Hillsborough Township Public Schools
Mathematics Department
Geometry Curriculum Map

Essential Questions	Enduring Understandings	Domain	Cluster	Standard	Learning Targets	Assessment Formative and Summative	Inter-disciplinary Connections	21st Century Connections
Unit 1 – Foundations for Geometry **Pacing: CP – 17 days** **H – 17 days**						Common Unit Tests		
How can we use geometric language to describe spatial relationships?	Geometric properties can be used to construct geometric figures.	Congruence SMP 6 – Attend to Precision	Experiment with transformations in the plane.	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.	Identify, define, and denote basic geometric terms.	Describe and sketch ways in which a line and a plane can intersect or not intersect. Identify and correctly name, using the correct case and symbols for points, lines, line segments, angles, and rays. Give examples using the walls, floor, and ceiling in your classroom.	RST.9-10.4 - Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 9–10 texts and topics*.	
How can we best represent and verify geometric/algebraic relationships?	Geometric properties can be used to construct geometric figures.	Congruence SMP 5 – Use appropriate tools strategically.	Make geometric constructions.	G.CO.12 - Make formal geometric constructions with a variety of tools and methods (compass and straight edge, string, reflective devices, paper folding, dynamic geometric software, etc.). *Copying a segment; copying an angle; bisecting a segment;*	Use a variety of tools to construct basic geometric shapes.	Use a compass and a straight edge to copy an angle. Use a protractor to measure each angle and show that they are congruent.	RST.9-10.3 - Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.	9.4.12.B.(2).17 - Use craft skills to meet or exceed teacher and/or employer expectations.

Essential Questions	Enduring Understandings	Domain	Cluster	Standard	Learning Targets	Assessment Formative and Summative	Inter-disciplinary Connections	21st Century Connections
				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.				
How can we use the coordinate plane to determine information about the polygon?	Coordinate planes can easily be used to describe perimeter and area of a polygon.	Expressing Geometric Properties with Equations. SMP 2 – Reason abstractly and quantitatively.	Use Coordinates to prove simple geometric theorems algebraically.	G.GPE.7 - Use coordinates to compute perimeter of polygons and areas of triangles and rectangles, e.g. using the distance formula.*	Find the perimeter and area of figures in a coordinate plane.	Draw the polygon with vertices A(-3, 1), B(1,4) C(4,0), D (0,-3). Find the perimeter and area of the polygon.		9.4.12.O. (1).3 - Demonstrate the ability to select, apply, and convert systems of measurement to solve problems.

Essential Questions	Enduring Understandings	Domain	Cluster	Standard	Learning Targets	Assessment Formative and Summative	Inter-disciplinary Connections	21st Century Connections
How can we use mathematical models to describe physical relationships?	Mathematical models can be used to describe and quantify physical relationships.	Modeling with Geometry SMP 1 – Make sense of problems an persevere in solving them. SMP 4 – Model with mathematics.	Apply geometric concepts in modeling situations.	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).*	Use the properties of segments and angles and apply them to solve real world phenomena.	You are growing zucchini plants in your garden. In the figure, the entire garden is rectangle QRST. Each unit in the coordinate plane represents 1 foot. Find the area of the garden. Zucchini plants require 9 square feet around each plant. How many zucchini plants can you plant?		9.4.12.O.(2).1 - Develop an understanding of how science and mathematics function to provide results, answers, and algorithms for engineering activities to solve problems and issues in the real world.
Unit 2 – Reasoning and Proofs **Pacing: CP – 14 days** **H – 14 days**						Common Unit Tests		
How can we best represent and verify geometric/algebraic relationships?	Reasoning and/or proof can be used to verify or refute conjectures or theorems in geometry.	Congruence SMP 3 – Construct viable arguments and critique the reasoning of others.	Prove geometric theorems.	G.CO.9 - Prove theorems about lines and angles. *Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; points on a perpendicular*	Prove and apply theorems about points, segments, lines, and angles.	Given <1 and <3 are complementary and <2 and <4 are complementary and <3 is congruent to <4, prove <1 is congruent to <2.	WHST.9-10.1 - Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant sufficient textual and non-textual evidence. A. Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims,	9.4.12.O.(1).1 - Apply the concepts, processes, guiding principles, and standards of school mathematics to solve science, technology, engineering, and mathematics problems.

Essential Questions	Enduring Understandings	Domain	Cluster	Standard	Learning Targets	Assessment Formative and Summative	Inter-disciplinary Connections	21st Century Connections
				bisector of a line segment are exactly those equidistant from the segment's endpoints.			and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence.	
Unit 3 – Parallel and Perpendicular Lines **Pacing: CP – 15 days** **H – 15 days**						Common Unit Tests		
How can we use geometric language to describe spatial relationships?	Geometric properties can be used to construct geometric figures.	Congruence SMP 6 – Attend to precision	Experiment with transformations in the plane.	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.	Identify, define, and denote basic geometric terms.	Classify pairs of lines in a cube as parallel, intersecting, coincident, or skew.	RST.9-10.4 - Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 9–10 texts and topics*.	

Hillsborough Township Public Schools
Mathematics Department
Geometry Curriculum Map

Essential Questions	Enduring Understandings	Domain	Cluster	Standard	Learning Targets	Assessment Formative and Summative	Inter-disciplinary Connections	21st Century Connections
How can we best represent and verify geometric/algebraic relationships?	Reasoning and/or proof can be used to verify or refute conjectures or theorems in geometry.	Congruence SMP 3 – Construct viable arguments and critique the reasoning of others.	Prove geometric theorems.	G.CO.9 - Prove theorems about lines and angles. *Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints.*	Prove and apply theorems about points, segments, lines, and angles.	Given <1 and <3 are corresponding angles and <2 and <4 are corresponding angles and <3 is congruent to <4, prove <1 is congruent to <2.	WHST.9-10.1 - Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant sufficient textual and non-textual evidence. A. Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence.	9.4.12.O.(1).1 - Apply the concepts, processes, guiding principles, and standards of school mathematics to solve science, technology, engineering, and mathematics problems.
How can we best represent and verify geometric/algebraic relationships?	Geometric properties can be used to construct geometric figures.	Congruence SMP 3 – Construct viable arguments and critique the reasoning of others.	Make geometric constructions.	G.CO.12 - Make formal geometric constructions with a variety of tools and methods (compass and straight edge, string, reflective	Use a variety of tools to construct basic geometric shapes.	Use dynamic geometry software to draw two parallel lines. Draw a third line that intersects both parallel lines. Find the measures of the eight angles that	RST.9-10.3 - Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or	9.4.12.B.(2).17 - Use craft skills to meet or exceed teacher and/or employer expectations.

