

RRPS District Standards: MATHEMATICS

Geometry

June 2009

GEOMETRY

Strand: ALGEBRA, FUNCTIONS, AND GRAPHS

Standard: Students will understand algebraic concepts and applications.

RRPS Geometry Power Standards

While all benchmarks are taught, Power Standards are consistently emphasized and regularly assessed.

NM State Benchmark A.1: Grades 9-12

Represent and analyze mathematical situations and structures using algebraic symbols.

NM Performance Standards

9-12.A.1.1 Use the special symbols of mathematics correctly and precisely.

9-12.A.1.2 Classify and use equivalent representations of natural, whole, integer, rational, irrational numbers and complex

9-12.A.1.4 Explain that the distance between two numbers on the number line is the absolute value of their difference.

9-12.A.1.6 Simplify numerical expressions using the order of operations, including integer exponents.

9-12.A.1.7 Translate verbal statements into algebraic expressions or equations.

9-12.A.1.8 Solve formulas for specified variables.

9-12.A.1.9 Solve quadratic equations in one variable.

9-12.A.1.10 Solve radical equations involving one radical.

9-12.A.1.12 Explain and use equivalent representations for algebraic expressions (e.g., simplify using the distributive property).

9-12.A.1.13 Simplify rational expressions by factoring and reducing to lowest terms.

9-12.A.1.14 Evaluate polynomial, rational, radical, and absolute value expressions for one or more variables.

9-12.A.1.17 Solve linear equations and inequalities in one variable including those involving the absolute value of a linear function.

9-12.A.1.18 Use the four basic operations (+, -, \times , \div) with linear, polynomial, and rational expressions in contextual situations.

9-12.A.1.19 Use the four basic operations (+, -, \times , \div) in contextual situations with numbers in scientific notation, and express the results with the appropriate number of significant figures.

Power Standard 1 (Benchmark 9-12.A.1.4)

Explain that the distance between two numbers on the number line is the absolute value of their difference.

Power Standard 2 (Benchmark 9-12.A.1.12)

Explain and use equivalent representations for algebraic expressions (e.g., simplify using the distributive property).

Power Standard 3 (Benchmark 9-12.A.1.14)

Evaluate polynomial, rational, radical, and absolute value expressions for one or more variables

Power Standard 4 (Benchmark 9-12.A.1.19)

Use the four basic operations (+, -, \times , \div) in contextual situations with numbers in scientific notation, and express the

- results with the appropriate number of significant figures

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NM State Benchmark A.2: Grades 9-12

Understand patterns, relations, functions, and graphs.

NM Performance Standards

9-12.A.2.8 Graph a quadratic function and understand the relationship between its real zeros and the x-intercepts of its graph.

9-12.A.2.10 Identify and describe symmetries of graphs.

9-12.A.2.11 Use the quadratic formula and factoring techniques to determine whether the graph of a quadratic function will intersect the x-axis in zero, one, or two points (include quadratic functions that represent real phenomena).

9-12.A.2.13 Read information and draw conclusions from graphs, and identify properties of a graph that provide useful information about the original problem.

9-12.A.2.14 Understand the relationship between the coefficients of a linear equation and the slope and x- and y- intercepts of its graphs.

9-12.A.2.15 Evaluate estimated rate of change in a contextual situations.

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Power Standard 5 (Benchmark 9-12.A.2.10)

Identify and describe symmetries of graphs.

Power Standard 6 (Benchmark 9-12.A.2.14)

Understand the relationship between the coefficients of a linear equation and the slope and x- and y- intercepts of its graphs

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NM State Benchmark A.3: Grades 9-12

Use mathematical models to represent and understand quantitative relationships.

NM Performance Standards

9-12.A.3.1 Model real-world phenomena using linear equations and linear inequalities interpret resulting solutions, and use estimation to detect errors.

9-12.A.3.4 Solve systems of linear equations in two variables algebraically and graphically

9-12.A.3.5 Solve applications involving systems of two equations in two variables.

9-12.A.3.6 Write an equation of the line that passes through two given points.

9-12.A.3.7 Verify that a point lies on a line, given an equation of the line, and be able to derive linear equations given a point and a slope.

9-12.A.3.8 Determine whether the graphs of two given linear equations are parallel, perpendicular, coincide or none of these.

Power Standard 7(Benchmark 9-12.A.3.7)

Verify that a point lies on a line, given an equation of the line, and be able to derive linear equations given a point and a slope.

GEOMETRY

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NM State Benchmark G.1: Grades 9-12

Analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships.

NM Performance Standards

9-12.G.1.1 Understand that numerical values associated with measurements of physical quantities must be assigned units of measurement or dimensions; apply such units correctly in expressions, equations and problem solutions that involve measurements; and convert a measurement using one unit of measurement to another unit of measurement.

9-12.G.1.2 Find the area and perimeter of a geometric figure composed of a combination of two or more rectangles, triangles, and/or semicircles with just edges in common.

9-12.G.1.3 Draw three-dimensional objects and calculate the surface areas and volumes of these figures (e.g. prisms, cylinders, pyramids, cones, spheres) as well as figures constructed from unions of prisms with faces in common, given the formulas for these figures.

9-12.G.1.4 Identify the hypothesis and conclusion in examples of conditional statements.

