

## Alignments of PSAT/NMSQT Skill Categories and State Standards

PSAT/NMSQT Skill Category and Description of Skills	Washington DC Math: Learning Standards 2005		
	Course/ Level	Standard	Standard ID
<b>Algebra and Functions</b> Solve problems using algebraic expressions and symbols to represent relationships, patterns and functions of different types.	Algebra I	AI.P.1. Recognize, describe, and extend patterns governed by a linear, quadratic, or exponential functional relationship or by a simple iterative process (e.g., the Fibonacci sequence).	AI.P.1
	Algebra I	AI.P.10. Divide polynomials by monomials with emphasis on 1st- and 2nd-degree polynomials.	AI.P.10
	Algebra I	AI.P.11. Perform basic arithmetic operations with rational expressions and functions.	AI.P.11
	Algebra I	AI.P.12. Find solutions to quadratic equations (with real roots) by factoring, completing the square, or using the quadratic formula. Demonstrate an understanding of the equivalence of the methods.	AI.P.12
	Algebra I	AI.P.13. Solve equations and inequalities, including those involving absolute value of linear expressions (e.g., $ x - 2  > 5$ ), and apply to the solution of problems.	AI.P.13
	Algebra I	AI.P.14. Solve everyday problems (e.g., compound interest and direct and inverse variation problems) that can be modeled using linear or quadratic functions. Apply appropriate graphical or symbolic methods to the solution.	AI.P.14
	Algebra I	AI.P.15. Solve everyday problems (e.g., mixture, rate, and work problems) that can be modeled using systems of linear equations or inequalities. Apply algebraic and graphical methods to the solution.	AI.P.15
	Algebra I	AI.P.2. Use properties of the real number system to judge the validity of equations and inequalities and to justify every step in a sequential argument.	AI.P.2
	Algebra I	AI.P.3. Demonstrate an understanding of relations and functions. Identify the domain, range, and dependent and independent variables of functions.	AI.P.3
	Algebra I	AI.P.4. Translate between different representations of functions and relations: graphs, equations, sets of ordered pairs (scatter plots), verbal, and tabular.	AI.P.4
Algebra I	AI.P.5. Demonstrate an understanding of the relationship between various representations of a line. Determine a line's slope and x- and y-intercepts from its graph or from a linear equation that represents the line.	AI.P.5	
Algebra I	AI.P.6. Find a linear function describing a line from a graph or a geometric description of the line (e.g., by using the point-slope or slope y-intercept formulas). Explain the significance of a positive, negative, zero, or undefined slope.	AI.P.6	

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<b>Algebra and Functions</b> Solve problems using algebraic expressions and symbols to represent relationships, patterns and functions of different types.	Algebra I	AI.P.7. Find linear functions that represent lines either perpendicular or parallel to a given line and through a point (e.g., by using the point-slope form of the equation).	AI.P.7
	Algebra I	AI.P.8. Add, subtract, and multiply polynomials with emphasis on 1st- and 2nd-degree polynomials.	AI.P.8
	Algebra I	AI.P.9. Demonstrate facility in symbolic manipulation of polynomial and rational expressions by rearranging and collecting terms, factoring [e.g., $a^2 - b^2 = (a + b)(a - b)$ , $x^2 + 10x + 21 = (x + 3)(x + 7)$ , $(5x \text{ to the 4th power}) + 10x^2 - 5x^2 = 5x^2(x^2 + 2x - 1)^2$ , identifying and canceling common factors in rational expressions, and applying the properties of positive integer exponents.	AI.P.9
	Algebra II	AII.P.1. Describe, complete, extend, analyze, generalize, and create a wide variety of patterns, including iterative and recursive patterns such as Fibonacci Numbers and Pascal's Triangle.	AII.P.1
	Algebra II	AII.P.10. Solve everyday problems that can be modeled using polynomial, rational, exponential, logarithmic, and step functions; absolute values; and square roots. Apply appropriate graphical, tabular, or symbolic methods to the solution. Include compound interest, exponential growth and decay, and direct and inverse variation problems.	AII.P.10
	Algebra II	AII.P.11. Recognize translations and scale changes of a given function $f(x)$ resulting from substitutions for the various parameters $a$ , $b$ , $c$ , and $d$ in $y = a f(b(x + c/b)) + d$ . In particular, describe qualitatively the effect of such changes on polynomial, rational, exponential, and logarithmic functions.	AII.P.11
	Algebra II	AII.P.12. Simplify rational expressions. Solve rational equations and inequalities.	AII.P.12
	Algebra II	AII.P.2. Identify arithmetic and geometric sequences and finite arithmetic and geometric series. Use the properties of such sequences and series to solve problems, including finding the formula for the general term and the sum, recursively and explicitly.	AII.P.2
	Algebra II	AII.P.3. Understand functional notation, evaluate a function at a specified point in its domain, and perform operations on functions with emphasis on the domain and range.	AII.P.3
	Algebra II	AII.P.4. Understand exponential and logarithmic functions and their basic arithmetic properties, including change of base and formulas for exponential of a sum and logarithm of a product.	AII.P.4
Algebra II	AII.P.5. Given algebraic, numeric, and/or graphical representations, recognize functions as polynomial, rational, logarithmic, or exponential, and describe their behavior.	AII.P.5	