Essential Questions	Enduring Understandings	Domain	Cluster	Standard	Learning Targets	Assessment Formative and Summative	Inter-disciplinary Connections	21st Century Connections
		SMP 5 – Use appropriate tools strategically.		devices, paper folding, dynamic geometric software, etc.). *Copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line.*		are formed. What can you conclude?	exceptions defined in the text.	
How can we best represent and verify geometric/algebraic relationships?	What we measure affects how we measure it.	Expressing Geometric Properties with Equations. SMP 3 – Construct viable arguments and critique the reasoning of others.	Use Coordinates to prove simple geometric theorems algebraically.	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 of perpendicular to a given line that passes through a given point.)	Prove and use the slope criteria for parallel and perpendicular lines have opposite/ reciprocal slopes.	Tell whether the lines through the given points are parallel, perpendicular, or neither. Justify your answer. Line 1: (2,0), (-2,2) Line 2: (1, -2), (4, 4)		9.4.12.O.(1).2 - Apply and use algebraic, geometric, and trigonometric relationships, characteristics, and properties to solve problems.

Essential Questions	Enduring Understandings	Domain	Cluster	Standard	Learning Targets	Assessment Formative and Summative	Inter-disciplinary Connections	21st Century Connections
		SMP 5 – Use appropriate tools strategically.						
How can measurements be used to solve problems?	Measurements can be used to describe, compare, and make sense of phenomena.	Expressing Geometric Properties with Equations. SMP 6 – Attend to precision.	Use Coordinates to prove simple geometric theorems algebraically.	G.GPE.6 - Find the point on a directed line segment between two given points that partitions the segment in a given ratio.	Use slope to partition directed line segments.	Find the coordinates of point P along the directed line segment AB so that the ratio of AP to PB is 3 to 2.	RST.9-10.3 - Follow precisely a complex multi-step procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.	9.4.12.O.(1).3 - Demonstrate the ability to select, apply, and convert systems of measurement to solve problems.
Unit 4 – Transformations **Pacing: CP – 15days** **H – 15 days**						Common Unit Tests		
How can we use transfor-mations to represent algebraic changes?	Shape and area can be conserved during mathematical transformations.	Congruence SMP 7 – Look for and make use of structure. SMP 8- Look for and express regularity in repeated reasoning.	Experiment with transformations in the plane.	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	Perform reflections, translations and rotations in the coordinate plane.	Provide the transformation rule that moves it down 4 places and right 3 places.		9.4.12.O.(2).1 - Develop an understanding of how science and mathematics function to provide results, answers, and algorithms for engineering activities to solve problems and issues in the real world.

Essential Questions	Enduring Understandings	Domain	Cluster	Standard	Learning Targets	Assessment Formative and Summative	Inter-disciplinary Connections	21st Century Connections
				to those that do not (e.g., translation versus horizontal stretch).				
How can we use transfor-mations to represent algebraic changes?	Shape and area can be conserved during mathematical transformations.	Congruence SMP 3 – Construct viable arguments and critique the reasoning of others.	Experiment with transformations in the plane.	G.CO.3 - Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself. Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.	Apply theorems about isometry.	Tell whether the figure can be folded in half so that one side matches the other.		9.4.12.O.(1).2 - Apply and use algebraic, geometric, and trigonometric relationships, characteristics, and properties to solve problems.
How can we use transfor-mations to represent algebraic changes?	Shape and area can be conserved during mathematical transformations.	Congruence SMP 8- Look for and express regularity in repeated reasoning.	Experiment with transformations in the plane.	G.CO.4 - Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel	Recognize that perpendicular and parallel lines are rotations and reflections.	Given a figure describe how you can rotate it 180 degrees using reflections.		9.4.12.O.(1).2 - Apply and use algebraic, geometric, and trigonometric relationships, characteristics, and properties to solve problems.

Essential Questions	Enduring Understandings	Domain	Cluster	Standard	Learning Targets	Assessment Formative and Summative	Inter-disciplinary Connections	21st Century Connections
				lines, and line segments.				
How can we use transfor-mations to represent algebraic changes?	Shape and area can be conserved during mathematical transformations.	Congruence SMP 6 – Attend to precision.	Experiment with transformations in the plane.	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.	Graph transformations in the coordinate plane.	The vertices of triangle ABC are A(-1,1), B(-3,3) and C(-4,0). Find the coordinates for the image after the translation (x,y) -> (x+3,y-4)		9.4.12.O.(1).2 - Apply and use algebraic, geometric, and trigonometric relationships, characteristics, and properties to solve problems.
How can we use transfor-mations to represent algebraic changes?	Shape and area can be conserved during mathematical transformations.	Congruence SMP 3 – Construct viable arguments and critique the reasoning of others.	Understand congruence in terms of rigid motions.	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.	Find the effect of the transformation, rotation or reflection and show that the figures maintain their congruency.	Determine whether the polygons with the given vertices are congruent. Use transformations to explain your reasoning. Q(2,4), R(5,4), S(4,1) and T(6,4), U(9,4), V(8,1)		9.4.12.O.(1).1 - Apply the concepts, processes, guiding principles, and standards of school mathematics to solve science, technology, engineering, and mathematics problems.

Hillsborough Township Public Schools
Mathematics Department
Geometry Curriculum Map

Essential Questions	Enduring Understandings	Domain	Cluster	Standard	Learning Targets	Assessment Formative and Summative	Inter-disciplinary Connections	21st Century Connections
How can we use geometric language to describe spatial relationships?	Geometric relationships provide a means to make sense of a variety of phenomena.	Modeling with Geometry. SMP 1 – Make sense of problems and persevere to solve them. SMP 4 – Model with mathematics.	Apply geometric concepts in modeling situations.	G.MG.3 - Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).*	Apply geometric methods to solve design problems	You are going to buy books. Your friend is going to buy CDs. Where should you park to minimize the distance you both will walk?	8.2.12.C.2 - Evaluate ethical considerations regarding the sustainability of resources that are used for the design, creation, and maintenance of a chosen product.	9.4.12.O.(2).2 - Apply science and mathematics when developing plans, processes, and projects to find solutions to real world problems.

Essential Questions	Enduring Understandings	Domain	Cluster	Standard	Learning Targets	Assessment Formative and Summative	Inter-disciplinary Connections	21st Century Connections
How can we best represent and verify geometric/algebraic relationships?	Coordinate geometry can be used to represent and verify geometric/algebraic relationships.	Similarity, Right Triangles, and Trigonometry SMP 6 – Attend to precision.	Understand similarity in terms of similarity transformations.	G.SRT.1 - Verify experimentally the properties of dilations given by a center and a scale factor: (a) A dilation takes a line not passing through the center of the dilation to a parallel line, and leaves a line passing through the center unchanged. (b) The dilation of a line segment is longer or shorter in the ratio given by the scale factor.	Identify and draw dilations using a scale factor and center of dilation.	Dilate a triangle with vertices (1,1), (-3,1), (-1,4), on a coordinate grid by a scale factor of 2 (using the origin as the center). Show that the resulting lines of the image are parallel to, and double the length of, the pre-image lines.		9.4.12.O.(1).1 - Apply the concepts, processes, guiding principles, and standards of school mathematics to solve science, technology, engineering, and mathematics problems.
How can we use transformations to represent algebraic changes?	Shape and area can be conserved during mathematical transformations.	Similarity, Right Triangles, and Trigonometry. SMP 2 – Reason abstractly and quantitatively.	Understand similarity in terms of similarity transformations.	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	Investigate proportional relationships in triangles.	Given three triangles (two of which are similar) with measurements of sides and angles specified, determine which two triangles are similar.		9.4.12.O.(1).1 - Apply the concepts, processes, guiding principles, and standards of school mathematics to solve science, technology, engineering, and mathematics problems.

