <p>G.SRT.5-Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures. (09-12)[State:New Jersey CCSS]</p> <p>G.SRT.6-Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles. (09-12) [State:New Jersey CCSS]</p> <p>A.CED.1-Create equations and inequalities in one variable and use them to solve problems. <i>Include equations arising from linear and quadratic functions, and simple rational and exponential functions.</i> (09-12) [State:New Jersey CCSS]</p> <p>G.SRT.7-Explain and use the relationship between the sine and cosine of complementary angles. (09-12)[State:New Jersey CCSS]</p>

Plans:

Duration: February/Week 24 - March/Week 26

**UNIT NAME: Quadrilaterals**

Enduring Understandings	Essential Questions	Knowledge	Skills	Standards
<ul style="list-style-type: none"> <li>Using angle relationships in polygons</li> <li>Using properties of parallelograms</li> <li>Classifying quadrilaterals by their properties</li> </ul>	<ul style="list-style-type: none"> <li>How do you find a missing angle measure in a convex polygon?</li> <li>How do you find angle and side measures in a parallelogram?</li> <li>How can you prove a quadrilateral is a parallelogram?</li> <li>What are the properties of parallelograms that have all sides or all angles congruent?</li> <li>What are the main properties of trapezoids and kites?</li> <li>How can you identify special quadrilaterals?</li> </ul>	<ul style="list-style-type: none"> <li>Vocabulary: diagonal, parallelogram, rhombus, rectangle, square, trapezoid, isosceles trapezoid, kite, midsegment of a trapezoid.</li> <li>Polygon Interior and Exterior Angle Theorems.</li> <li>Properties of Quadrilaterals (parallelogram, rectangle, rhombus, square, trapezoid, isosceles trapezoid, kite).</li> <li>Midpoint, distance, and slope coordinate formulas.</li> </ul>	<ul style="list-style-type: none"> <li>Determine the sum of the interior and exterior angles of a convex polygon.</li> <li>Determine the number of diagonals in a polygon.</li> <li>Determine the number of sides of a regular convex polygon given angle measures.</li> <li>Determine the measure of one interior or exterior angle of a regular convex polygon.</li> <li>Apply properties of quadrilaterals in numeric and algebraic examples.</li> <li>Classify quadrilaterals using coordinate geometry.</li> <li>Prove that a quadrilateral is a parallelogram.</li> <li>Identify special quadrilaterals by using properties.</li> </ul>	<p>G.CO.11-Prove theorems about parallelograms. <i>Theorems include: opposite sides are congruent, opposite angles are congruent, the diagonals of a parallelogram bisect each other, and conversely, rectangles are parallelograms with congruent diagonals.</i> (09-12)[State:New Jersey CCSS]            G.MG.1-Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder). * (09-12)[State:New Jersey CCSS]            G.SRT.5-Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures. (09-12)[State:New Jersey CCSS]            A.CED.1-Create equations and inequalities in one variable and use them to solve problems. <i>Include equations arising from linear and quadratic functions, and simple rational and exponential functions.</i> (09-12) [State:New Jersey CCSS]            A.REI.3-Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. (09-12)[State:New Jersey CCSS]</p>



