

Alignments of PSAT/NMSQT Skill Categories and State Standards

PSAT/NMSQT Skill Category and Description of Skills	Rhode Island Math: Grade Level and Grade Span Expectations 2006		
	Course/ Level	Standard	Standard ID
Algebra and Functions Solve problems using algebraic expressions and symbols to represent relationships, patterns and functions of different types.	Grades: 9-10	M(F&A)-10-1 Identifies, extends, and generalizes a variety of patterns (linear and nonlinear) represented by models, tables, sequences, or graphs to solve problems.	M(F&A)-10-1
	Grades: 9-10	M(F&A)-10-2 Demonstrates conceptual understanding of linear and nonlinear functions and relations (including characteristics of classes of functions) through an analysis of constant, variable, or average rates of change, intercepts, domain, range, maximum and minimum values, increasing and decreasing intervals and rates of change (e.g., the height is increasing at a decreasing rate); describes how change in the value of one variable relates to change in the value of a second variable; or works between and among different representations of functions and relations (e.g., graphs, tables, equations, function notation).	M(F&A)-10-2
	Grades: 9-10	M(F&A)-10-3 Demonstrates conceptual understanding of algebraic expressions by solving problems involving algebraic expressions, by simplifying expressions (e.g., simplifying polynomial or rational expressions, or expressions involving integer exponents, square roots, or absolute values), by evaluating expressions, or by translating problem situations into algebraic expressions.	M(F&A)-10-3
	Grades: 9-10	M(F&A)-10-4 Demonstrates conceptual understanding of equality by solving problems involving algebraic reasoning about equality; by translating problem situations into equations; by solving linear equations (symbolically and graphically) and expressing the solution set symbolically or graphically, or provides the meaning of the graphical interpretations of solution(s) in problem-solving situations; or by solving problems involving systems of linear equations in a context (using equations or graphs) or using models or representations.	M(F&A)-10-4
	Grades: 11-12	M(F&A)-12-1 Identifies arithmetic and geometric sequences and finds the n th term; then uses the generalization to find a specific term.	M(F&A)-12-1
	Grades: 11-12	M(F&A)-12-2 Demonstrates conceptual understanding of linear and nonlinear functions and relations by representing and analyzing functions in several ways; recognizing properties of functions and characteristics properties of families of functions; applying knowledge of functions to interpret, model, and solve problems; analyzing characteristics of classes of functions (polynomial, rational, and exponential) to include domain, range, intercepts, increasing and decreasing intervals and rates of change; representing functions numerically, algebraically, graphically, and verbally (i.e. in written words), recognizing properties of a function from these representations, and transfers information from one representation to another; graphing polynomial, rational and exponential functions, including vertical and horizontal shifts, stretches, and compressions as well as reflections across vertical and horizontal axes; applying knowledge of functions to interpret and understand situations, design mathematical models, and solve problems in mathematics as well as in natural and social sciences.	M(F&A)-12-2

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<p>Algebra and Functions</p> <p>Solve problems using algebraic expressions and symbols to represent relationships, patterns and functions of different types.</p>	Grades: 11-12	<p>M(F&A)-12-3 Demonstrates conceptual understanding of algebraic expressions by manipulating, evaluating, and simplifying algebraic and numerical expressions; adding, subtracting, multiplying and dividing polynomials; adding, subtracting, multiplying and dividing rational expressions; simplifying complex fractions; factoring quadratic and higher degree polynomials, including difference of squares; applying properties of logarithms (e.g., log base a of (b to the nth power) = n times log base a of b, a to the power (log base a of b) = b) and converting between logarithmic and exponential forms; manipulating, evaluating, and simplifying expressions involving rational exponents and radicals and converting between expressions with rational exponents and expressions with radicals.</p>	M(F&A)-12-3
	Grades: 11-12	<p>M(F&A)-12-4 Demonstrates conceptual understanding of equality by solving equations and systems of equations or inequalities and interpreting the solutions algebraically and graphically; by factoring, completing the square, using the quadratic formula, and graphing quadratic functions to solve quadratic equations; solving and interpreting solutions of equations involving polynomial, rational, and radical expressions; analyzing the effect of simplifying radical or rational expressions on the solution set of equations involving such expressions. (e.g. $x^2/x = x$ for $x \neq 0$); finding approximate solutions to equations by graphing each side as a function using technology. [Understand that any equation in x can be interpreted as the equation $f(x) = g(x)$ and interpret the solutions of the equation as the x-value(s) of the intersection point(s) of the graphs of $y = f(x)$ and $y = g(x)$.]; solving 2x2 and 3x3 systems of linear equations and graphically interprets the solutions; solving systems of linear and quadratic inequalities; solving and graphically interpreting solutions systems of equations involving nonlinear expressions.</p>	M(F&A)-12-4
	Advanced	<p>M(F&A)-AM-1 Identifies and computes partial sums of infinite arithmetic and geometric sequences, determines when an infinite geometric series converges, and finds its sum. Connects arithmetic and geometric sequences to linear and exponential functions, respectively.</p>	M(F&A)-AM-1
	Advanced	<p>M(F&A)-AM-2 Demonstrates conceptual understanding of linear and nonlinear functions and relations from a set-theoretic perspective, and operations on functions including composition and inverse including computing inverses algebraically; analyzing characteristics of classes of functions and inverse functions (exponential, logarithmic, trigonometric) to include domain, range, intercepts, increasing and decreasing intervals and rates of change, periodicity, end behavior, maximum and minimum values, continuity, and asymptotes; analyzing properties of functions including injectivity (1-1), surjectivity (onto), critical points and inflection points. Determine graphically and analytically whether a function is even, odd or neither; analyzing informally the idea of continuity and limits; recognizing properties of families of functions including logarithmic and trigonometric, and graphs them; analyzing domain restriction and the effects of it on the function and its properties.</p>	M(F&A)-AM-2