Essential Questions	Enduring Understandings	Domain	Cluster	Standard	Learning Targets	Assessment Formative and Summative	Inter-disciplinary Connections	21st Century Connections
				corresponding pairs of angles and the proportionality of all corresponding pairs of sides.				
Unit 5 – Congruent Triangles **Pacing: CP – 16 days** **H – 16 days**						Common Unit Tests		
How can we use transfor-mations to represent algebraic changes?	Shape and area can be conserved during mathematical transformations.	Congruence SMP 6 – Attend to precision.	Understand congruence in terms of rigid motions.	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 angles are congruent.	Show that an isometry produces a congruent triangle.	Reflect a triangle over the y-axis. Measure the angles to show the pre-image and the images have congruent angles.		9.4.12.O.(1).2 - Apply and use algebraic, geometric, and trigonometric relationships, characteristics, and properties to solve problems.
How can we best represent and verify geometric/algeb raic relationships?	Reasoning and/or proof can be used to verify or refute conjectures or theorems in geometry.	Congruence. SMP 3 – Construct viable arguments and critique the reasoning of others.	Understand congruence in terms of rigid motions.	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.	Use the triangle congruence postulates to show whether or not triangles are congruent.	Prove how two triangles are congruent by using rigid motions.	WHST.9-10.2 – Write informative/explanat ory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. A. Introduce a topic and organize ideas,	9.1.4.D.1 - Use effective oral and written communication in face-to-face and online interactions and when presenting to an audience.

Essential Questions	Enduring Understandings	Domain	Cluster	Standard	Learning Targets	Assessment Formative and Summative	Inter-disciplinary Connections	21st Century Connections
							concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.	
How can we best represent and verify geometric/algebraic relationships?	Reasoning and/or proof can be used to verify or refute conjectures or theorems in geometry.	Congruence SMP 3 – Construct viable arguments and critique the reasoning of others. SMP 6 – Attend to precision.	Prove geometric theorems	G.CO.10 - Prove theorems about triangles. *Theorems include: measures of the 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.*	Prove theorems about triangles.	Given triangle ABC prove m<A + m<B + m<C = 180 degrees.	WHST.9-10.1 - Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant sufficient textual and non-textual evidence. A. Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims,	9.1.12.A.1 - Apply critical thinking and problem-solving strategies during structured learning experiences.

Essential Questions	Enduring Understandings	Domain	Cluster	Standard	Learning Targets	Assessment Formative and Summative	Inter-disciplinary Connections	21st Century Connections
							reasons, and evidence.	
How can we use mathematical models to describe physical relationships?	Mathematical models can be used to describe and quantify physical relationships.	Modeling with Geometry SMP 4 – Model with mathematics.	Apply geometric concepts in modeling situations.	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).*	Use the properties of segments and angles in congruent triangles and apply them to solve real world phenomena.	The triangular faces of the peaks on a roof are congruent isosceles triangles with vertex angles U and V. Name two angles congruent to <WUX.		9.4.12.O.(2).1 - Develop an understanding of how science and mathematics function to provide results, answers, and algorithms for engineering activities to solve problems and issues in the real world.
How can we use geometric language to describe spatial relationships?	Geometric relationships provide a means to make sense of a variety of phenomena.	Modeling with Geometry SMP 4 – Model with mathematics. SMP 8 – Look for and express regularity in repeated reasoning.	Apply geometric concepts in modeling situations.	G.MG.3 - Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).*	Apply geometric methods to solve design problems	A quilt is made of triangles. You know PS || QR and PS is congruent to QR. Use the SAS Congruent Theorem to show that triangle PQR is congruent to triangle RSP.	8.2.12.C.2 - Evaluate ethical considerations regarding the sustainability of resources that are used for the design, creation, and maintenance of a chosen product.	9.4.12.O.(2).2 - Apply science and mathematics when developing plans, processes, and projects to find solutions to real world problems.
How can we use transfor-mations to represent algebraic changes?	Shape and area can be conserved during mathematical transformations.	Similarity, Right Triangles, and Trigonometry.	Prove theorems involving similarity.	G.SRT.5 - Use congruence and similarity criteria for triangles to solve problems and to prove	Use congruence statements with congruent triangles and solve for an unknown side.	Explain how to find the distance across the canyon when given two triangles that have a right angle, one	RST.9-10.8 – Determine if the extent to which the reasoning and evidence in a text support the author's	9.4.12.O.(1).3 - Demonstrate the ability to select, apply, and convert systems of measurement

Essential Questions	Enduring Understandings	Domain	Cluster	Standard	Learning Targets	Assessment Formative and Summative	Inter-disciplinary Connections	21st Century Connections
		SMP 3 – Construct viable arguments and critique the reasoning of others.		relationships in geometric figures.		pair of congruent sides, and share a vertical angle.	claim or a recommendation for solving a scientific or technical problem.	to solve problems.
How can we best represent and verify geometric/algebraic relationships?	Coordinate geometry can be used to represent and verify geometric/algebraic relationships.	Expressing Geometric Properties with Equations. SMP 3 – Construct viable arguments and critique the reasoning of others.	Use coordinates to prove simple geometric theorems algebraically.	G.GPE.4 - Use Coordinates to prove simple geometric theorems algebraically.	Use coordinates to prove simple geometric theorems algebraically.	Use the coordinate plane to give an example of how to prove that Hypotenuse -Leg Congruence Theorem is true.	RST.9-10.3 - Follow precisely a complex multi-step procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.	9.4.12.O.2 - Demonstrate mathematics knowledge and skills required to pursue the full range of postsecondary education and career opportunities.
Unit 6 – Relationships within Triangles **Pacing: CP – 11 days** **H – 11 days**						Common Unit Test		
How can we best represent and verify geometric/algebraic relationships?	Reasoning and/or proof can be used to verify or refute conjectures or theorems in geometry.	Congruence SMP 3 – Construct viable arguments and critique the reasoning of others.	Prove geometric theorems.	G.CO.9 - Prove theorems about lines and angles. *Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are*	Prove and apply theorems about points, segments, lines, and angles.	Tell whether the information in the diagram allows you to conclude that point P lies on the perpendicular bisector of LM. Explain.	WHST.9-10.1 - Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant sufficient textual and non-textual evidence. A. Introduce precise claim(s), distinguish the	9.4.12.O.(1).1 - Apply the concepts, processes, guiding principles, and standards of school mathematics to solve science, technology, engineering, and mathematics problems.

Essential Questions	Enduring Understandings	Domain	Cluster	Standard	Learning Targets	Assessment Formative and Summative	Inter-disciplinary Connections	21st Century Connections
				congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints.			claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence.	
How can we best represent and verify geometric/algebraic relationships?	Reasoning and/or proof can be used to verify or refute conjectures or theorems in geometry.	Congruence SMP 3 – Construct viable arguments and critique the reasoning of others. SMP 6 – Attend to precision.	Prove geometric theorems	G.CO.10 - Prove theorems about triangles. *Theorems include: measures of the 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.*	Prove theorems about triangles.	Find the coordinates of the centroid of the triangle with the given vertices A(2,3), B(8,1), C(5,7).	WHST.9-10.1 - Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant sufficient textual and non-textual evidence. A. Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims,	9.1.12.A.1 - Apply critical thinking and problem-solving strategies during structured learning experiences.