**Title : Geometry**

**Type : Essential**

**Plans:**

Duration: March/Week 27 - April/Week 29

**UNIT NAME: Properties of Transformations**

Enduring Understandings	Essential Questions	Knowledge	Skills	Standards
<ul style="list-style-type: none"> <li>Performing congruence and similarity transformations</li> <li>Making real-world connections to symmetry and tessellation</li> <li>Apply vectors in Geometry</li> </ul>	<ul style="list-style-type: none"> <li>How do you translate a figure using a vector?</li> <li>How do you identify a rigid motion in a plane?</li> <li>What transformations create an image congruent to the original figure?</li> <li>How do you identify a similarity transformation in the plane?</li> <li>How do you reflect a figure in a line?</li> <li>How do you rotate a figure about the origin?</li> <li>What is a glide reflection?</li> <li>When does a figure have line symmetry?</li> </ul>	<ul style="list-style-type: none"> <li>Vocabulary: rigid motion, transformation (translation, reflection, rotation, dilation), isometry, image, pre image, clockwise, counterclockwise, enlargement and reduction, vector, component, magnitude, initial point, terminal point, center of rotation, angle of rotation.</li> <li>Coordinate plane transformation formulas.</li> <li>Transformation notations.</li> <li>Vector notation, component notation.</li> <li>Rotational symmetry.</li> <li>Lines of reflection.</li> </ul>	<ul style="list-style-type: none"> <li>Identify the types of transformation.</li> <li>Determine if the transformation represents an isometric transformation.</li> <li>Sketch a transformation on the coordinate plane.</li> <li>Determine the scale factor of a dilation.</li> <li>Determine if the dilation is a reduction or enlargement.</li> <li>Write a similarity statement for a dilation.</li> <li>Sketch a vector.</li> <li>Name a vector and determine its component and magnitude.</li> <li>Apply vectors to real world applications.</li> <li>Determine the number of lines of symmetry in a figure.</li> <li>Determine the rotational symmetry of a figure.</li> <li>Reflect a figure over a line.</li> <li>Apply composition of transformations to figures.</li> </ul>	<p>G.CO.6-Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent. (09-12)[State:New Jersey CCSS]</p> <p>G.CO.2-Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch). (09-12) [State:New Jersey CCSS]</p> <p>G.SRT.1-Verify experimentally the properties of dilations given by a center and a scale factor: (09-12)[State:New Jersey CCSS]</p> <p>G.SRT.2-Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all</p>

				<p>corresponding pairs of sides. (09-12)[State:New Jersey CCSS]</p> <p>G.CO.3-Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself. (09-12) [State:New Jersey CCSS]</p> <p>G.CO.5-Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another. (09-12)[State:New Jersey CCSS]</p> <p>G.CO.4-Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments. (09-12)[State:New Jersey CCSS]</p> <p>G.SRT.1-Verify experimentally the properties of dilations given by a center and a scale factor: (09-12)[State:New Jersey CCSS]</p> <p>G.SRT.1.b-The dilation of a line segment is longer or shorter in the ratio given by the scale factor. (09-12)[State:New Jersey CCSS]</p> <p>G.CO.7-Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs</p>
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				of angles are congruent. (09-12) [State:New Jersey CCSS] G.CO.8-Explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the definition of congruence in terms of rigid motions. (09-12) [State:New Jersey CCSS]
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**Plans:**