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<p>Algebra and Functions</p> <p>Solve problems using algebraic expressions and symbols to represent relationships, patterns and functions of different types.</p>	Advanced	M(F&A)-AM-3 Demonstrates conceptual understanding of algebraic expressions by using the remainder theorem, the factor theorem and rational root theorem for polynomials; by factoring polynomials over integer, rational, real and complex numbers.	M(F&A)-AM-3
	Advanced	M(F&A)-AM-4 Demonstrates conceptual understanding of equality by solving equations and verifying identities involving trigonometric expressions; solving, graphing and interpreting equations involving exponential and logarithmic expressions; interpreting systems as matrix equations and solving them by computing the appropriate matrix inverse and multiplication, with or without technology; applying the intermediate value theorem to find exact or approximate solutions of equations or zeros of continuous functions.	M(F&A)-AM-4
<p>Communication</p> <p>Express mathematical ideas precisely and communicate them coherently and clearly in the language and notation of mathematics.</p>	Grades: 9-10	M(DSP)-10-3 Identifies or describes representations or elements of representations that best display a given set of data or situation, consistent with the representations required in M(DSP)-10-1.	M(DSP)-10-3
	Grades: 9-10	M(F&A)-10-2 Demonstrates conceptual understanding of linear and nonlinear functions and relations (including characteristics of classes of functions) through an analysis of constant, variable, or average rates of change, intercepts, domain, range, maximum and minimum values, increasing and decreasing intervals and rates of change (e.g., the height is increasing at a decreasing rate); describes how change in the value of one variable relates to change in the value of a second variable; or works between and among different representations of functions and relations (e.g., graphs, tables, equations, function notation).	M(F&A)-10-2
	Grades: 11-12	M(F&A)-12-2 Demonstrates conceptual understanding of linear and nonlinear functions and relations by representing and analyzing functions in several ways; recognizing properties of functions and characteristics properties of families of functions; applying knowledge of functions to interpret, model, and solve problems; analyzing characteristics of classes of functions (polynomial, rational, and exponential) to include domain, range, intercepts, increasing and decreasing intervals and rates of change; representing functions numerically, algebraically, graphically, and verbally (i.e. in written words), recognizing properties of a function from these representations, and transfers information from one representation to another; graphing polynomial, rational and exponential functions, including vertical and horizontal shifts, stretches, and compressions as well as reflections across vertical and horizontal axes; applying knowledge of functions to interpret and understand situations, design mathematical models, and solve problems in mathematics as well as in natural and social sciences.	M(F&A)-12-2

