MATHEMATICS CURRICULUM PROJECT

GOAL 9: Use geometric methods to analyze, categorize and draw conclusions about points, lines, planes and space.
Standard A: Demonstrate and apply geometric concepts involving points, lines, planes and space.

As a result of their schooling students will be able to…

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4
1. Identify circle, square, triangle and rectangle. 2. Begin to recognize other shapes of objects. 3. Explore three-dimensional shapes.	1. Identify two- and three-dimensional shapes. 2. Model two-dimensional geometric shapes by drawing or building. 3. Describe and interpret relative positions in space and apply concepts of relative position (e.g., above/below). 4. Recognize and describe shapes that have line symmetry. 5. Identify geometric shapes and structures in the environment. 6. Explore the effects of translations (slides), reflections (flips) and rotations (turns) with concrete objects.	1. Investigate and predict the results of putting together and taking apart two- and three-dimensional shapes (e.g., put two triangles together to make a quadrilateral). 2. Describe and interpret direction and distance in navigating space and apply concepts of direction and distance (e.g., nearer/farther). 3. Perform translations (slides), reflections (flips) and rotations (turns) with concrete objects. 4. Create and complete shapes that have line symmetry.	1. Find and name two- and three-dimensional geometric figures in every day objects. 2. Identify the properties, number of sides and corners of geometric shapes. 3. Draw two-dimensional shapes using rulers, graphing paper and tracing paper. 4. Visualize the transition from two-dimensional to its three-dimensional figure. 5. Construct three-dimensional geometric figures. 6. Locate and identify points using numbers and symbols on a grid and describe how points relate to each other on a grid.	1. Identify, draw and label lines, line segments, rays, parallel lines, intersecting lines, perpendicular lines, acute angles, obtuse angles, right angles and acute, obtuse, right, scalene, isosceles and equilateral triangles. 2. Identify, draw and build regular and irregular polygons. 3. Read and plot ordered pairs of numbers in the positive quadrant of the Cartesian plane. 4. Describe paths and movement using coordinate systems. 5. Differentiate between polygons and non-polygons. 6. Identify and label radius and diameter of a circle. 7. Explore and describe rotational symmetry of two- and three-dimensional shapes. 8. Construct a circle with a specified radius or diameter using a compass.

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Grade 5	Grade 6	Grade 7	Grade8/Pre-Algebra/Algebra
1. Identify, compare and analyze attributes of two- and three-dimensional shapes and develop vocabulary to describe the attributes. 2. Classify two- or three-dimensional shapes according to their properties (e.g., regular and irregular types of quadrilaterals, pyramids and prisms). 3. Investigate and describe the results of subdividing and combining shapes. 4. Describe paths using coordinate systems. 5. Determine the distance between points along horizontal and vertical lines of a coordinate system. 6. Identify and justify rotational symmetry in two- and three-dimensional shapes. 7. Identify and describe how geometric figures are used in practical settings (e.g., construction, art, advertising, architecture). 8. Identify and label radius, diameter, chord and circumference of a circle. 9. Copy a line segment or an angle using a straightedge and a compass. 10. Construct angles and perpendicular bisectors of line segments. 11. Solve problems using properties of triangles (e.g., sum of interior angles of a triangle is 180°).	1. Plot and read ordered pairs of numbers in all four quadrants. 2. Describe sizes, positions and orientations of shapes under transformations, including dilations. 3. Perform simple constructions (e.g., equal segments, angle and segment bisectors, or perpendicular lines, inscribing a hexagon in a circle) with a compass and straightedge or a mira. 4. Determine and describe the relationship between pi, the diameter, the radius and the circumference of a circle. 5. Determine unknown angle measures using angle relationships and properties of a triangle or a quadrilateral.	1. Examine and describe a geometric shape, such as a regular polygon or a quadrilateral with pairs of parallel or perpendicular sides, using coordinate geometry. 2. Draw geometric shapes with specified properties, such as side lengths or angle measures. 3. Examine and describe line or rotational symmetry of objects in terms of transformations. 4. Draw transformations of figures in a plane to match specified criteria. 5. Perform constructions of congruent angles or parallel lines using a compass and straightedge, paper folding, or a mira. 6. Determine the relationship among the number of edges, faces and vertices in a three-dimensional object.	1. Solve problems involving two- and three-dimensional shapes. 2. Apply and use the Pythagorean Theorem. 3. Identify, describe and determine the radius, diameter and circumference of a circle and their relationship to each other and to pi. 4. Graph points and identify coordinates of points on the Cartesian coordinate plane. 5. Represent and identify geometric figures using coordinate geometry. 6. Use transformations in a Cartesian coordinate plane. 7. Identify relationships of angles formed by intersecting lines. 8. Solve problems involving vertical, complementary and supplementary angles.