Essential Questions	Enduring Understandings	Domain	Cluster	Standard	Learning Targets	Assessment Formative and Summative	Inter-disciplinary Connections	21st Century Connections
							reasons, and evidence.	
How can we best represent and verify geometric/algebraic relationships?	Geometric properties can be used to construct geometric figures.	Congruence SMP 5 – Use appropriate tools strategically.	Make geometric constructions.	G.CO.12 - Make formal geometric constructions with a variety of tools and methods (compass and straight edge, string, reflective devices, paper folding, dynamic geometric software, etc.). *Copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line.*	Use a variety of tools to construct basic geometric shapes.	Use a compass and a straight edge to construct a circle that is circumscribed about triangle ABC.	RST.9-10.3 - Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.	9.4.12.B.(2).17 - Use craft skills to meet or exceed teacher and/or employer expectations.
How can we use mathematical	Mathematical models can be used to describe	Modeling with Geometry	Apply geometric concepts in	G.MG.1 - Use geometric shapes, their	Use the properties of segments and	A high school is being built for three towns shown		9.4.12.O.(2).1 - Develop an understanding of

Essential Questions	Enduring Understandings	Domain	Cluster	Standard	Learning Targets	Assessment Formative and Summative	Inter-disciplinary Connections	21st Century Connections
models to describe physical relationships?	and quantify physical relationships.	SMP 1 – Make sense of problems and persevere to solve them. SMP 4 – Model with mathematics.	modeling situations.	measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).*	angles in triangles and circles and apply them to solve real world phenomena.	on a map. Each town agrees that the school should be an equal distance from each of the three towns. Is there a single point where they could agree to build the school?		how science and mathematics function to provide results, answers, and algorithms for engineering activities to solve problems and issues in the real world.
How can we use geometric language to describe spatial relationships?	Geometric relationships provide a means to make sense of a variety of phenomena.	Modeling with Geometry SMP 1 – Make sense of problems and persevere to solve them. SMP 4 – Model with mathematics.	Apply geometric concepts in modeling situations.	G.MG.3 - Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).*	Apply geometric methods to solve design problems	You are installing a circular pool in the triangular courtyard shown. Find the largest pool possible on the site without extending into the walkway.	8.2.12.C.2 - Evaluate ethical considerations regarding the sustainability of resources that are used for the design, creation, and maintenance of a chosen product.	9.4.12.O.(2).2 - Apply science and mathematics when developing plans, processes, and projects to find solutions to real world problems.
How can we use geometric language to describe spatial relationships?	Geometric properties can be used to construct geometric figures.	Circles SMP 5 – Use appropriate tools strategically.	Understand and apply theorems about circles.	G.C.3 - Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle.	Construct the inscribed and circumscribed circles of a triangle.	Given a triangle, construct inscribed and circumscribed circles.		9.4.12.B.(2).17 - Use craft skills to meet or exceed teacher and/or employer expectations.

Essential Questions	Enduring Understandings	Domain	Cluster	Standard	Learning Targets	Assessment Formative and Summative	Inter-disciplinary Connections	21st Century Connections
Mid-Term Exam **Pacing: 1 day**								
Unit 7 – Quadrilaterals and Other Polygons **Pacing: CP – 14 days** **H – 14 days**						Common Unit Test		
How can we best represent and verify geometric/algebraic relationshps?	Reasoning and/or proof can be used to verify or refute conjectures or theorems in geometry.	Congruence SMP 3 – Construct viable arguments and critique the reasoning of others.	Prove geometric theorems.	G.CO.11 - Prove theorems about parallelograms. *Theorems include: opposite sides are congruent; opposite angles are congruent; the diagonals of a parallelogram bisect each other; and conversely, rectangles are parallelograms with congruent diagonals.*	Prove theorems about parallelograms.	Given parallelogram ABCD, prove that the opposite sides are congruent.	WHST.9-10.1 - Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant sufficient textual and non-textual evidence. A. Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence.	9.1.12.A.1 - Apply critical thinking and problem-solving strategies during structured learning experiences.
How can we use transfor-mations to represent	Shape and area can be conserved during mathematical transformations.	Similarity, Right Triangles, and Trigonometry.	Prove theorems involving similarity.	G.SRT.5 - Use congruence and similarity criteria for triangles to solve problems	Use triangle properties to prove theorems about polygons.	Use triangles to prove the Polygon Interior Angles Theorem.	RST.9-10.8 – Determine if the extent to which the reasoning and evidence in a text	9.4.12.O.(1).3 - Demonstrate the ability to select, apply, and convert systems

Essential Questions	Enduring Understandings	Domain	Cluster	Standard	Learning Targets	Assessment Formative and Summative	Inter-disciplinary Connections	21st Century Connections
algebraic changes?		SMP 3 – Construct viable arguments and critique the reasoning of others.		and to prove relationships in geometric figures.			support the author's claim or a recommendation for solving a scientific or technical problem.	of measurement to solve problems.
How can we use mathematical models to describe physical relationships?	Mathematical models can be used to describe and quantify physical relationships.	Modeling with Geometry SMP 1 – Make sense of problems and persevere to solve them. SMP 4 – Model with mathematics.	Apply geometric concepts in modeling situations.	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).*	Use the properties of segments and angles in polygons and apply them to solve real world phenomena.	The floor of the gazebo shown is shaped like a regular decagon. Find the measure of each interior and exterior angle.		9.4.12.O.(2).1 - Develop an understanding of how science and mathematics function to provide results, answers, and algorithms for engineering activities to solve problems and issues in the real world.
How can we use geometric language to describe spatial relationships?	Geometric relationships provide a means to make sense of a variety of phenomena.	Modeling with Geometry SMP 1 – Make sense of problems and persevere to solve them. SMP 4 – Model with mathematics.	Apply geometric concepts in modeling situations.	G.MG.3 - Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).*	Apply geometric methods to solve design problems	You are building a frame for a window. How can you measure the frame for the window to ensure that it is a rectangle and will fit the designated window?	8.2.12.C.2 - Evaluate ethical considerations regarding the sustainability of resources that are used for the design, creation, and maintenance of a chosen product.	9.4.12.O.(2).2 - Apply science and mathematics when developing plans, processes, and projects to find solutions to real world problems.
Unit 8 – Similarity						Common Unit		

Hillsborough Township Public Schools
Mathematics Department
Geometry Curriculum Map