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<p>Connections</p> <p>Connect ideas from different areas of mathematics (particularly geometry and algebra) to state or solve abstract or applied problems.</p>	Advanced	M(F&A)-AM-2 Demonstrates conceptual understanding of linear and nonlinear functions and relations from a set-theoretic perspective, and operations on functions including composition and inverse including computing inverses algebraically; analyzing characteristics of classes of functions and inverse functions (exponential, logarithmic, trigonometric) to include domain, range, intercepts, increasing and decreasing intervals and rates of change, periodicity, end behavior, maximum and minimum values, continuity, and asymptotes; analyzing properties of functions including injectivity (1-1), surjectivity (onto), critical points and inflection points. Determine graphically and analytically whether a function is even, odd or neither; analyzing informally the idea of continuity and limits; recognizing properties of families of functions including logarithmic and trigonometric, and graphs them; analyzing domain restriction and the effects of it on the function and its properties.	M(F&A)-AM-2
	Advanced	M(F&A)-AM-4 Demonstrates conceptual understanding of equality by solving equations and verifying identities involving trigonometric expressions; solving, graphing and interpreting equations involving exponential and logarithmic expressions; interpreting systems as matrix equations and solving them by computing the appropriate matrix inverse and multiplication, with or without technology; applying the intermediate value theorem to find exact or approximate solutions of equations or zeros of continuous functions.	M(F&A)-AM-4
<p>Data, Statistics, and Probability</p> <p>Analyze data, understand descriptive statistics, make inferences and determine the likelihood that certain events will occur.</p>	Grades: 9-10	M(DSP)-10-1 Interprets a given representation (e.g., box-and-whisker plots, scatter plots, bar graphs, line graphs, circle graphs, histograms, frequency charts) to make observations, to answer questions, to analyze the data to formulate or justify conclusions, critique conclusions, make predictions, or to solve problems within mathematics or across disciplines or contexts (e.g. media, workplace, social and environmental situations).	M(DSP)-10-1
	Grades: 9-10	M(DSP)-10-2 Analyzes patterns, trends, or distributions in data in a variety of contexts by determining, using, or analyzing measures of central tendency (mean, median, or mode), dispersion (range or variation), outliers, quartile values, estimated line of best fit, regression line, or correlation (strong positive, strong negative, or no correlation) to solve problems; and solve problems involving conceptual understanding of the sample from which the statistics were developed.	M(DSP)-10-2
	Grades: 9-10	M(DSP)-10-3 Identifies or describes representations or elements of representations that best display a given set of data or situation, consistent with the representations required in M(DSP)-10-1.	M(DSP)-10-3
	Grades: 9-10	M(DSP)-10-4 Uses counting techniques to solve contextualized problems involving combinations or permutations (e.g., organized lists, tables, tree diagrams, models, Fundamental Counting Principle, or others).	M(DSP)-10-4

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	Course/ Level	Standard	Standard ID
Data, Statistics, and Probability Analyze data, understand descriptive statistics, make inferences and determine the likelihood that certain events will occur.	Grades: 9-10	M(DSP)-10-5 Solves problems involving experimental or theoretical probability.	M(DSP)-10-5
	Grades: 9-10	M(DSP)-10-6 In response to a teacher or student generated question or hypothesis decides the most effective method (e.g., survey, observation, research, experimentation) and sampling techniques (e.g., random sample, stratified random sample) to collect the data necessary to answer the question; collects, organizes, and appropriately displays the data; analyzes the data to draw conclusions about the questions or hypotheses being tested while considering the limitations of the data that could effect interpretations; and when appropriate makes predications, asks new questions, or makes connections to real-world situations.	M(DSP)-10-6
	Grades: 11-12	M(DSP)-12-1 Interprets a given representation(s) (e.g., regression function including linear, quadratic, and exponential) to analyze the data to make inferences and to formulate, justify, and critique conclusions.	M(DSP)-12-1
	Grades: 11-12	M(DSP)-12-2 Analyzes patterns, trends, or distributions in data in a variety of contexts by calculating and analyzing measures of dispersion (standard deviation, variance, and percentiles).	M(DSP)-12-2
	Grades: 11-12	M(DSP)-12-3 Organizes and displays one- and two- variable data using a variety of representations (e.g., box-and-whisker plots, scatter plots, bar graphs, line graphs, circle graphs, histograms, frequency charts, linear, quadratic, and exponential regression functions) to analyze the data to formulate or justify conclusions, make predictions, or to solve problems with or without using technology.	M(DSP)-12-3
	Grades: 11-12	M(DSP)-12-4 Uses counting techniques to solve problems in context involving combination or permutations using a variety of strategies (e.g., nCr , nPr , or $n!$); and finds unions, intersections, and complements of sets.	M(DSP)-12-4
	Grades: 11-12	M(DSP)-12-5 For a probability event in which the sample space may or may not contain equally likely outcomes, predicts the theoretical probability of an event and tests the prediction through experiments and simulations; compares and contrasts theoretical and experimental probabilities; finds the odds of an event and understands the relationship between probability and odds.	M(DSP)-12-5