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	Course/ Level	Standard	Standard ID
<b>Algebra and Functions</b> Solve problems using algebraic expressions and symbols to represent relationships, patterns and functions of different types.	Algebra II	All.P.6. Find solutions to radical equations; find solutions to quadratic equations (with real coefficients and real or complex roots) graphically, by factoring, by completing the square, or by using the quadratic formula.	All.P.6
	Algebra II	All.P.7. Solve a variety of equations and inequalities using algebraic, graphical, and numerical methods, including the quadratic formula. Include polynomial, exponential, and logarithmic functions, expressions involving the absolute values, and simple rational expressions.	All.P.7
	Algebra II	All.P.9. Use symbolic, numeric, and graphical methods to solve systems of equations and/or inequalities involving algebraic, exponential, and logarithmic expressions. Describe the relationships among the methods.	All.P.9
<b>Communication</b> Express mathematical ideas precisely and communicate them coherently and clearly in the language and notation of mathematics.	Algebra I	Al.N.1. Use the properties of operations on real numbers, including the associative, commutative, identity, and distributive properties, and use them to simplify calculations.	Al.N.1
	Algebra I	Al.P.1. Recognize, describe, and extend patterns governed by a linear, quadratic, or exponential functional relationship or by a simple iterative process (e.g., the Fibonacci sequence).	Al.P.1
	Algebra I	Al.P.12. Find solutions to quadratic equations (with real roots) by factoring, completing the square, or using the quadratic formula. Demonstrate an understanding of the equivalence of the methods.	Al.P.12
	Algebra I	Al.P.3. Demonstrate an understanding of relations and functions. Identify the domain, range, and dependent and independent variables of functions.	Al.P.3
	Algebra I	Al.P.6. Find a linear function describing a line from a graph or a geometric description of the line (e.g., by using the point-slope or slope y-intercept formulas). Explain the significance of a positive, negative, zero, or undefined slope.	Al.P.6
	Algebra I	Al.P.9. Demonstrate facility in symbolic manipulation of polynomial and rational expressions by rearranging and collecting terms, factoring [e.g., $a^2 - b^2 = (a + b)(a - b)$ , $x^2 + 10x + 21 = (x + 3)(x + 7)$ , $(5x \text{ to the 4th power}) + 10xi - 5xi = 5xi(x^2 + 2x - 1)$ ], identifying and canceling common factors in rational expressions, and applying the properties of positive integer exponents.	Al.P.9
	Algebra II	All.N.1. Know and use the properties of operations on real numbers, including the existence of the identity and inverse elements for addition and multiplication and the existence of $n$ th roots of positive real numbers for any positive integer $n$ , and the $n$ th power of positive real numbers.	All.N.1

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	Course/ Level	Standard	Standard ID
<b>Communication</b> Express mathematical ideas precisely and communicate them coherently and clearly in the language and notation of mathematics.	Algebra II	All.P.11. Recognize translations and scale changes of a given function $f(x)$ resulting from substitutions for the various parameters $a$ , $b$ , $c$ , and $d$ in $y = a f(b(x + c/b)) + d$ . In particular, describe qualitatively the effect of such changes on polynomial, rational, exponential, and logarithmic functions.	All.P.11
	Algebra II	All.P.3. Understand functional notation, evaluate a function at a specified point in its domain, and perform operations on functions with emphasis on the domain and range.	All.P.3
	Algebra II	All.P.5. Given algebraic, numeric, and/or graphical representations, recognize functions as polynomial, rational, logarithmic, or exponential, and describe their behavior.	All.P.5
	Geometry	G.G.17. Demonstrate an understanding of the relationship between various representations of a line. Determine a line's slope and $x$ - and $y$ -intercepts from its graph or from a linear equation that represents the line. Find a linear equation describing a line from a graph or a geometric description of the line (e.g., by using the point-slope or slope $y$ -intercept formulas). Explain the significance of a positive, negative, zero, or undefined slope.	G.G.17
	Geometry	G.G.25. Describe the effects of approximate error in measurement and rounding on measurements and on computed values from measurements.	G.G.25
	Geometry	G.G.9. Distinguish between postulates and theorems. Use inductive and deductive reasoning, as well as proof by contradiction. Given a conditional statement, write its inverse, converse, and contrapositive.	G.G.9
	Probability and Statistics	PS.2. Know the definition of conditional probability, and use it to solve for probabilities in finite sample spaces.	PS.2
	Probability and Statistics	PS.6. Know the definitions of the mean, median, and mode of a distribution of data, and compute each in particular situations.	PS.6
	Probability and Statistics	PS.7. Describe a set of frequency distribution data by spread (variance and standard deviation), skewness, symmetry, number of modes, or other characteristics. Use these concepts in everyday applications.	PS.7
Probability and Statistics	PS.8. Organize and describe distributions of data by using a number of different methods, including frequency tables, histograms, standard line and bar graphs, stem-and-leaf displays, scatter plots, and box-and-whisker plots.	PS.8	