Essential Questions	Enduring Understandings	Domain	Cluster	Standard	Learning Targets	Assessment Formative and Summative	Inter-disciplinary Connections	21st Century Connections
Pacing: CP – 10 days H – 10 days						Test		
How can we use transfor-mations to represent algebraic changes?	Shape and area can be conserved during mathematical transformations.	Similarity, Right Triangles, and Trigonometry SMP 3 – Construct viable arguments and critique the reasoning of others. SMP 8 – Look for and express regularity in repeated reasoning.	Understand similarity in terms of similarity transformations.	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.	Investigate proportional relationships in triangles.	Given three triangles (two of which are similar) with measurements of sides and angles specified, determine which two triangles are similar.		9.4.12.O.(1).1 - Apply the concepts, processes, guiding principles, and standards of school mathematics to solve science, technology, engineering, and mathematics problems.
How can we use transfor-mations to represent algebraic changes?	Shape and area can be conserved during mathematical transformations.	Similarity, Right Triangles, and Trigonometry SMP 3 – Construct viable arguments and critique the reasoning of others.	Understand similarity in terms of similarity transformations.	G.SRT.3 - Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.	Explain why triangles with 2 known congruent corresponding angles are similar.	Explain why two triangles, one with a right angle and a 43 degree angle, and another with a right angle and a 47 degree angle, are similar.	RST.9-10.7 - Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically	9.4.12.O.(1).1 - Apply the concepts, processes, guiding principles, and standards of school mathematics to solve science, technology, engineering, and

Essential Questions	Enduring Understandings	Domain	Cluster	Standard	Learning Targets	Assessment Formative and Summative	Inter-disciplinary Connections	21st Century Connections
							(e.g., in an equation) into words.	mathematics problems.
What makes two figures similar?	Similar figures have corresponding congruent angles and corresponding proportional sides.	Similarity, Right Triangles, and Trigonometry SMP 3 – Construct viable arguments and critique the reasoning of others.	Prove theorems involving similarity.	G.SRT.4 - Prove theorems about triangles. Theorems include: a line parallel to one side of a triangle divides the other two proportionally and conversely; the Pythagorean Theorem proved using triangle similarity.	Prove two triangles similar using the AA~ Postulate, SAS ~ Theorem and SSS~ Similarity Theorem.	Given a triangle, which is intersected by a line parallel to its base, prove the original triangle is similar to the smaller triangle formed by the intersecting line.	RST.9-10.8 – Determine if the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.	9.4.12.O.(1).3 - Demonstrate the ability to select, apply, and convert systems of measurement to solve problems.
How can we use transfor-mations to represent algebraic changes?	Shape and area can be conserved during mathematical transformations.	Similarity, Right Triangles, and Trigonometry SMP 6 – Attend to precision.	Prove theorems involving similarity.	G.SRT.5 - Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.	Use ratios and proportions with similar triangles and solve for an unknown side.	Given a similarity statement and the side measures of one triangle, and one side measure of the other triangle, find the unknown side lengths.	RST.9-10.8 – Determine if the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.	9.4.12.O.(1).3 - Demonstrate the ability to select, apply, and convert systems of measurement to solve problems.
How can we use mathematical models to describe physical relationships?	Mathematical models can be used to describe and quantify physical relationships.	Modeling with Geometry SMP 1 – Make sense of problems and persevere in solving them.	Apply geometric concepts in modeling situations.	G.MG.1 - Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a	Use the properties of segments and angles in triangles and apply them to solve real world phenomena.	You are building a lean-to shelter starting from a tree branch, as shown. Can you construct the right end so it is similar to the left end using the angle		9.4.12.O.(2).1 - Develop an understanding of how science and mathematics function to provide results, answers, and algorithms for

Essential Questions	Enduring Understandings	Domain	Cluster	Standard	Learning Targets	Assessment Formative and Summative	Inter-disciplinary Connections	21st Century Connections
		SMP 4 – Model with mathematics.		human torso as a cylinder).*		measure and lengths shown?		engineering activities to solve problems and issues in the real world.
How can we use geometric language to describe spatial relationships?	Geometric relationships provide a means to make sense of a variety of phenomena.	Modeling with Geometry SMP 1 – Make sense of problems and persevere in solving them. SMP 4 – Model with mathematics.	Apply geometric concepts in modeling situations.	G.MG.3 - Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).*	Apply geometric methods to solve design problems	In table tennis, the table is a rectangle 9 feet long and 5 feet wide. A tennis court is a rectangle 78 feet long and 36 feet wide. Are the two surfaces similar? If so, find the scale factor.	8.2.12.C.2 - Evaluate ethical considerations regarding the sustainability of resources that are used for the design, creation, and maintenance of a chosen product.	9.4.12.O.(2).2 - Apply science and mathematics when developing plans, processes, and projects to find solutions to real world problems.
How can we best represent and verify geometric/algebraic relationships?	What we measure affects how we measure it.	Expressing Geometric Properties with Equations SMP 3 – Construct viable arguments and critique the reasoning of others.	Use Coordinates to prove simple geometric theorems algebraically.	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 of perpendicular to a given line that passes through a given point.)	Prove and use the slope criteria for parallel and perpendicular lines have opposite/ reciprocal slopes.	Prove the Slopes of Parallel Lines Theorem.		9.4.12.O.(1).2 - Apply and use algebraic, geometric, and trigonometric relationships, characteristics, and properties to solve problems.
How can measurements be used to solve problems?	Measurements can be used to describe, compare, and	Expressing Geometric Properties with Equations.	Use Coordinates to prove simple geometric	G.GPE.6 - Find the point on a directed line segment between	Using ratios to set- up equations to solve problems.	Find the missing side of a triangle when it is given as	RST.9-10.3 - Follow precisely a complex multi-step procedure when carrying out	9.4.12.O.(1).3 - Demonstrate the ability to select, apply, and

Essential Questions	Enduring Understandings	Domain	Cluster	Standard	Learning Targets	Assessment Formative and Summative	Inter-disciplinary Connections	21st Century Connections
	make sense of phenomena.	SMP 6 – Attend to precision.	theorems algebraically.	two given points that partitions the segment in a given ratio.		a part of two similar triangles.	experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.	convert systems of measurement to solve problems.
Unit 9 – Right Triangles and Trigonometry **Pacing: CP – 17 days** **H – 17 days**						Common Unit Test		
What situations can be analyzed using similar triangles?	Similar triangles allow us to determine missing information.	Similarity, Right Triangles, and Trigonometry SMP 6 – Attend to precision.	Prove theorems involving similarity.	G.SRT.4 - Prove theorems about triangles. Theorems include: a line parallel to one side of a triangle divides the other two proportionally and conversely; the Pythagorean Theorem proved using triangle similarity.	Use the Pythagorean Theorem to determine missing values in a right triangle.	Find the value of the third side of a right triangle using the Pythagorean Theorem.	RST.9-10.8 – Determine if the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.	9.4.12.O.(1).3 - Demonstrate the ability to select, apply, and convert systems of measurement to solve problems.
How can we use transfor-mations to represent algebraic changes?	Shape and area can be conserved during mathematical transformations.	Similarity, Right Triangles, and Trigonometry SMP 6 – Attend to precision.	Prove theorems involving similarity.	G.SRT.5 - Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.	Use ratios and proportions with similar triangles and solve for an unknown side.	Given a similarity statement and the side measures of one triangle, and one side measure of the other triangle, find the unknown side lengths (altitude).	RST.9-10.8 – Determine if the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.	9.4.12.O.(1).3 - Demonstrate the ability to select, apply, and convert systems of measurement to solve problems.

