Standard 5: Geometry					
	Pre-Algebra Plus	Algebra	Geometry	Algebra II	Fourth Course
Benchmark 1 - Part 1	Draw construct, and describe geometrical figures and describe the relationships between them.		Make geometric constructions. (Formalize and explain processes)		
	Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle.		Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.).		
			Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.		
Benchmark 1 - Part 2	Understand congruence and similarity using physical models, transparencies, or geometric software.		Understand congruence in terms of rigid motions. Build on rigid motions as a familiar starting point for development of concept of geometric proof		
	Verify experimentally the properties of rotations, reflections, and translations		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.		
	Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them.		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.		
	Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles.				
Benchmark 1 - Part 3	Use informal arguments to establish angle sum and exterior angle theorems for triangles and angles relationships when parallel lines are cut by a transversal.		Prove geometric theorems.(Focus on validity of underlying reasoning while using variety of ways of writing proofs.		
			Prove theorems about lines and angles.		
			Prove theorems about triangles.		
			Prove theorems about parallelograms.		

Benchmark 1 - Part 4			Experiment with transformations in the plane.		
			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.		
			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).		
			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.		
			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.		
Benchmark 2 - Part 1	Draw, construct, and describe geometrical figures and describe the relationships between them.				
	Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.				
Benchmark 2 - Part 2	Understand congruence and similarity using physical models, transparencies, or geometric software.		Understand similarity in terms of similarity transformations.		
	Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.		Verify experimentally the properties of dilations given by a center and a scale factor		

	Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.		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.		
	Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles.		Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.		
Benchmark 2 - Part 3	Use informal arguments to establish angle sum and exterior angle theorems for triangles and angles relationships when parallel lines are cut by a transversal.		Prove theorems involving similarity.		
			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 congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.		
Benchmark 2 - Part 4			Define trigonometric ratios and solve problems involving right triangles.		
			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.		
			Explain and use the relationship between the sine and cosine of complementary angles.		
			Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.⋆		
Benchmark 2 - Part 5			Apply trigonometry to general triangles.		
			(+) Derive the formula A = 1/2 ab sin(C) for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side.		
			(+) Prove the Laws of Sines and Cosines and use them to solve problems.		

			(+) Understand and apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles (e.g., surveying problems, resultant forces).		
Benchmark 3 - Part 1			Understand and apply theorems about circles.		
			Prove that all circles are similar.		
			Identify and describe relationships among inscribed angles, radii, and chords. Include the relationship between central, inscribed, and circumscribed angles; inscribed angles on a diameter are right angles; the radius of a circle is perpendicular to the tangent where the radius intersects the circle.		
			Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle.		
			(+) Construct a tangent line from a point outside a given circle to the circle.		
Benchmark 3 - Part 2			Find arc lengths and areas of sectors of circles. Radian introduced only as unit of measure		
			Derive, using proportionality, 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.		
Benchmark 4 - Part 1			Translate between the geometric description and the equation for a conic section.		Translate between the geometric description and the equation for a conic section.
			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.		(+) Derive the equations of ellipses and hyperbolas given the foci, using the fact that the sum or difference of distances from the foci is constant.
			Derive the equation of a parabola given a focus and directrix.		
Benchmark 4 - Part 2			Use coordinates to prove simple geometric theorems algebraically. (Include distance formula; relate to Pythagorean theorem)		
			Use coordinates to prove simple geometric theorems algebraically.		
			Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems		

			Find the point on a directed line segment between two given points that partitions the segment in a given ratio.		
			Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.⋆		
Benchmark 5 - Part 1	Draw, construct, and describe geometrical figures and describe the relationships between them.(Slicing 3-D figures)		Visualize the relation between two-dimensional and three- dimensional objects.		
	Describe the two-dimensional figures that result from slicing three- dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.		Identify the shapes of two-dimensional cross-sections of three- dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects.		
Benchmark 5 - Part 2	Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.				
	Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.				
	Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.				
	Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.				
Benchmark 5 - Part 3	Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.		Explain volume formulas and use them to solve problems.		Explain volume formulas and use them to solve problems.
	Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.		Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.⋆		
			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.		(+) Give an informal argument using Cavalieri's principle for the formulas for the volume of a sphere and other solid figures.
	Understand and apply the Pythagorean theorem. (Connect to radicals, rational exponents, and irrational numbers)				
	Explain a proof of the Pythagorean Theorem and its converse.				

	Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.				
	Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.				
Benchmark 6 - Part 1			Apply geometric concepts in modeling situations.		
			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 concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).⋆		
			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).⋆		