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<p><b>Connections</b></p> <p>Connect ideas from different areas of mathematics (particularly geometry and algebra) to state or solve abstract or applied problems.</p>	Algebra II	All.G.3. Relate geometric and algebraic representations of lines and simple curves.	All.G.3
	Algebra II	All.P.10. Solve everyday problems that can be modeled using polynomial, rational, exponential, logarithmic, and step functions; absolute values; and square roots. Apply appropriate graphical, tabular, or symbolic methods to the solution. Include compound interest, exponential growth and decay, and direct and inverse variation problems.	All.P.10
	Geometry	G.G.18. Using rectangular coordinates, calculate midpoints of segments, slopes of lines and segments, and distances between two points, and apply the results to the solutions of problems.	G.G.18
	Geometry	G.G.2. Recognize special types of polygons (e.g., isosceles triangles, parallelograms, and rhombuses).	G.G.2
<p><b>Data, Statistics, and Probability</b></p> <p>Analyze data, understand descriptive statistics, make inferences and determine the likelihood that certain events will occur.</p>	Algebra I	All.D.1. Select, create, and interpret an appropriate graphical representation (e.g., scatter plot, table, stem-and-leaf plots, circle graph, line graph, and line plot) for a set of data, and use appropriate statistics (e.g., mean, median, range, and mode) to communicate information about the data. Use these notions to compare different sets of data.	All.D.1
	Algebra II	All.D.1. Select an appropriate graphical representation for a set of data and use appropriate statistics (e.g., quartile or percentile distribution) to communicate information about the data, including box plots.	All.D.1
	Algebra II	All.D.2. Use combinatorics (e.g., fundamental counting principle, permutations, and combinations) to solve problems, including computing geometric probabilities and probabilities of compound events.	All.D.2
	Probability and Statistics	PS.1. Demonstrate understanding of the definition of the notion of independent events and use the rules for addition, multiplication, and complementation to solve for probabilities of particular events in finite sample spaces.	PS.1
	Probability and Statistics	PS.10. Approximate a line of best fit (trend line) given a set of data (e.g., scatter plot).	PS.10
	Probability and Statistics	PS.2. Know the definition of conditional probability, and use it to solve for probabilities in finite sample spaces.	PS.2

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<b>Data, Statistics, and Probability</b> Analyze data, understand descriptive statistics, make inferences and determine the likelihood that certain events will occur.	Probability and Statistics	PS.3. Demonstrate understanding of the notion of discrete random variables by using them to solve for the probabilities of outcomes (e.g., the probability of the occurrences of five heads in 14 coin tosses).	PS.3
	Probability and Statistics	PS.4. Apply uniform, normal, and binomial distributions to the solutions of problems.	PS.4
	Probability and Statistics	PS.5. Determine the mean and the standard deviation of a normally distributed random variable.	PS.5
	Probability and Statistics	PS.6. Know the definitions of the mean, median, and mode of a distribution of data, and compute each in particular situations.	PS.6
	Probability and Statistics	PS.7. Describe a set of frequency distribution data by spread (variance and standard deviation), skewness, symmetry, number of modes, or other characteristics. Use these concepts in everyday applications.	PS.7
	Probability and Statistics	PS.8. Organize and describe distributions of data by using a number of different methods, including frequency tables, histograms, standard line and bar graphs, stem-and-leaf displays, scatter plots, and box-and-whisker plots.	PS.8
	Probability and Statistics	PS.9. Describe and explain how the relative sizes of a sample and the population affect the validity of predictions from a set of data.	PS.9
<b>Geometry and Measurement</b> Solve problems based on understanding the properties of shapes, such as triangles and circles, and the spatial relationships between angles and lines.	Algebra II	All.G.3. Relate geometric and algebraic representations of lines and simple curves.	All.G.3
	Geometry	G.G.1. Know correct geometric notation, including the notation for line segment (line segment AB) and angle (angle ABC).	G.G.1
	Geometry	G.G.10. Apply formulas for a rectangular coordinate system to justify theorems.	G.G.10
	Geometry	G.G.11. Draw congruent and similar figures using a compass, straightedge, or protractor. Justify the constructions by logical argument.	G.G.11
	Geometry	G.G.12. Apply congruence and similarity correspondences (e.g., "triangle" ABC is congruent to "triangle" XYZ) and properties of the figures to find missing parts of geometric figures, and provide logical justification.	G.G.12
	Geometry	G.G.13. Apply properties of angles, parallel lines, arcs, radii, chords, tangents, and secants to solve problems.	G.G.13