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<p>Data, Statistics, and Probability</p> <p>Analyze data, understand descriptive statistics, make inferences and determine the likelihood that certain events will occur.</p>	Grades: 11-12	M(DSP)-12-6 In response to a teacher or student generated question or hypothesis decides the most effective method (e.g., survey, observation, research, experimentation) and sampling techniques (e.g., random sample, stratified random sample) to collect the data necessary to answer the question; collects, organizes, and appropriately displays the data; analyzes the data to draw conclusions about the questions or hypotheses being tested while considering the limitations of the data that could effect interpretations; and when appropriate makes predications, asks new questions, or makes connections to real-world situations.	M(DSP)-12-6
	Advanced	M(DSP)-AM-2 Analyzes and interprets measures of dispersion (standard deviation, variance, and percentiles) and central tendency for the normal distribution; and interprets the correlation coefficient and the coefficient of determination in the context of data.	M(DSP)-AM-2
	Advanced	M(DSP)-AM-3 Uses technology to explore the method of least squares and median-median for linear regression.	M(DSP)-AM-3
	Advanced	M(DSP)-AM-5 Solves probability problems (e.g., by applying concepts of counting, random variables, independence/dependence of events, and conditional probability).	M(DSP)-AM-5
<p>Geometry and Measurement</p> <p>Solve problems based on understanding the properties of shapes, such as triangles and circles, and the spatial relationships between angles and lines.</p>	Grades: 9-10	M(G&M)-10-10 Demonstrates conceptual understanding of spatial reasoning and visualization by sketching or using dynamic geometric software to generate three-dimensional objects from two-dimensional perspectives, or to generate two-dimensional perspectives from three-dimensional objects, or by solving related problems.	M(G&M)-10-10
	Grades: 9-10	M(G&M)-10-2a Creates formal proofs of propositions (e.g. angles, lines, circles, distance, midpoint and polygons including triangle ratios).	M(G&M)-10-2a
	Grades: 9-10	M(G&M)-10-2b Makes and defends conjectures, constructs geometric arguments, uses geometric properties, or uses theorems to solve problems involving angles, lines, polygons, circles, or right triangle ratios (sine, cosine, tangent) within mathematics or across disciplines or contexts (e.g., Pythagorean Theorem, Triangle Inequality Theorem).	M(G&M)-10-2b
	Grades: 9-10	M(G&M)-10-4 Applies the concepts of congruency by solving problems on or off a coordinate plane involving reflections, translations, or rotations; or solves problems using congruency involving problems within mathematics or across disciplines or contexts.	M(G&M)-10-4
	Grades: 9-10	M(G&M)-10-5 Applies concepts of similarity by solving problems within mathematics or across disciplines or contexts.	M(G&M)-10-5

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Geometry and Measurement Solve problems based on understanding the properties of shapes, such as triangles and circles, and the spatial relationships between angles and lines.	Grades: 9-10	M(G&M)-10-6 Solves problems involving perimeter, circumference, or area of two-dimensional figures (including composite figures) or surface area or volume of three-dimensional figures (including composite figures) within mathematics or across disciplines or contexts.	M(G&M)-10-6
	Grades: 9-10	M(G&M)-10-7 Uses units of measure appropriately and consistently when solving problems across content strands; makes conversions within or across systems and makes decisions concerning an appropriate degree of accuracy in problem situations involving measurement in other GSEs.	M(G&M)-10-7
	Grades: 9-10	M(G&M)-10-9 Solves problems on and off the coordinate plane involving distance, midpoint, perpendicular and parallel lines, or slope.	M(G&M)-10-9
	Grades: 11-12	M(G&M)-12-10 Demonstrates conceptual understanding of spatial reasoning and visualization by performing and justifying constructions with compass and straightedge or dynamic geometric software.	M(G&M)-12-10
	Grades: 11-12	M(G&M)-12-2 Creates formal proofs of propositions (e.g. angles, lines, circles, distance, midpoint and polygons including triangle congruence and similarity).	M(G&M)-12-2
	Grades: 11-12	M(G&M)-12-7 Uses informal concepts of successive approximation, upper and lower bounds, and limits in measurement situations (e.g., use successive approximation to find the area of a pond); uses measurement conversion strategies (e.g., unit/dimensional analysis).	M(G&M)-12-7
	Grades: 11-12	M(G&M)-12-9 Solves problems involving circles as loci of points in the plane satisfying certain distance requirements, and uses the distance formula to obtain equations for circles.	M(G&M)-12-9
	Advanced	M(G&M)-AM-2 Extends and deepens knowledge and usage of proofs and proof techniques; and uses geometric models to represent and distinguish between Euclidean and non-Euclidean Systems.	M(G&M)-AM-2
	Advanced	M(G&M)-AM-6 Solves problems involving volume using Cavalieri's principle and derives and uses formulas for lengths of arcs and areas of sectors and segments of circles.	M(G&M)-AM-6
Advanced	M(G&M)-AM-7 Uses radian measure appropriately when solving problems; converts between radian measure and degree measure; and understands why radian measure is useful.	M(G&M)-AM-7	