GOAL 9: Use geometric methods to analyze, categorize and draw conclusions about points, lines, planes and space.
Standard B: Identify, describe, classify and compare relationships using points, lines, planes, and solids.

As a result of their schooling students will be able to…

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4
1. Identify and sort objects according to their shape.	1. Identify objects that are the same shape. 2. Compare and sort two- and three-dimensional objects. 3. Compare and contrast sides and corners of basic geometric shapes.	1. Identify objects that are congruent 2. Compare and contrast attributes of two- and three-dimensional objects using appropriate vocabulary.	1. Identify parallel and intersecting lines. 2. Identify polygons v. non-polygons by defining components. 3. Recognize and identify symmetrical figures with one and two lines of symmetry. 4. Identify congruent figures in different positions. 5. Identify similar figures that are not congruent and tell how they are similar.	1. Determine congruence and similarity of given shapes. 2. Explore polyhedra (three-dimensional figures) using concrete models.

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Grade 5	Grade 6	Grade 7	Grade8/Pre-Algebra/Algebra
1. Demonstrate congruence of plane figures using transformations (translation, rotation, reflection). 2. Determine if two polygons are congruent using measures of angles and sides. 3. Match a front, right side and top view drawing with a three-dimensional model built with cubes.	1. Determine the relationships between the number of vertices or sides in a polygon, the number of diagonals and the sum of its angles. 2. Analyze quadrilaterals for defining characteristics. 3. Create a three-dimensional object from any two-dimensional representation of the object, including multiple views, nets, or technological representations. 4. Identify and describe the five regular polyhedra. 5. Create regular and semi-regular tessellations using pattern blocks, other manipulatives or technology to tile a plane.	1. Describe, classify and justify relationships among types of two- and three-dimensional objects using their defining properties. 2. Solve problems using properties of polygons and circles. 3. Classify and order quadrilaterals according to their properties.	1. Identify front, side and top views of a three-dimensional solid built with cubes. 2. Solve problems involving congruent and similar figures. 3. Relate absolute value to distance on the number line.

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Standard C: Construct convincing arguments and proofs to solve problems.
Standard D: Use trigonometric ratios and circular functions to solve problems (only applies to grades 7 & 8).

As a result of their schooling students will be able to…

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4
1. Verbally explain the different qualities of the shape of an object.	1. Recognize and explain a geometric pattern. 2. Verbalize the rule for the geometric pattern sequence (e.g., amount doubles).	1. Justify an extension of a pattern.	1. Verbally describe the properties of basic geometric figures. 2. Create and explain patterns using pattern blocks and manipulatives.	3. Make and test predictions about mathematical properties and relationships and justify the conclusions.

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As a result of their schooling students will be able to…

Grade 5	Grade 6	Grade 7	Grade8/Pre-Algebra/Algebra
1. Make and test conjectures about mathematical properties and relationships and develop logical arguments to justify conclusions. 2. Make and test conjectures about the results of subdividing and combining shapes.	1. Make, test and justify conjectures about various quadrilateral and triangle relationships, including the triangle inequality. 2. Justify the relationship between vertical angles. 3. Justify that the sum of the angles of a triangle is 180 degrees.	1. Create and critique arguments about geometric relationships in figures based upon inductive and deductive reasoning. 2. Justify the area formulas for triangles, parallelograms and trapezoids based on the formula for the area of a rectangle. 3. Make and test conjectures about the relationships between side length and angle measure in various triangles and quadrilaterals. 4. Justify the properties of angles formed by parallel lines cut by a transversal using appropriate terminology. <u>Standard D</u> 1. Analyze the relationship between sides of right triangles using the Pythagorean theorem. 2. Solve problems that involve the use of proportions and the Pythagorean theorem in similar right triangles with whole number side lengths.	1. Create and critique arguments concerning geometric ideas and relationships, such as congruence, similarity, the Pythagorean relationship, or formulas for surface areas or volume of simple three-dimensional objects. 2. Represent, solve and explain numerical and algebraic relationships using geometric concepts. 3. Provide examples or counter-examples to either illustrate or disprove conjectures about geometric characteristics. <u>Standard D</u> 1. Recognize Pythagorean Triples. 2. Identify the basic trigonometric ratio in terms of lengths of the sides of a right triangle and an acute angle.