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<b>Geometry and Measurement</b> Solve problems based on understanding the properties of shapes, such as triangles and circles, and the spatial relationships between angles and lines.	Geometry	G.G.14. Solve simple triangle problems using the triangle angle sum property and/or the Pythagorean theorem; study and understand more than one proof of this theorem.	G.G.14
	Geometry	G.G.15. Use the properties of special triangles (e.g., isosceles, equilateral, 30-60-90, 45-45-90) to solve problems.	G.G.15
	Geometry	G.G.17. Demonstrate an understanding of the relationship between various representations of a line. Determine a line's slope and x- and y-intercepts from its graph or from a linear equation that represents the line. Find a linear equation describing a line from a graph or a geometric description of the line (e.g., by using the point-slope or slope y-intercept formulas). Explain the significance of a positive, negative, zero, or undefined slope.	G.G.17
	Geometry	G.G.18. Using rectangular coordinates, calculate midpoints of segments, slopes of lines and segments, and distances between two points, and apply the results to the solutions of problems.	G.G.18
	Geometry	G.G.19. Find linear equations that represent lines either perpendicular or parallel to a given line and through a point (e.g., by using the point-slope form of the equation).	G.G.19
	Geometry	G.G.2. Recognize special types of polygons (e.g., isosceles triangles, parallelograms, and rhombuses).	G.G.2
	Geometry	G.G.20. Draw the results and interpret transformations on figures in the coordinate plane such as translations, reflections, rotations, scale factors, and the results of successive transformations. Apply transformations to the solution of problems.	G.G.20
	Geometry	G.G.21. Demonstrate the ability to visualize solid objects and recognize their projections, cross sections, and graph points in 3-D.	G.G.21
	Geometry	G.G.22. Find and use measures of perimeter, circumference, and area of common geometric figures such as parallelograms, trapezoids, circles, and triangles.	G.G.22
	Geometry	G.G.23. Find and use measures of lateral areas, surface areas, and volumes of prisms, pyramids, spheres, cylinders, and cones, and relate these measures to each other using formulas (e.g., find the volume of a sphere with a specified surface area).	G.G.23
Geometry	G.G.24. Relate changes in the measurement (including units) of one attribute of an object to changes in other attributes (e.g., how changing the radius or height of a cylinder affects its surface area or volume).	G.G.24	

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<b>Geometry and Measurement</b> Solve problems based on understanding the properties of shapes, such as triangles and circles, and the spatial relationships between angles and lines.	Geometry	G.G.25. Describe the effects of approximate error in measurement and rounding on measurements and on computed values from measurements.	G.G.25
	Geometry	G.G.26. Use dimensional analysis for unit conversion and to confirm that expressions and equations make sense.	G.G.26
	Geometry	G.G.3. Apply properties of sides, diagonals, and angles in special polygons; identify their parts and special segments (e.g., altitudes, midsegments); determine interior angles for regular polygons.	G.G.3
	Geometry	G.G.4. Draw and label sets of points such as line segments, rays, and circles.	G.G.4
	Geometry	G.G.5. Detect symmetries of geometric figures.	G.G.5
	Geometry	G.G.6. Apply the triangle inequality and other inequalities associated with triangles (e.g., the longest side is opposite the greatest angle) to prove theorems and to solve problems.	G.G.6
	Geometry	G.G.7. Use properties and theorems about congruent and similar figures and about perpendicular and parallel lines to solve problems.	G.G.7
	Geometry	G.G.8. Write simple proofs of theorems in geometric situations, such as theorems about triangles, congruent and similar figures, and perpendicular and parallel lines (e.g., the longest side is opposite the greatest angle, two lines parallel to a third are parallel to each other; perpendicular bisectors of line segments are the set of all points equidistant from the two end points).	G.G.8
	Geometry	G.G.9. Distinguish between postulates and theorems. Use inductive and deductive reasoning, as well as proof by contradiction. Given a conditional statement, write its inverse, converse, and contrapositive.	G.G.9
<b>Number and Operations</b> Understand types of numbers (integers, fractions, decimals), their properties and the correct order of operations (addition, multiplication, division). Perform computations correctly.	Algebra I	A1.N.1. Use the properties of operations on real numbers, including the associative, commutative, identity, and distributive properties, and use them to simplify calculations.	A1.N.1
	Algebra I	A1.N.2. Simplify numerical expressions, including those involving integer exponents or the absolute value (e.g., $3(2 \text{ to the } 4\text{th power}) - 1 = 45$ , $4 3 - 5  + 6 = 14$ ); apply such simplifications in the solution of problems.	A1.N.2