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<p>Geometry and Measurement</p> <p>Solve problems based on understanding the properties of shapes, such as triangles and circles, and the spatial relationships between angles and lines.</p>	Advanced	M(G&M)-AM-9 Solves problems using analytic geometry (including three-dimensions) and circular trigonometry (e.g., find the equation of a circle inscribed in a triangle; find the distance between opposite vertices in a rectangular solid); explores and interprets the characteristics of conic sections graphically and algebraically including understanding how different planar slices of a double cone yield different conic sections; knows the characterization of conic sections as loci of points in the plane satisfying certain distance requirements, and uses the distance formula to obtain equations for the conic sections.	M(G&M)-AM-9
<p>Number and Operations</p> <p>Understand types of numbers (integers, fractions, decimals), their properties and the correct order of operations. Perform computations correctly.</p>	Grades: 9-10	M(N&O)-10-2 Demonstrates understanding of the relative magnitude of real numbers by solving problems involving ordering or comparing rational numbers, common irrational numbers (e.g., "square root" of 2, pi), rational bases with integer exponents, square roots, absolute values, integers, or numbers represented in scientific notation using number lines or equality and inequality symbols.	M(N&O)-10-2
	Grades: 9-10	M(N&O)-10-4 Accurately solves problems that involve but are not limited to proportional relationships, percents, ratios, and rates. (The problems might be drawn from contexts outside of and within mathematics including those that cut across content strands or disciplines.)	M(N&O)-10-4
	Grades: 9-10	M(N&O)-10-6 Uses a variety of mental computation strategies to solve problems. Calculates benchmark perfect squares and related square roots (e.g., 11, 21, ..., 121, 151, 201, 251, 1001, 10001). Determines any whole number percentage of a number or any multiples of 100% up to 500%. Determines benchmark fractions of a number.	M(N&O)-10-6
	Grades: 9-10	M(N&O)-10-7 Makes appropriate estimates in a given situation by determining the level of accuracy needed and analyzing the accuracy of results. Estimates tips, discounts, and tax and estimates the value of a non-perfect square root or cube root.	M(N&O)-10-7
	Grades: 9-10	M(N&O)-10-8 Applies properties of numbers to solve problems, to simplify computations, or to compare and contrast the properties of numbers and number systems.	M(N&O)-10-8
	Grades: 11-12	M(N&O)-12-1 Demonstrates conceptual understanding of rational numbers by knowing why a real number is rational if and only if the number's decimal expansion eventually repeats or terminates.	M(N&O)-12-1
	Grades: 11-12	M(N&O)-12-2 Demonstrates understanding of the relative magnitude of real numbers by solving problems that involve ordering or comparing any subset of the real numbers.	M(N&O)-12-2

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<p>Number and Operations</p> <p>Understand types of numbers (integers, fractions, decimals), their properties and the correct order of operations. Perform computations correctly.</p>	Grades: 11-12	M(N&O)-12-4 Accurately solves problems involving scientific notation or uses significant digits to assess the precision of an answer. Interprets rational exponents and their relation to radicals; computes by hand in simple cases (e.g. "4 to the 3/2 power"), and using a calculator when appropriate. Interprets numbers given in scientific notation and carries out computations of them with and without a calculator. Solves problems involving compound interest.	M(N&O)-12-4
	Grades: 11-12	M(N&O)-12-7 Makes appropriate estimates in a given situation by determining the level of accuracy needed and analyzing the accuracy of results.	M(N&O)-12-7
	Grades: 11-12	M(N&O)-12-8 Applies properties to determine whether a given subset of numbers is closed under a given arithmetic operation.	M(N&O)-12-8
	Advanced	M(N&O)-AM-1 Demonstrates conceptual understanding of the real number system as an extension of the rational numbers by representing real numbers as infinite decimal expansions (that provide successive rational approximations to the number) and as points on a number line. Determines whether the decimal expansion of a rational number given in fractional form eventually repeats or terminates (without using a calculator).	M(N&O)-AM-1
<p>Problem Solving</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>	Grades: 9-10	M(DSP)-10-2 Analyzes patterns, trends, or distributions in data in a variety of contexts by determining, using, or analyzing measures of central tendency (mean, median, or mode), dispersion (range or variation), outliers, quartile values, estimated line of best fit, regression line, or correlation (strong positive, strong negative, or no correlation) to solve problems; and solve problems involving conceptual understanding of the sample from which the statistics were developed.	M(DSP)-10-2
	Grades: 9-10	M(DSP)-10-4 Uses counting techniques to solve contextualized problems involving combinations or permutations (e.g., organized lists, tables, tree diagrams, models, Fundamental Counting Principle, or others).	M(DSP)-10-4
	Grades: 9-10	M(DSP)-10-5 Solves problems involving experimental or theoretical probability.	M(DSP)-10-5
	Grades: 9-10	M(F&A)-10-3 Demonstrates conceptual understanding of algebraic expressions by solving problems involving algebraic expressions, by simplifying expressions (e.g., simplifying polynomial or rational expressions, or expressions involving integer exponents, square roots, or absolute values), by evaluating expressions, or by translating problem situations into algebraic expressions.	M(F&A)-10-3

