MATHEMATICS POWER STANDARDS

Geometry

Geometry students will be able to:

1. **Apply geometric thinking to problem solving (integrated throughout the course).**
   - G.1.B. Use inductive reasoning to make conjectures, to test the plausibility of a geometric statement, and to help find a counterexample.
   - G.1.C. Use deductive reasoning to provide that a valid geometric statement is true.
   - G.1.E. Identify errors or gaps in a mathematical argument and develop counterexamples to refute invalid statements about geometric relationships.
   - G.7.G. Synthesize information to draw conclusions and evaluate the arguments and conclusions of others.
   - G.7.H. Use inductive reasoning to make conjectures, and use deductive reasoning to prove or disprove conjectures.
   - G.7.A. Analyze a problem situation and represent it mathematically.
   - G.7.B. Select and apply strategies to solve problems.
   - G.7.C. Evaluate a solution for reasonableness, verify its accuracy, and interpret the solution in the context of the original problem.
   - G.7.D. Generalize a solution strategy for a single problem to a class of related problems, and apply a strategy for a class of related problems to solve specific problems.
   - G.7.E. Read and interpret diagrams, graphs, and text containing the symbols, language, and conventions of mathematics.
   - G.7.F. Summarize mathematical ideas with precision and efficiency for a given audience and purpose.
   - G.6.E. Use different degrees of precision in measurement, explain the reason for using a certain degree of precision, and apply estimation strategies to obtain reasonable measurements with appropriate precision for a given purpose.
   - G.6.F. Solve problems involving measurement conversions within and between systems, including those involving derived units, and analyze solutions in terms of reasonableness of solutions and appropriate units.

2. **Understand and use logical arguments such as inductive and deductive reasoning when writing proofs.**
   - G.1.A. Distinguish between inductive and deductive reasoning.
   - G.1.D. Write the converse, inverse, and contrapositive of a valid proposition and determine their validity.
   - G.1.F. Distinguish between definitions and undefined geometric terms and explain the role of definitions, undefined terms, postulates (axioms), and theorems.

3. **Know and apply definitions and theorems for two and three dimensional figures.**
   - G.2.A. Know, prove, and apply theorems about parallel and perpendicular lines.
   - G.2.B. Know, prove, and apply theorems about angles, including angles that arise from parallel lines intersected by a transversal.
   - G.2.C. Explain and perform basic compass and straightedge constructions related to parallel and perpendicular lines.
   - G.2.D. Describe the intersections of lines in the plane and in space, of lines and planes and of planes and space.
   - G.3.A. Know, explain, and apply basic postulates and theorems about triangles and the special lines, line segments, and rays associated with a triangle.
   - G.3.B. Determine and prove triangle congruence, triangle similarity, and other properties of triangles.
   - G.3.C. Use the properties of special right triangles (30°-60°-90°and 45°-45°-90°) to solve problems.

Standards are included but not part of the guaranteed and viable curriculum.   *Created June 2010*

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Geometry

- G.3.D. Know, prove, and apply the Pythagorean Theorem and its converse.
- G.3.E. Solve problems involving the basic trigonometric ratios of sine, cosine, and tangent.
- G.3.F. Know, prove, and apply basic theorems about parallelograms.
- G.3.G. Know, prove, and apply theorems about properties of quadrilaterals and other polygons.
- G.3.J. Describe prisms, pyramids, parallelepipeds, tetrahedral, and regular polyhedral in terms of their faces, edges, vertices, and properties.
- G.3.K. Analyze cross-sections of cubes, prisms, pyramids, and spheres and identify the resulting shapes.
- G.3.H.Know, prove, and apply basic theorems relating circles to tangents, chords, radii, secants, and inscribed angles.
- G.3.I. Explain and perform constructions related to the circle.

4. **Apply measurement techniques to two and three dimensional figures.**
   - G.6.A. Derive and apply formulas for arc length and area of a sector of a circle.
   - G.6.B. Analyze distance and angle measures on a sphere and apply these measurements to the geometry of the earth.
   - G.6.C. Apply formulas for surface area and volume of three-dimensional figures to solve problems.
   - G.6.D. Predict and verify the effect that changing one, two, or three linear dimensions has on perimeter, area, volume, or surface area of two- and three-dimensional figures.
   - G.6.E. Use different degrees of precision in measurement, explain the reason for using a certain degree of precision, and apply estimation strategies to obtain reasonable measurements with appropriate precision for a given purpose.
   - G.6.F. Solve problems involving measurement conversions within and between systems, including those involving derived units, and analyze solutions in terms of reasonableness of solutions and appropriate units.

5. **Sketch, describe, and apply geometric transformations.**
   - G.5.A.Sketch results of transformations and compositions of transformations for a given two-dimensional figure on the coordinate plane, and describe the rule(s) for performing translations or for performing reflections about the coordinate axes for the line $y = x$.
   - G.5.B. Determine and apply properties of transformations.
   - G.5.C. Given two congruent or similar figures in a coordinate plane, describe a composition of translations, reflections, rotations, and dilations that superimposes one figure on the other.
   - G.5.D. Describe the symmetries of two-dimensional figures and describe transformations, including reflections across a line and rotations about a point.

*Apply algebraic principles to geometric figures in the coordinate plane.
   - G.4.A. Determine the equation of a line in the coordinate plane that is described geometrically, including a line through two given points, a line through a given point parallel to a given line, and a line through a given point perpendicular to a given line.
   - G.4.B. Determine the coordinates of a point that is described geometrically.
   - G.4.C. Verify and apply properties of triangles and quadrilaterals in the coordinate plane.
   - G.4.D. Determine the equation of a circle that is described geometrically in the coordinate plane and, given equations for a circle and a line, determine the coordinates of their intersection(s).

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