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<p><b>Number and Operations</b></p> <p>Understand types of numbers (integers, fractions, decimals), their properties and the correct order of operations (addition, multiplication, division). Perform computations correctly.</p>	Algebra I	AI.N.3. Calculate and apply ratios, proportions, rates, and percentages to solve a range of consumer and practical problems.	AI.N.3
	Algebra I	AI.N.4. Use estimation to judge the reasonableness of results of computations and of solutions to problems involving real numbers, including approximate error in measurement and the approximate value of square roots. (Reminder: This is without the use of calculators.)	AI.N.4
	Algebra I	AI.N.5. Understand the concept of nth roots of positive real numbers and of raising a positive real number to a fractional power. Use the rules of exponents also for fractional exponents.	AI.N.5
	Algebra I	AI.N.6. Apply the set operations of union and intersection and the concept of complement, universal set, and disjoint sets, and use them to solve problems, including those involving Venn diagrams.	AI.N.6
	Algebra II	AII.N.1. Know and use the properties of operations on real numbers, including the existence of the identity and inverse elements for addition and multiplication and the existence of nth roots of positive real numbers for any positive integer n, and the nth power of positive real numbers.	AII.N.1
	Algebra II	AII.N.2. Simplify numerical expressions with powers and roots, including fractional and negative exponents.	AII.N.2
<p><b>Problem Solving</b></p> <p>Solve abstract and practical problems, applying and adapting a variety of strategies. Monitor progress and evaluate answers in terms of questions asked.</p>	Algebra I	AI.N.3. Calculate and apply ratios, proportions, rates, and percentages to solve a range of consumer and practical problems.	AI.N.3
	Algebra I	AI.N.6. Apply the set operations of union and intersection and the concept of complement, universal set, and disjoint sets, and use them to solve problems, including those involving Venn diagrams.	AI.N.6
	Algebra I	AI.P.10. Divide polynomials by monomials with emphasis on 1st- and 2nd-degree polynomials.	AI.P.10
	Algebra I	AI.P.11. Perform basic arithmetic operations with rational expressions and functions.	AI.P.11

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<p><b>Problem Solving</b></p> <p>Solve abstract and practical problems, applying and adapting a variety of strategies. Monitor progress and evaluate answers in terms of questions asked.</p>	Algebra I	Al.P.13. Solve equations and inequalities, including those involving absolute value of linear expressions (e.g., $ x - 2  > 5$ ), and apply to the solution of problems.	Al.P.13
	Algebra I	Al.P.14. Solve everyday problems (e.g., compound interest and direct and inverse variation problems) that can be modeled using linear or quadratic functions. Apply appropriate graphical or symbolic methods to the solution.	Al.P.14
	Algebra I	Al.P.15. Solve everyday problems (e.g., mixture, rate, and work problems) that can be modeled using systems of linear equations or inequalities. Apply algebraic and graphical methods to the solution.	Al.P.15
	Algebra I	Al.P.5. Demonstrate an understanding of the relationship between various representations of a line. Determine a line's slope and x- and y-intercepts from its graph or from a linear equation that represents the line.	Al.P.5
	Algebra I	Al.P.8. Add, subtract, and multiply polynomials with emphasis on 1st- and 2nd-degree polynomials.	Al.P.8
	Algebra II	All.D.2. Use combinatorics (e.g., fundamental counting principle, permutations, and combinations) to solve problems, including computing geometric probabilities and probabilities of compound events.	All.D.2
	Algebra II	All.P.12. Simplify rational expressions. Solve rational equations and inequalities.	All.P.12
	Algebra II	All.P.2. Identify arithmetic and geometric sequences and finite arithmetic and geometric series. Use the properties of such sequences and series to solve problems, including finding the formula for the general term and the sum, recursively and explicitly.	All.P.2
	Algebra II	All.P.6. Find solutions to radical equations; find solutions to quadratic equations (with real coefficients and real or complex roots) graphically, by factoring, by completing the square, or by using the quadratic formula.	All.P.6
	Algebra II	All.P.7. Solve a variety of equations and inequalities using algebraic, graphical, and numerical methods, including the quadratic formula. Include polynomial, exponential, and logarithmic functions, expressions involving the absolute values, and simple rational expressions.	All.P.7
Algebra II	All.P.9. Use symbolic, numeric, and graphical methods to solve systems of equations and/or inequalities involving algebraic, exponential, and logarithmic expressions. Describe the relationships among the methods.	All.P.9	