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<p>Problem Solving</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>	Grades: 9-10	M(F&A)-10-4 Demonstrates conceptual understanding of equality by solving problems involving algebraic reasoning about equality; by translating problem situations into equations; by solving linear equations (symbolically and graphically) and expressing the solution set symbolically or graphically, or provides the meaning of the graphical interpretations of solution(s) in problem-solving situations; or by solving problems involving systems of linear equations in a context (using equations or graphs) or using models or representations.	M(F&A)-10-4
	Grades: 9-10	M(G&M)-10-2a Creates formal proofs of propositions (e.g. angles, lines, circles, distance, midpoint and polygons including triangle ratios).	M(G&M)-10-2a
	Grades: 9-10	M(G&M)-10-4 Applies the concepts of congruency by solving problems on or off a coordinate plane involving reflections, translations, or rotations; or solves problems using congruency involving problems within mathematics or across disciplines or contexts.	M(G&M)-10-4
	Grades: 9-10	M(G&M)-10-5 Applies concepts of similarity by solving problems within mathematics or across disciplines or contexts.	M(G&M)-10-5
	Grades: 9-10	M(G&M)-10-6 Solves problems involving perimeter, circumference, or area of two-dimensional figures (including composite figures) or surface area or volume of three-dimensional figures (including composite figures) within mathematics or across disciplines or contexts.	M(G&M)-10-6
	Grades: 9-10	M(G&M)-10-7 Uses units of measure appropriately and consistently when solving problems across content strands; makes conversions within or across systems and makes decisions concerning an appropriate degree of accuracy in problem situations involving measurement in other GSEs.	M(G&M)-10-7
	Grades: 9-10	M(G&M)-10-9 Solves problems on and off the coordinate plane involving distance, midpoint, perpendicular and parallel lines, or slope.	M(G&M)-10-9
	Grades: 9-10	M(N&O)-10-2 Demonstrates understanding of the relative magnitude of real numbers by solving problems involving ordering or comparing rational numbers, common irrational numbers (e.g., "square root" of 2, pi), rational bases with integer exponents, square roots, absolute values, integers, or numbers represented in scientific notation using number lines or equality and inequality symbols.	M(N&O)-10-2
	Grades: 9-10	M(N&O)-10-3 No GSE at this grade	M(N&O)-10-3
	Grades: 9-10	M(N&O)-10-4 Accurately solves problems that involve but are not limited to proportional relationships, percents, ratios, and rates. (The problems might be drawn from contexts outside of and within mathematics including those that cut across content strands or disciplines.)	M(N&O)-10-4

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<p>Problem Solving</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>	Grades: 9-10	M(N&O)-10-6 Uses a variety of mental computation strategies to solve problems. Calculates benchmark perfect squares and related square roots (e.g., 11, 21, ..., 121, 151, 201, 251, 1001, 10001). Determines any whole number percentage of a number or any multiples of 100% up to 500%. Determines benchmark fractions of a number.	M(N&O)-10-6
	Grades: 9-10	M(N&O)-10-7 Makes appropriate estimates in a given situation by determining the level of accuracy needed and analyzing the accuracy of results. Estimates tips, discounts, and tax and estimates the value of a non-perfect square root or cube root.	M(N&O)-10-7
	Grades: 9-10	M(N&O)-10-8 Applies properties of numbers to solve problems, to simplify computations, or to compare and contrast the properties of numbers and number systems.	M(N&O)-10-8
	Grades: 11-12	M(DSP)-12-2 Analyzes patterns, trends, or distributions in data in a variety of contexts by calculating and analyzing measures of dispersion (standard deviation, variance, and percentiles).	M(DSP)-12-2
	Grades: 11-12	M(DSP)-12-4 Uses counting techniques to solve problems in context involving combination or permutations using a variety of strategies (e.g., nCr , nPr , or $n!$); and finds unions, intersections, and complements of sets.	M(DSP)-12-4
	Grades: 11-12	M(DSP)-12-5 For a probability event in which the sample space may or may not contain equally likely outcomes, predicts the theoretical probability of an event and tests the prediction through experiments and simulations; compares and contrasts theoretical and experimental probabilities; finds the odds of an event and understands the relationship between probability and odds.	M(DSP)-12-5
	Grades: 11-12	M(F&A)-12-1 Identifies arithmetic and geometric sequences and finds the n th term; then uses the generalization to find a specific term.	M(F&A)-12-1
	Grades: 11-12	M(F&A)-12-3 Demonstrates conceptual understanding of algebraic expressions by manipulating, evaluating, and simplifying algebraic and numerical expressions; adding, subtracting, multiplying and dividing polynomials; adding, subtracting, multiplying and dividing rational expressions; simplifying complex fractions; factoring quadratic and higher degree polynomials, including difference of squares; applying properties of logarithms (e.g., $\log_{\text{base } a} \text{ of } (b \text{ to the } n\text{th power}) = n \text{ times } \log_{\text{base } a} \text{ of } b$, $a \text{ to the power } (\log_{\text{base } a} \text{ of } b) = b$) and converting between logarithmic and exponential forms; manipulating, evaluating, and simplifying expressions involving rational exponents and radicals and converting between expressions with rational exponents and expressions with radicals.	M(F&A)-12-3