9-12.G.1.5 Use definitions in making logical arguments.

9-12.G.1.6 Use counterexamples to show that an assertion is false and recognize that a single counterexample is sufficient to refute a universal statement.

9-12.G.1.7 Explain the difference between inductive and deductive reasoning and provide examples of each.

9-12.G.1.8 Explain why, for inductive reasoning, showing a statement is true for a finite number of examples does not show it is true for all cases unless the cases verified are all possible cases.

9-12.G.1.9 Write geometric proofs, including proofs by contradiction, and perform and explain basic geometric constructions related to: theorems involving the properties of parallel and perpendicular lines, circles, and polygons; theorems involving complementary, supplementary, and congruent angles; theorems involving congruence and similarity; and the Pythagorean theorem.

9-12.G.1.10 Recognize that there are geometries, other than Euclidean geometry, in which the parallel postulate is not true.

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Power Standard 8 (Benchmark 9-12.G.1.2)

Find the area and perimeter of a geometric figure composed of a combination of two or more rectangles, triangles, and/or semicircles with just edges in common.

Power Standard 9 (Benchmark 9-12.G.1.3)

Draw three-dimensional objects and calculate the surface areas and volumes of these figures (e.g. prisms, cylinders)

Power Standard 10 (Benchmark 9-12.G.1.4)

Identify the hypothesis and conclusion in examples of conditional statements.

Power Standard 11 (Benchmark 9-12.G.1.8)

Explain why, for inductive reasoning, showing a statement is true for a finite number of examples does not show it is true for all cases unless the cases verified are all possible cases.

Power Standard 12 (Benchmark 9-12.G.1.10)

Recognize that there are geometries, other than Euclidean geometry, in which the parallel postulate is not true.

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NM State Benchmark G.2: Grades 9-12

Specify locations and describe spatial relationships using coordinate geometry and other representational systems.

NM Performance Standards

9-12.G.2.1 Identify the origin, coordinate axes, and four quadrants on the Cartesian coordinate plane, and draw and label them correctly.

9-12.G.2.2 Determine the midpoint and distance between two points within a coordinate system and relate these ideas to geometric figures in the plane (e.g., find the center of a circle given the two points of a diameter of the circle).

9-12.G.2.3 Use basic geometric ideas (e.g., the Pythagorean theorem, area and perimeter) in the context of the Cartesian coordinate plane (e.g., calculate the perimeter of a rectangle with integer coordinates and with sides parallel to the coordinate axes, and of a rectangle with sides not parallel).

Power Standard 13 (Benchmark 9-12.G.2.3)

Use basic geometric ideas (e.g., the Pythagorean theorem, area and perimeter) in the context of the Cartesian coordinate plane (e.g., calculate the perimeter of a rectangle with integer coordinates and with sides parallel to the coordinate axes, and of a rectangle with sides not parallel).

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NM State Benchmarks Grades 9-12

NM State Benchmark G.3: Grades 9-12

Apply transformations and use symmetry to analyze mathematical situations.

NM Performance Standards

9-12.G.3.1 Use rigid motions (compositions of reflections, translations and rotations) to determine whether two geometric figures are congruent in a coordinate plane.

9-12.G.3.2 Sketch a planar figure that is the result of given transformations (i.e., translation, reflection, rotation, and/or dilation).

9-12.G.3.3 Identify similarity in terms of transformations.

9-12.G.3.4 Determine the effects of transformations on linear and area measurements of the original planar figure.

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Power Standard 14 (Benchmark 9-12.G.3.1)

Use rigid motions (compositions of reflections, translations and rotations) to determine whether two geometric figures are congruent in a coordinate plane.

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NM State Benchmarks Grades 9-12	RRPS Geometry Power Standards <i>While all benchmarks are taught, Power Standards are consistently emphasized and regularly assessed.</i>
NM Benchmark G.4: Grade 9-12 Use visualization, spatial reasoning, and geometric modeling to solve problems.	Power Standard 15 (Benchmark 9-12.G.4.3) Solve problems involving complementary, supplementary, and congruent angles.
NM Performance Standards 9-12.G.4.1 Solve contextual problems using congruence and similarity relationships of triangles (e.g., find the height of a pole given the length of its shadow). 9-12.G.4.2 Solve problems involving complementary, supplementary, and congruent angles. 9-12.G.4.3 Know that the effect of a scale factor k on length, area and volume is to multiply each by k , k^2 and k^3 , respectively. 9-12.G.4.4 Solve problems using the Pythagorean theorem. 9-12.G.4.5 Understand how similarity of right triangles allows the trigonometric functions sine, cosine and tangent to be defined as ratios of sides and be able to use these functions to solve problems. 9-12.G.4.6 Apply basic trigonometric functions to solve right-triangle problems. 9-12.G.4.7 Use angle and side relationships in problems with special right triangles (e.g., 30-, 60-, 90-, and 45-, 45-, 90- degree triangles). 9-12.G.4.8 Describe the intersections of a line and a plane, intersections of lines in the plane and in space, or of two planes in space.	Power Standard 16 (Benchmark 9-12.G.4.4) Solve problems using the Pythagorean theorem Power Standard 17 (Benchmark 9-12.G.4.7) Use angle and side relationships in problems with special right triangles (e.g., 30-, 60-, 90-, and 45-, 45-, 90- degree