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<b>Problem Solving</b> Solve abstract and practical problems, applying and adapting a variety of strategies. Monitor progress and evaluate answers in terms of questions asked.	Geometry	G.G.1. Know correct geometric notation, including the notation for line segment (line segment AB) and angle (angle ABC).	G.G.1
	Geometry	G.G.13. Apply properties of angles, parallel lines, arcs, radii, chords, tangents, and secants to solve problems.	G.G.13
	Geometry	G.G.14. Solve simple triangle problems using the triangle angle sum property and/or the Pythagorean theorem; study and understand more than one proof of this theorem.	G.G.14
	Geometry	G.G.15. Use the properties of special triangles (e.g., isosceles, equilateral, 30°-60°-90°, 45°-45°-90°) to solve problems.	G.G.15
	Geometry	G.G.22. Find and use measures of perimeter, circumference, and area of common geometric figures such as parallelograms, trapezoids, circles, and triangles.	G.G.22
	Geometry	G.G.23. Find and use measures of lateral areas, surface areas, and volumes of prisms, pyramids, spheres, cylinders, and cones, and relate these measures to each other using formulas (e.g., find the volume of a sphere with a specified surface area).	G.G.23
	Geometry	G.G.7. Use properties and theorems about congruent and similar figures and about perpendicular and parallel lines to solve problems.	G.G.7
	Probability and Statistics	PS.1. Demonstrate understanding of the definition of the notion of independent events and use the rules for addition, multiplication, and complementation to solve for probabilities of particular events in finite sample spaces.	PS.1
	Probability and Statistics	PS.3. Demonstrate understanding of the notion of discrete random variables by using them to solve for the probabilities of outcomes (e.g., the probability of the occurrences of five heads in 14 coin tosses).	PS.3
Probability and Statistics	PS.5. Determine the mean and the standard deviation of a normally distributed random variable.	PS.5	
<b>Reasoning</b> Develop and use mathematical arguments and proofs to explore the truth of conjectures and justify conclusions.	Algebra I	AI.N.4. Use estimation to judge the reasonableness of results of computations and of solutions to problems involving real numbers, including approximate error in measurement and the approximate value of square roots. (Reminder: This is without the use of calculators.)	AI.N.4

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<b>Reasoning</b> Develop and use mathematical arguments and proofs to explore the truth of conjectures and justify conclusions.	Algebra I	Al.N.5. Understand the concept of $n$ th roots of positive real numbers and of raising a positive real number to a fractional power. Use the rules of exponents also for fractional exponents.	Al.N.5
	Algebra I	Al.P.2. Use properties of the real number system to judge the validity of equations and inequalities and to justify every step in a sequential argument.	Al.P.2
	Algebra II	All.D.1. Select an appropriate graphical representation for a set of data and use appropriate statistics (e.g., quartile or percentile distribution) to communicate information about the data, including box plots.	All.D.1
	Algebra II	All.P.4. Understand exponential and logarithmic functions and their basic arithmetic properties, including change of base and formulas for exponential of a sum and logarithm of a product.	All.P.4
	Geometry	G.G.10. Apply formulas for a rectangular coordinate system to justify theorems.	G.G.10
	Geometry	G.G.12. Apply congruence and similarity correspondences (e.g., "triangle" ABC is congruent to "triangle" XYZ) and properties of the figures to find missing parts of geometric figures, and provide logical justification.	G.G.12
	Geometry	G.G.24. Relate changes in the measurement (including units) of one attribute of an object to changes in other attributes (e.g., how changing the radius or height of a cylinder affects its surface area or volume).	G.G.24
	Geometry	G.G.26. Use dimensional analysis for unit conversion and to confirm that expressions and equations make sense.	G.G.26
	Geometry	G.G.3. Apply properties of sides, diagonals, and angles in special polygons; identify their parts and special segments (e.g., altitudes, midsegments); determine interior angles for regular polygons.	G.G.3
	Geometry	G.G.6. Apply the triangle inequality and other inequalities associated with triangles (e.g., the longest side is opposite the greatest angle) to prove theorems and to solve problems.	G.G.6
Probability and Statistics	PS.4. Apply uniform, normal, and binomial distributions to the solutions of problems.	PS.4	
Probability and Statistics	PS.9. Describe and explain how the relative sizes of a sample and the population affect the validity of predictions from a set of data.	PS.9	