Alignments of PSAT/NMSQT Skill Categories and State Standards

PSAT/NMSQT Skill Category and Description of Skills	Rhode Island Math: Grade Level and Grade Span Expectations 2006		
	Course/ Level	Standard	Standard ID
<p>Problem Solving</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>	Grades: 11-12	M(G&M)-12-10 Demonstrates conceptual understanding of spatial reasoning and visualization by performing and justifying constructions with compass and straightedge or dynamic geometric software.	M(G&M)-12-10
	Grades: 11-12	M(G&M)-12-7 Uses informal concepts of successive approximation, upper and lower bounds, and limits in measurement situations (e.g., use successive approximation to find the area of a pond); uses measurement conversion strategies (e.g., unit/dimensional analysis).	M(G&M)-12-7
	Grades: 11-12	M(G&M)-12-9 Solves problems involving circles as loci of points in the plane satisfying certain distance requirements, and uses the distance formula to obtain equations for circles.	M(G&M)-12-9
	Grades: 11-12	M(N&O)-12-1 Demonstrates conceptual understanding of rational numbers by knowing why a real number is rational if and only if the number's decimal expansion eventually repeats or terminates.	M(N&O)-12-1
	Grades: 11-12	M(N&O)-12-2 Demonstrates understanding of the relative magnitude of real numbers by solving problems that involve ordering or comparing any subset of the real numbers.	M(N&O)-12-2
	Grades: 11-12	M(N&O)-12-4 Accurately solves problems involving scientific notation or uses significant digits to assess the precision of an answer. Interprets rational exponents and their relation to radicals; computes by hand in simple cases (e.g. "4 to the 3/2 power"), and using a calculator when appropriate. Interprets numbers given in scientific notation and carries out computations of them with and without a calculator. Solves problems involving compound interest.	M(N&O)-12-4
	Grades: 11-12	M(N&O)-12-7 Makes appropriate estimates in a given situation by determining the level of accuracy needed and analyzing the accuracy of results.	M(N&O)-12-7
	Advanced	M(DSP)-AM-2 Analyzes and interprets measures of dispersion (standard deviation, variance, and percentiles) and central tendency for the normal distribution; and interprets the correlation coefficient and the coefficient of determination in the context of data.	M(DSP)-AM-2
	Advanced	M(DSP)-AM-5 Solves probability problems (e.g., by applying concepts of counting, random variables, independence/dependence of events, and conditional probability).	M(DSP)-AM-5
	Advanced	M(F&A)-AM-1 Identifies and computes partial sums of infinite arithmetic and geometric sequences, determines when an infinite geometric series converges, and finds its sum. Connects arithmetic and geometric sequences to linear and exponential functions, respectively.	M(F&A)-AM-1