Duration: April/Week 30 - May/Week 33

UNIT NAME: Properties of Circles

Enduring Understandings	Essential Questions	Knowledge	Skills	Standards
<ul style="list-style-type: none"> <li>• Using properties of segments that intersect circles</li> <li>• Applying angle relationships in circles</li> <li>• Using circles in the coordinate plane</li> </ul>	<ul style="list-style-type: none"> <li>• How many tangents to circle P can be drawn containing point A?</li> <li>• How do you find the measure of an arc in a circle?</li> <li>• How can you tell if two chords in a circle are congruent?</li> <li>• How do you find the measure of an inscribed angle?</li> <li>• How do you find the measure of an angle formed by two chords that intersect inside a circle?</li> <li>• What are some properties of chords, secants, and tangents to a circle?</li> <li>• What do you need to know to write the standard equation of a circle?</li> </ul>	<ul style="list-style-type: none"> <li>• Definitions: Circle (center, radius, diameter), chord, secant, tangent (common internal and external), point of tangency, central angle, minor arc, major arc, semicircle, congruent circles, concentric circles, congruent arcs, inscribed angle, intercepted arc, inscribed, circumscribed.</li> <li>• A radius drawn to a point of tangency is perpendicular to the tangent.</li> <li>• Two tangent segments drawn from the same external point are congruent .</li> <li>• Measure and notation of a major and minor arc.</li> <li>• Arc Addition Postulate.</li> <li>• Chord Theorems.</li> <li>• Central Angle Theorems.</li> <li>• Inscribed Angle Theorems.</li> <li>• Right triangle and quadrilaterals inscribed in a circle theorems.</li> <li>• Angle relationships corresponding to circles (formulas).</li> <li>• Segments of chords theorem, segments of secants theorem, segments of secants and tangents theorem.</li> <li>• Equation of a circle.</li> </ul>	<ul style="list-style-type: none"> <li>• Identify parts of a circle, special segments, and lines.</li> <li>• Apply numeric and algebraic examples to tangent theorems.</li> <li>• Determine if a line is tangent to a circle using Pythagorean theorem.</li> <li>• Determine number of common tangents to two circles.</li> <li>• Determine the measure of an arc.</li> <li>• Label arcs using proper notation.</li> <li>• Determine congruent arc in congruent circles.</li> <li>• Apply algebraic and numeric examples to chord theorems.</li> <li>• Determine the measure of an arc using inscribed and central angles.</li> <li>• To determine the measure of a central and inscribed angle using the intercepted arcs.</li> <li>• Determine the measure of angles in an inscribed quadrilateral and right triangle.</li> <li>• Apply numeric and algebraic examples relating to angles corresponding to circles.</li> <li>• Apply numeric and algebraic examples relating to segments of circles.</li> </ul>	<p>G.CO.1-Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc. (09-12)[State:New Jersey CCSS]</p> <p>G.C.2-Identify and describe relationships among inscribed angles, radii, and chords. <i>Include the relationship between central, inscribed, and circumscribed angles; inscribed angles on a diameter are right angles; the radius of a circle is perpendicular to the tangent where the radius intersects the circle.</i> (09-12)[State:New Jersey CCSS]</p> <p>G.C.3-Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle. (09-12) [State:New Jersey CCSS]</p> <p>G.GPE.1-Derive the equation of a circle of given center and radius using the Pythagorean Theorem; complete the square to find the center and radius of a circle given by an equation. (09-12)[State:New Jersey CCSS]</p>

			<ul style="list-style-type: none"><li>• Write and graph equations of circles.</li></ul>	
<b>Plans:</b>				

**Duration: May/Week 34 - June/Week 37**

**UNIT NAME: Measurement of Figures and Solids**

Enduring Understandings	Essential Questions	Knowledge	Skills	Standards
<ul style="list-style-type: none"> <li>• Comparing measures for parts of circles and the whole circle</li> <li>• Solving problems using surface area and volume</li> <li>• Connecting similarity to solids</li> </ul>	<ul style="list-style-type: none"> <li>• How do you find the length of an arc of a circle?</li> <li>• How do you find the area of a sector of a circle?</li> <li>• How do you find the area of a regular polygon?</li> <li>• When is a solid a polyhedron?</li> <li>• How do you find the volume of a right prism or right cylinder?</li> <li>• How do you find the volume of a pyramid or cone?</li> <li>• How do you find the volume of a sphere?</li> </ul>	<ul style="list-style-type: none"> <li>• Vocabulary: Circumference, arc length, sector, center of a polygon, radius of a polygon, apothem of a polygon, central angle of a regular polygon, polyhedron (face, edge, vertex), platonic solids, height, cross section, volume, sphere, great circle, hemisphere, similar solids.</li> <li>• Circumference Formula.</li> <li>• Arc Length Theorem.</li> <li>• Area of a Circle Formula.</li> <li>• Area of a Sector Theorem.</li> <li>• Area of a Regular Polygon Formula.</li> <li>• Euler's Theorem.</li> <li>• Volume or prisms, cylinders, pyramids, cones, and spheres formula.</li> <li>• Surface Area of Spheres Formula.</li> <li>• Volume Addition Postulate.</li> <li>• Cavalieri's Principle.</li> <li>• Similar Solids Theorem.</li> </ul>	<ul style="list-style-type: none"> <li>• Find the circumference, and length of an arc given the radius or diameter.</li> <li>• Find the radius or diameter given the circumference or length of an arc.</li> <li>• Find the area, and area of a sector, given the radius or diameter.</li> <li>• Find the radius or diameter given the area or area of a sector.</li> <li>• Apply length of arc theorem to real world applications.</li> <li>• Apply area of a sector theorem to real world applications.</li> <li>• Determine the central angle, radius, apothem, and length of side of a regular polygon using special right triangle and right triangle trigonometry.</li> <li>• Find the perimeter and area of a regular polygon.</li> <li>• Identify and name polyhedron's.</li> <li>• Use Euler's theorem to determine the number of vertices, faces, or edges.</li> <li>• Describe the cross section of a polyhedron.</li> <li>• Use Pythagorean theorem to determine the height of a solid.</li> <li>• Determine the volume of prisms, cylinders, pyramids, cones, and spheres.</li> </ul>	<p>G.C.5-Derive using similarity the fact that the length of the arc intercepted by an angle is proportional to the radius, and define the radian measure of the angle as the constant of proportionality; derive the formula for the area of a sector. (09-12)[State:New Jersey CCSS]</p> <p>G.GMD.3-Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems. * (09-12)[State:New Jersey CCSS]</p> <p>G.GMD.4-Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects. (09-12)[State:New Jersey CCSS]</p> <p>G.SRT.8-Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems. * (09-12) [State:New Jersey CCSS]</p>