Essential Questions	Enduring Understandings	Domain	Cluster	Standard	Learning Targets	Assessment Formative and Summative	Inter-disciplinary Connections	21st Century Connections
How can we use transfor-mations to represent algebraic changes?	Shape and area can be conserved during mathematical transformations.	Similarity, Right Triangles, and Trigonometry SMP 6 – Attend to precision.	Define trigonometric ratios and solve problems involving right triangles.	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 rations for acute angles.	Calculate and use tangent, sine and cosine ratios.	Given one side length and one acute angle measure in a right triangle, find the unknown side lengths using trig ratios. Given 3 side lengths of a right triangle, find the sin, cos, and tan of the acute angles.		9.4.12.O.(1).2 - Apply and use algebraic, geometric, and trigonometric relationships, characteristics, and properties to solve problems.
How can we use transfor-mations to represent algebraic changes?	Shape and area can be conserved during mathematical transformations.	Similarity, Right Triangles, and Trigonometry SMP 3 – Construct viable arguments and critique the reasoning of others.	Define trigonometric ratios and solve problems involving right triangles.	G.SRT.7 - Explain and use the relationship between the sine and cosine of complementary angles.	Explain and use the relationship between the sine and cosine of complementary angles.	Given a 30-60-90 triangle, explain why the sine of 30 equals the cosine of 60.	RST.9-10.8 – Determine if the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.	9.4.12.O.(1).2 - Apply and use algebraic, geometric, and trigonometric relationships, characteristics, and properties to solve problems.
How can we use transfor-mations to represent algebraic changes?	Shape and area can be conserved during mathematical transformations.	Similarity, Right Triangles, and Trigonometry SMP 6 – Attend to precision	Define trigonometric ratios and solve problems involving right triangles.	G.SRT.8 - Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.	Use trig functions and the Pythagorean Theorem to solve problems.	Given only the side lengths of 2 legs in a right triangle, find the hypotenuse length and acute angle measures.		9.4.12.O.(1).2 - Apply and use algebraic, geometric, and trigonometric relationships, characteristics, and properties to solve problems.
How can we use	Mathematical models can be	Modeling with Geometry	Apply geometric concepts in	G.MG.1 - Use geometric shapes,	Use the properties of	The International Space Station		9.4.12.O.(2).1 -

Essential Questions	Enduring Understandings	Domain	Cluster	Standard	Learning Targets	Assessment Formative and Summative	Inter-disciplinary Connections	21st Century Connections
mathematical models to describe physical relationships?	used to describe and quantify physical relationships.	SMP 1 – Make sense of problems and persevere in solving them. SMP 4 – Model with mathematics.	modeling situations.	their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).*	segments and angles in circles and apply them to solve real world phenomena.	orbits Earth at an altitude of 240 miles. What is the distance from the space station to Earth's horizon to the nearest mile?		Develop an understanding of how science and mathematics function to provide results, answers, and algorithms for engineering activities to solve problems and issues in the real world.
How can we use geometric language to describe spatial relationships?	Geometric relationships provide a means to make sense of a variety of phenomena.	Modeling with Geometry SMP 1 – Make sense of problems and persevere in solving them. SMP 4 – Model with mathematics.	Apply geometric concepts in modeling situations.	G.MG.3 - Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).*	Apply geometric methods to solve design problems	You are standing on a footbridge that is 12 feet above a lake. You look down and see a duck in the water. The duck is 7 feet away from the footbridge. What is the angle of elevation from the duck to you?	8.2.12.C.2 - Evaluate ethical considerations regarding the sustainability of resources that are used for the design, creation, and maintenance of a chosen product.	9.4.12.O.(2).2 - Apply science and mathematics when developing plans, processes, and projects to find solutions to real world problems.
Unit 10 – Circles **Pacing: CP – 15 days** **H – 15 days**						Common Unit Test		
How can we use geometric language to describe spatial relationships?	Geometric properties can be used to construct geometric figures.	Congruence SMP 6 – Attend to precision.	Experiment with transformations in the plane.	G.CO.1 - Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the	Identify, define, and denote basic geometric terms.	Given a diagram, identify and correctly name, using the correct case and symbols for chords, secants,	RST.9-10.4 - Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a	

Essential Questions	Enduring Understandings	Domain	Cluster	Standard	Learning Targets	Assessment Formative and Summative	Inter-disciplinary Connections	21st Century Connections
				undefined notions of point, line, distance along a line, and distance around a circular arc.		tangents, radii, and diameters.	specific scientific or technical context relevant to *grades 9–10 texts and topics*.	
How can we best represent and verify geometric/algebraic relationships?	Geometric properties can be used to construct geometric figures.	Congruence SMP 5 – Use appropriate tools strategically.	Make geometric constructions.	G.CO.13 - Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.	Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.	Using a compass and a straight edge, construct a square inscribed in a circle.	RST.9-10.3 - Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.	9.4.12.B.(2).17 - Use craft skills to meet or exceed teacher and/or employer expectations.
How can we best represent and verify geometric/algebraic relationships?	Reasoning and/or proof can be used to verify or refute conjectures or theorems in geometry.	Circles SMP 3 – Construct viable arguments and critique the reasoning of others.	Understand and apply theorems about circles.	G.C.1 -Prove that all circles are similar.	Prove that all circles are similar.	Find the ratio of the circumference of a circle to its diameter and show that it is the same for every circle.	WHST.9-10.2 - Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.	
How do geometric relationships help to solve problems and/or make sense of phenomena?	Geometric relationships provide a means to make sense of a variety of phenomena.	Circles SMP 6 – Attend to precision.	Understand and apply theorems about circles.	G.C.2 - Identify and describe relationships among inscribed angles, radii, and chords. Include the relationship between central, inscribed, and	In a circle, find the measures of central angles, arcs of circles, inscribed angles and the arcs they intersect, and the measures of angles formed by	Given a diagram, find the measures of minor and major arcs, central angles, and inscribed angles. Use the properties of congruent arcs, congruent chords,	RST.9-10.4 - Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context	9.4.12.B.14 - Develop and interpret tables, charts, and figures to support written and oral communications.