Alignments of PSAT/NMSQT Skill Categories and State Standards

PSAT/NMSQT Skill Category and Description of Skills	Washington DC Math: Learning Standards 2005		
	Course/ Level	Standard	Standard ID
<b>Representation</b> Use and translate among representations including verbal, numerical, symbolic and graphical to communicate mathematical ideas and solve problems.	Algebra I	AI.D.1. Select, create, and interpret an appropriate graphical representation (e.g., scatter plot, table, stem-and-leaf plots, circle graph, line graph, and line plot) for a set of data, and use appropriate statistics (e.g., mean, median, range, and mode) to communicate information about the data. Use these notions to compare different sets of data.	AI.D.1
	Algebra I	AI.N.2. Simplify numerical expressions, including those involving integer exponents or the absolute value (e.g., $3((2 \text{ to the } 4\text{th power}) - 1) = 45$ , $4 3 - 5  + 6 = 14$ ); apply such simplifications in the solution of problems.	AI.N.2
	Algebra I	AI.P.4. Translate between different representations of functions and relations: graphs, equations, sets of ordered pairs (scatter plots), verbal, and tabular.	AI.P.4
	Algebra I	AI.P.7. Find linear functions that represent lines either perpendicular or parallel to a given line and through a point (e.g., by using the point-slope form of the equation).	AI.P.7
	Algebra II	All.N.2. Simplify numerical expressions with powers and roots, including fractional and negative exponents.	All.N.2
	Algebra II	All.P.1. Describe, complete, extend, analyze, generalize, and create a wide variety of patterns, including iterative and recursive patterns such as Fibonacci Numbers and Pascal's Triangle.	All.P.1
	Geometry	G.G.11. Draw congruent and similar figures using a compass, straightedge, or protractor. Justify the constructions by logical argument.	G.G.11
	Geometry	G.G.19. Find linear equations that represent lines either perpendicular or parallel to a given line and through a point (e.g., by using the point-slope form of the equation).	G.G.19
	Geometry	G.G.20. Draw the results and interpret transformations on figures in the coordinate plane such as translations, reflections, rotations, scale factors, and the results of successive transformations. Apply transformations to the solution of problems.	G.G.20
	Geometry	G.G.21. Demonstrate the ability to visualize solid objects and recognize their projections, cross sections, and graph points in 3-D.	G.G.21
Geometry	G.G.4. Draw and label sets of points such as line segments, rays, and circles.	G.G.4	
Geometry	G.G.5. Detect symmetries of geometric figures.	G.G.5	

Alignments of PSAT/NMSQT Skill Categories and State Standards

PSAT/NMSQT	Washington DC Math: Learning Standards 2005		
Skill Category and Description of Skills	Course/ Level	Standard	Standard ID
<p><b>Representation</b></p> <p>Use and translate among representations including verbal, numerical, symbolic and graphical to communicate mathematical ideas and solve problems.</p>	Geometry	<p>G.G.8. Write simple proofs of theorems in geometric situations, such as theorems about triangles, congruent and similar figures, and perpendicular and parallel lines (e.g., the longest side is opposite the greatest angle, two lines parallel to a third are parallel to each other; perpendicular bisectors of line segments are the set of all points equidistant from the two end points).</p>	G.G.8
	Probability and Statistics	PS.10. Approximate a line of best fit (trend line) given a set of data (e.g., scatter plot).	PS.10

# PSAT/NMSQT Skills Insight™ Alignment to State Standards

## Executive Summary, July 2010

### Purpose

PSAT/NMSQT *Skills Insight*™ is a free online tool designed to help students and educators gain a better understanding of how PSAT/NMSQT® scores relate to specific academic skills. It provides a description of the academic skills that are typical of students scoring at each score band, suggestions for improvement, and practice test questions. Learn more by visiting [www.collegeboard.com/psatskills](http://www.collegeboard.com/psatskills).

The information provided by PSAT/NMSQT *Skills Insight* is organized by skill category. There are five skill categories for the critical reading section, nine for the mathematics section (4 content skill categories; 5 process skill categories), and 5 for the writing skills section. This report shows the alignment between state standards in English Language Arts and Mathematics and the content and skills measured by the PSAT/NMSQT.