			<ul style="list-style-type: none"><li>• Determine the volume of a composition of solids.</li><li>• Determine the surface area of a sphere.</li><li>• Apply Cavalieri's principle to two solids.</li><li>• Determine the radius of the sphere and the circumference of the great circle.</li><li>• Identify similar solids.</li></ul>	
<b>Plans:</b>				



Duration: June/Week 38 - June/Week 40

**UNIT NAME: Probability**

Enduring Understandings	Essential Questions	Knowledge	Skills	Standards
<ul style="list-style-type: none"> <li>Finding probabilities of simple events.</li> <li>Finding probabilities of compound events.</li> <li>Finding geometric probabilities.</li> </ul>	<ul style="list-style-type: none"> <li>How do you find the probability that a point randomly selected in a region is in a particular part of that region?</li> <li>How do you find the probability of an event?</li> <li>How do you use the formula for permutations?</li> <li>How do you use combinations to count possibilities?</li> <li>How can you simplify solutions for disjoint and compound events?</li> <li>How can you distinguish between the probabilities of independent and dependent events?</li> </ul>	<ul style="list-style-type: none"> <li>Definitions: Probability (theoretical and experimental), geometric probability, outcome, event, odds, permutation, factorial, combination, sample space, compound events, overlapping events, independent and dependent events, disjoint events, and conditional probability.</li> <li>Length of a line segment.</li> <li>Area of figures.</li> <li>Permutation Combination Formula.</li> <li>Compound Events.</li> </ul>	<ul style="list-style-type: none"> <li>Apply lengths of segments to calculate the probability.</li> <li>Apply area formulas to determine geometric probabilities.</li> <li>Determine the sample space.</li> <li>Determine the number of possible outcomes in the sample space.</li> <li>Distinguish between theoretical and experimental probability.</li> <li>Apply permutation and combinations to real world problems.</li> <li>Evaluate factorial, permutation, and combination using a calculator.</li> <li>Determine the probabilities of disjoint and overlapping events.</li> <li>Find the probability of complements.</li> <li>Determine whether events are dependent or independent.</li> <li>Calculate the probability of dependent and independent events.</li> </ul>	<p>S.CP.1-Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events (“or,” “and,” “not”). (09-12)[State:New Jersey CCSS]</p> <p>S.CP.9-(+) Use permutations and combinations to compute probabilities of compound events and solve problems. (09-12)[State:New Jersey CCSS]</p>

**Plans:**