Essential Questions	Enduring Understandings	Domain	Cluster	Standard	Learning Targets	Assessment Formative and Summative	Inter-disciplinary Connections	21st Century Connections
				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.	chords, secants and tangents.	and congruent central angles to find the unknown values.	relevant to grades 9–10 texts and topics.	
How can we use geometric language to describe spatial relationships?	Geometric properties can be used to construct geometric figures.	Circles SMP 6 – Attend to precision.	Understand and apply theorems about circles.	G.C.3 - Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle.	Use inscribed angles and their properties to show that the opposite angles in a quadrilateral inscribed in a circle are supplementary. Construct the inscribed and circumscribed circles of a triangle.	Given a picture of a quadrilateral inscribed in a circle with an algebraic expression for at least three of the angles, find the measures of all the angles in the quadrilateral. Given a triangle, construct inscribed and circumscribed circles.		9.4.12.B.(2).17 - Use craft skills to meet or exceed teacher and/or employer expectations.
How can we use mathematical models to describe physical relationships?	Mathematical models can be used to describe and quantify physical relationships.	Modeling with Geometry SMP 1 – Make sense of problems and persevere in solving them.	Apply geometric concepts in modeling situations.	G.MG.1 - Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a	Use the properties of segments and angles in circles and apply them to solve real world phenomena.	A circular plot with a 800 ft. diameter is watered by a spray irrigation system. To the nearest square foot, what is the area that is watered as the sprinkler		9.4.12.O.(2).1 - Develop an understanding of how science and mathematics function to provide results, answers, and algorithms for

Essential Questions	Enduring Understandings	Domain	Cluster	Standard	Learning Targets	Assessment Formative and Summative	Inter-disciplinary Connections	21st Century Connections
		SMP 4 – Model with mathematics.		human torso as a cylinder).*		rotates through an angle of 71°?		engineering activities to solve problems and issues in the real world.
How can we use geometric language to describe spatial relationships?	Geometric relationships provide a means to make sense of a variety of phenomena.	Modeling with Geometry SMP 1 – Make sense of problems and persevere in solving them. SMP 4 – Model with mathematics.	Apply geometric concepts in modeling situations.	G.MG.3 - Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).*	Apply geometric methods to solve design problems	An archaeologist finds part of a circular plate. What was the diameter of the plate to the nearest tenth of an inch?	8.2.12.C.2 - Evaluate ethical considerations regarding the sustainability of resources that are used for the design, creation, and maintenance of a chosen product.	9.4.12.O.(2).2 - Apply science and mathematics when developing plans, processes, and projects to find solutions to real world problems.
How do geometric relationships help to solve problems and/or make sense of phenomena?	Geometric relationships provide a means to make sense of a variety of phenomena.	Expressing Geometric Properties with Equations SMP 6 – Attend to precision.	Translate between the geometric description and the equation for a conic section.	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.	Write the equation of a circle using the center and the radius; graph the circle using the equation of the circle.	If the center of a circle is (3,-5) and the diameter is 10 units, find the equation of the circle and then graph it on a coordinate plane.		
How can we best represent and verify geometric/algeb	Coordinate geometry can be used to represent and verify	Expressing Geometric Properties with Equations	Translate between the geometric description and the equation for a conic section.	G.GPE.4 - Use Coordinates to prove simple geometric theorems	Use Coordinates to prove simple geometric theorems algebraically.	If the radius of a circle is 4 and the center is (2,-3), explain if the point		

Essential Questions	Enduring Understandings	Domain	Cluster	Standard	Learning Targets	Assessment Formative and Summative	Inter-disciplinary Connections	21st Century Connections
raic relationships?	geometric/algebraic relationships.	SMP 3 – Construct viable arguments and critique the reasoning of others.		algebraically. For example, prove or disprove that a figure defined by four given points in the coordinate plane is a rectangle; prove or disprove that the point (1, √3) lies on the circle centered at the origin and containing the point (0, 2).		(5,2) lies on the circle.		
Unit 11 – Perimeter, Area, and Volume **Pacing: CP – 19 days** **H – 19 days**						Common Unit Test		
How can we use geometric language to describe spatial relationships?	Geometric properties can be used to construct geometric figures.	Congruence SMP 6 – Attend to precision.	Experiment with transformations in the plane.	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.	Identify, define, and denote basic geometric terms.	Given a diagram, identify and correctly name, using the correct case and symbols for vertices, edges, faces, and three dimensional shapes.	RST.9-10.4 - Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 9–10 texts and topics*.	
How do geometric relationships help to solve	Geometric relationships provide a means to make sense of	Circles	Find arc lengths and areas of sectors of circles.	G.C.5 - Derive using similarity the fact that the length of the arc	Compute the areas of circles, sectors, and	Given diagrams with the radius and the central angle measure, find the		

Essential Questions	Enduring Understandings	Domain	Cluster	Standard	Learning Targets	Assessment Formative and Summative	Inter-disciplinary Connections	21st Century Connections
problems and/or make sense of phenomena?	a variety of phenomena.	SMP 6 – Attend to precision.		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.	segments of a circle.	area of a sector, a segment, and the arc length.		
How can we use geometric language to describe spatial relationships?	Geometric properties can be used to construct geometric figures.	Geometric Measurement and Dimension SMP 3 – Construct viable arguments and critique the reasoning of others.	Explain volume formulas and use them to solve problems.	G.GMD.1 - Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid and cone. *Use dissection arguments, Cavalieri's principle, and informal limit arguments.*	Explain the formulas for the circumference and area of a circle and volume of a cylinder, pyramid, and cone.	Show that the volume of the figure is a function of the area of the base.	WHST.9-10.4 - Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.	9.1.12.A.1 - Apply critical thinking and problem-solving strategies during structured learning experiences.
How do geometric relationships help to solve problems and/or make sense of phenomena?	Geometric relationships provide a means to make sense of a variety of phenomena.	Geometric Measurement and Dimension SMP 6 – Attend to precision.	Explain volume formulas and use them to solve problems.	G.GMD.3 - Use volume formulas for cylinders, pyramids, cones and spheres to solve problems.*	Use volume formulas for cylinders, pyramids, cones and spheres to solve problems.	Identify if a figure is a prism, cylinder, or sphere and then find the volume of each using the appropriate formula.		

Hillsborough Township Public Schools
Mathematics Department
Geometry Curriculum Map

Essential Questions	Enduring Understandings	Domain	Cluster	Standard	Learning Targets	Assessment Formative and Summative	Inter-disciplinary Connections	21st Century Connections
How can we use geometric language to describe spatial relationships?	Geometric properties can be used to construct geometric figures.	Geometric Measurement and Dimension SMP 3 – Construct viable arguments and critique the reasoning of others.	Visualize relationships between two-dimensional and three-dimensional objects.	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.	Use cross sections to analyze three-dimensional figures.	Given a cone with a plane slicing perpendicular to the base, describe the cross section.		
How can we use mathematical models to describe physical relationships?	Mathematical models can be used to describe and quantify physical relationships.	Modeling with Geometry SMP 1 – Make sense of problems and persevere in solving them. SMP 4 – Model with mathematics.	Apply geometric concepts in modeling situations.	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).*	Apply geometric shapes, their measures, and their properties to describe real life situations.	Given a composite figure of a shed with labeled dimensions, if one gallon of paint covers 250 square feet, how many gallons of paint will be needed to cover the shed, not including the roof? If a gallon of paint costs $25, about how much will it cost to paint the walls of the shed?	RST.9-10.4 - Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 9–10 texts and topics*.	9.4.12.O.(1).7 - Use mathematics, science, and technology concepts and processes to solve problems in projects involving design and/or production (e.g., medical, agricultural, biotechnological, energy and power, information and communication, transportation, manufacturing, and construction).