### Using Alignment Results with PSAT/NMSQT Reports

Schools and districts that administer the PSAT/NMSQT have access to the *Summary of Answers and Skills* (SOAS) report<sup>1</sup>. SOAS reports summarize performance on test sections, skill categories, and individual test questions, and compare local results to the state or nation. Using SOAS and the alignment information provided in this report, schools and districts can develop remediation strategies to help students improve their college readiness skills, future SAT scores, and performance on state assessments.

### Mathematics: Alignment Approach and Findings

- There are nine Skills Categories in Mathematics, representing both content and process skills: *Number and Operations; Algebra and Functions; Geometry and Measurement; Data, Statistics and Probability; Problem Solving; Representation; Reasoning; Connections and Communication*.
- Only standards for grades 9-12 were considered for these alignments. Within grades 9-12, the areas with the greatest concentration of alignments are the Number and Operations, Algebra and Geometry strands of the state standards. In most cases, Precalculus and Trigonometry were excluded from the alignment study.
- The organization and hierarchy of standards varies on a state-by-state basis. During the alignment process, the College Board aligned the PSAT/NMSQT skills to the most specific level of the state's standards.
- States often integrate process and content standards. In such cases, the state standard received an alignment to both a process skill category and a content skill category.
- Generally, there is strong correspondence between the PSAT/NMSQT Skills Categories in Mathematics and state standards. Coverage of the Skills Categories across a state standards document is dependent upon the specific state standards and on the degree of specificity of language employed within the standards.
- The PSAT/NMSQT is administered to students in grades 10 and 11; consequently, the strongest areas of alignment are in the content categories of *Number and Operations, Algebra and Functions* and *Geometry and Measurement* and in the process categories of *Problem Solving, Reasoning* and *Representations*. Considering the design and purpose of the PSAT/NMSQT, extensive alignments in upper levels of high school mathematics standards, including Trigonometry, are not intended or expected.

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<sup>1</sup> Using the access code printed on the PSAT/NMSQT *Roster of Student Scores and Plans*, SOAS reports can be downloaded from [www.collegeboard.com/reports](http://www.collegeboard.com/reports) beginning in the first week of January.

- The College Board content specialists who conducted the alignments have a deep understanding of the PSAT/NMSQT test specifications. Therefore, although multiple Skills Categories might link to a particular standard, these alignments display only the strongest and most appropriate matches.

## English Language Arts: Alignment Approach and Findings

- Reading and Writing each have five PSAT/NMSQT Skills Categories. In Reading, the categories are *Determining the Meaning of Words*, *Author’s Craft*, *Reasoning and Inferencing*, *Organization and Ideas* and *Understanding Literary Elements*. In Writing, the categories are *Manage Word Choice and Grammatical Relationships Between Words*, *Manage Grammatical Structures Used to Modify or Compare*, *Manage Phrases and Clauses in a Sentence*; *Recognize Correctly Formed Sentences* and *Manage Order and Relationships of Sentences and Paragraphs*.
- The PSAT/NMSQT is administered to students in grades 10 and 11, and the College Board targeted the English Language Arts alignments at these specific grade levels. In states where the standards are organized by grade band (grades 9-10, 11-12) or by one high school band (grades 9-12), the College Board aligned to all high school grade levels.
- Given the purpose and design of the PSAT/NMSQT, the English Language Arts alignment is focused on the areas of reading and writing and does not include state standards in speaking, listening, or media literacy. Additionally, these alignments excluded genre-specific state standards (such as those related to American, British, or World literature), although the essential PSAT/NMSQT skills in Reading can be used to support instruction in literature.
- The organization and hierarchy of standards varies on a state-by-state basis. During the alignment process, the College Board aligned the PSAT/NMSQT skills to the most specific level of the state’s standards. Coverage of the Skills Categories across a state standards document is dependent upon the specific state standards and on the degree of specificity of language employed within the standards.
- In Writing, generally there is strong correspondence between the PSAT/NMSQT Skills Categories and state standards that focus on grammar, usage, language conventions, and the role of editing and revising in writing.
- In Reading, there is strong correspondence between the PSAT/NMSQT Skills Categories and state standards in the essential areas of vocabulary development (determine the meaning of unfamiliar words or of words with multiple meanings by understanding context and by analyzing roots, prefixes, and suffixes) and reading comprehension (determine the main idea and supporting details; understand the organization of passages; analyze the various elements of an author’s craft, including purpose, perspective, word choice, and use of rhetorical and literary devices and understand literary elements such as plot, characterization, and setting).

## Summary

In summary, the PSAT/NMSQT Skills Categories correspond well to state standards. Educators can use these alignments to connect the PSAT/NMSQT to their local curricula and state standards to monitor student learning and to build a coherent instructional plan for their students.