Essential Questions	Enduring Understandings	Domain	Cluster	Standard	Learning Targets	Assessment Formative and Summative	Inter-disciplinary Connections	21st Century Connections
How can we use geometric language to describe spatial relationships?	Geometric relationships provide a means to make sense of a variety of phenomena.	Modeling with Geometry SMP 1 – Make sense of problems and persevere in solving them. SMP 6 – Attend to precision.	Apply geometric concepts in modeling situations.	G.MG.2 - Apply concepts of density based on area and volume in modeling situation (e.g., persons per square mile, BTUs per cubic foot).*	Apply concepts of density based on area and volume in modeling situation.	A 1 inch cube of cheese is one serving. How many servings are in a 4 inch by 4 inch by ¼ inch slice?	8.2.12.C.2 - Evaluate ethical considerations regarding the sustainability of resources that are used for the design, creation, and maintenance of a chosen product.	9.4.12.A.16 - Employ critical thinking skills (e.g., analyze, synthesize, and evaluate) independently and in teams to solve problems and make decisions.
How can we use geometric language to describe spatial relationships?	Geometric relationships provide a means to make sense of a variety of phenomena.	Modeling with Geometry SMP 6 – Attend to precision.	Apply geometric concepts in modeling situations.	G.MG.3 - Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).*	Apply geometric methods to solve design problems	If you want to multiply the dimensions of a hexagonal deck so that the area is 50% larger than the original area, what is your scale factor?	8.2.12.C.2 - Evaluate ethical considerations regarding the sustainability of resources that are used for the design, creation, and maintenance of a chosen product.	9.4.12.O.(2).2 - Apply science and mathematics when developing plans, processes, and projects to find solutions to real world problems.
Unit 12 - Applications of Probability **Pacing: CP – 15 days** **H – 15 days**						Common Unit Test		
How can experimental and theoretical probabilities be used to make predictions and draw conclusions?	The message conveyed by the data depends on how the data is collected, represented, and summarized.	Conditional Probability and the Rules of Probability SMP 4 – Model with mathematics.	Understand independence and conditional probability and use them to interpret data.	S.CP.1 - Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as	Calculate geometric probabilities.	A point is chosen randomly on line segment AD where points A,B, C and D are co- linear, find the probability of each event. a) The point is on AC	HS-LS2-4. Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.	9.4.12.O.37 - Identify how key organizational systems affect organizational performance and the quality of products and

Essential Questions	Enduring Understandings	Domain	Cluster	Standard	Learning Targets	Assessment Formative and Summative	Inter-disciplinary Connections	21st Century Connections
		SMP 6 – Attend to precision.		unions, intersections, or complements of other events ("or," "and," "not").		b) the point is not on AB and c) the point is on AB or CD.		services to demonstrate an understanding of how systems are managed and improved in this cluster.
How can experimental and theoretical probabilities be used to make predictions or draw conclusions?	The message conveyed by the data depends on how the data is collected, represented, and summarized.	Conditional Probability and the Rules of Probability SMP 4 – Model with mathematics.	Understand independence and conditional probability and use them to interpret data.	S.CP.2 - Understand that two events A and B are independent of the probability of A and B occurring together is the product of their probabilities, and use this characterization to determine if they are independent.	Identify the probability of independent events A and B both occurring as the product of the probability of A and B occurring.	When flipping a coin and rolling a dice what is the probability you will get heads and an even number. Explain why these two events are independent of each other.	HS-LS2-4. Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.	9.2.12.G.6 - Differentiate the costs and benefits of renter's and homeowner's insurance.
How can experimental and theoretical probabilities be used to make predictions or draw conclusions?	The results of a statistical investigation can be used to support or refute an argument.	Conditional Probability and the Rules of Probability SMP 4 – Model with mathematics.	Understand independence and conditional probability and use them to interpret data.	S.CP.3 - Understand the conditional probability of A given B as P(A and B)/P(B), and interpret independence of A and B as saying that the conditional probability of A given B is the same as the probability of A, and the	Determine if the probability of two events are independent of each other.	Describe two events that are independent and prove it using conditional probability.	WHST.11-12.7 - Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the	

Essential Questions	Enduring Understandings	Domain	Cluster	Standard	Learning Targets	Assessment Formative and Summative	Inter-disciplinary Connections	21st Century Connections
				conditional probability of B given A is the same as the probability of B.			subject under investigation.	
How can experimental and theoretical probabilities be used to make predictions or draw conclusions?	The results of a statistical investigation can be used to support or refute an argument.	Conditional Probability and the Rules of Probability SMP 4 – Model with mathematics. SMP 6 – Attend to precision.	Understand independence and conditional probability and use them to interpret data.	S.CP.4 - Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide of events are independent and to approximate conditional probabilities.	Identify information gathered for a frequency table and discuss conditional verse independent probability.	Collect data from a random sample of students in your school on their favorite subject among math, science, and English. Estimate the probability that a randomly selected student from your school will favor science given that the student is in tenth grade. Do the same for other subjects and compare the results.	WHST.11-12.7 - Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.	9.2.8.E.4 - Compare the value of goods or services from different sellers when purchasing large quantities and small quantities.
How can experimental and theoretical probabilities be used to make predictions or draw conclusions?	The results of a statistical investigation can be used to support or refute an argument.	Conditional Probability and the Rules of Probability SMP 1 – Make sense of problems and persevere in solving them.	Understand independence and conditional probability and use them to interpret data.	S.CP.5 - Recognize and explain the concepts of conditional probability and independence in everyday language and everyday	Identify how conditional and independent probabilities are part of their everyday lives.	A survey asks 60 teachers and 48 parents whether school uniforms reduce distractions in school. Of those, 49 teachers and 18 parents say uniforms reduce distractions in	WHST.11-12.7 - Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry	9.1.12.A.1 - Apply critical thinking and problem-solving strategies during structured learning experiences.

Essential Questions	Enduring Understandings	Domain	Cluster	Standard	Learning Targets	Assessment Formative and Summative	Inter-disciplinary Connections	21st Century Connections
				situations. For example, compare the chance of having lung cancer if you are a smoker with the change of being a smoker if you have lung cancer.		school. Organize these results in a two-way table. Find and interpret the marginal frequencies.	when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.	
How can experimental and theoretical probabilities be used to make predictions or draw conclusions?	The message conveyed by the data depends on how the data is collected, represented, and summarized.	Conditional Probability and the Rules of Probability SMP 6 – Attend to precision.	Use the rules of probability to compute probabilities of compound events in a uniform probability model.	S.CP.6 - Find the conditional probability of A given B as the fraction of B's outcomes that also belong to A, and interpret the answer in terms of the model.	Identify the conditional probability of two events and interpret the relationship of each in terms of using fraction.	Gather data of the hair and eye color and create a two-way frequency table. Find the probability of having hazel eyes given brown hair.		9.1.12.C.5 - Assume a leadership position by guiding the thinking of peers in a direction that leads to successful completion of a challenging task or project.
How can experimental and theoretical probabilities be used to make predictions or draw conclusions?	The message conveyed by the data depends on how the data is collected, represented, and summarized.	Conditional Probability and the Rules of Probability SMP 4 – Model with mathematics.	Use the rules of probability to compute probabilities of compound events in a uniform probability model.	S.CP.7 - Apply the Addition Rule, P(A or B) = P(A) + P(B) - P(A and B), and interpret the answer in terms of the model.	Identify how to use and apply the addition formula to interpret probability.	If you flip a coin and roll a die, find the probability that you will get tails or an even number on a die.	HS-LS2-4. Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.	
Final Exam **Pacing: 1 day**								