Alignments of PSAT/NMSQT Skill Categories and State Standards

PSAT/NMSQT Skill Category and Description of Skills	Rhode Island Math: Grade Level and Grade Span Expectations 2006		
	Course/ Level	Standard	Standard ID
Problem Solving Solve abstract and practical problems, applying and adapting a variety of strategies. Monitor progress and evaluate answers in terms of questions asked.	Advanced	M(F&A)-AM-3 Demonstrates conceptual understanding of algebraic expressions by using the remainder theorem, the factor theorem and rational root theorem for polynomials; by factoring polynomials over integer, rational, real and complex numbers.	M(F&A)-AM-3
	Advanced	M(G&M)-AM-6 Solves problems involving volume using Cavalieri's principle and derives and uses formulas for lengths of arcs and areas of sectors and segments of circles.	M(G&M)-AM-6
	Advanced	M(G&M)-AM-7 Uses radian measure appropriately when solving problems; converts between radian measure and degree measure; and understands why radian measure is useful.	M(G&M)-AM-7
	Advanced	M(G&M)-AM-9 Solves problems using analytic geometry (including three-dimensions) and circular trigonometry (e.g., find the equation of a circle inscribed in a triangle; find the distance between opposite vertices in a rectangular solid); explores and interprets the characteristics of conic sections graphically and algebraically including understanding how different planar slices of a double cone yield different conic sections; knows the characterization of conic sections as loci of points in the plane satisfying certain distance requirements, and uses the distance formula to obtain equations for the conic sections.	M(G&M)-AM-9
	Advanced	M(N&O)-AM-1 Demonstrates conceptual understanding of the real number system as an extension of the rational numbers by representing real numbers as infinite decimal expansions (that provide successive rational approximations to the number) and as points on a number line. Determines whether the decimal expansion of a rational number given in fractional form eventually repeats or terminates (without using a calculator).	M(N&O)-AM-1
Reasoning Develop and use mathematical arguments and proofs to explore the truth of conjectures and justify conclusions.	Grades: 9-10	M(DSP)-10-1 Interprets a given representation (e.g., box-and-whisker plots, scatter plots, bar graphs, line graphs, circle graphs, histograms, frequency charts) to make observations, to answer questions, to analyze the data to formulate or justify conclusions, critique conclusions, make predictions, or to solve problems within mathematics or across disciplines or contexts (e.g. media, workplace, social and environmental situations).	M(DSP)-10-1
	Grades: 9-10	M(DSP)-10-6 In response to a teacher or student generated question or hypothesis decides the most effective method (e.g., survey, observation, research, experimentation) and sampling techniques (e.g., random sample, stratified random sample) to collect the data necessary to answer the question; collects, organizes, and appropriately displays the data; analyzes the data to draw conclusions about the questions or hypotheses being tested while considering the limitations of the data that could effect interpretations; and when appropriate makes predications, asks new questions, or makes connections to real-world situations.	M(DSP)-10-6

Alignments of PSAT/NMSQT Skill Categories and State Standards

PSAT/NMSQT Skill Category and Description of Skills	Rhode Island Math: Grade Level and Grade Span Expectations 2006		
	Course/ Level	Standard	Standard ID
<p>Reasoning</p> <p>Develop and use mathematical arguments and proofs to explore the truth of conjectures and justify conclusions.</p>	Grades: 9-10	M(F&A)-10-1 Identifies, extends, and generalizes a variety of patterns (linear and nonlinear) represented by models, tables, sequences, or graphs to solve problems.	M(F&A)-10-1
	Grades: 9-10	M(G&M)-10-2b Makes and defends conjectures, constructs geometric arguments, uses geometric properties, or uses theorems to solve problems involving angles, lines, polygons, circles, or right triangle ratios (sine, cosine, tangent) within mathematics or across disciplines or contexts (e.g., Pythagorean Theorem, Triangle Inequality Theorem).	M(G&M)-10-2b
	Grades: 11-12	M(DSP)-12-1 Interprets a given representation(s) (e.g., regression function including linear, quadratic, and exponential) to analyze the data to make inferences and to formulate, justify, and critique conclusions.	M(DSP)-12-1
	Grades: 11-12	M(DSP)-12-3 Organizes and displays one- and two- variable data using a variety of representations (e.g., box-and-whisker plots, scatter plots, bar graphs, line graphs, circle graphs, histograms, frequency charts, linear, quadratic, and exponential regression functions) to analyze the data to formulate or justify conclusions, make predictions, or to solve problems with or without using technology.	M(DSP)-12-3
	Grades: 11-12	M(DSP)-12-6 In response to a teacher or student generated question or hypothesis decides the most effective method (e.g., survey, observation, research, experimentation) and sampling techniques (e.g., random sample, stratified random sample) to collect the data necessary to answer the question; collects, organizes, and appropriately displays the data; analyzes the data to draw conclusions about the questions or hypotheses being tested while considering the limitations of the data that could effect interpretations; and when appropriate makes predications, asks new questions, or makes connections to real-world situations.	M(DSP)-12-6
	Grades: 11-12	M(F&A)-12-4 Demonstrates conceptual understanding of equality by solving equations and systems of equations or inequalities and interpreting the solutions algebraically and graphically; by factoring, completing the square, using the quadratic formula, and graphing quadratic functions to solve quadratic equations; solving and interpreting solutions of equations involving polynomial, rational, and radical expressions; analyzing the effect of simplifying radical or rational expressions on the solution set of equations involving such expressions. (e.g. $x^2/x = x$ for $x \neq 0$); finding approximate solutions to equations by graphing each side as a function using technology. [Understand that any equation in x can be interpreted as the equation $f(x) = g(x)$ and interpret the solutions of the equation as the x -value(s) of the intersection point(s) of the graphs of $y = f(x)$ and $y = g(x)$.]; solving 2x2 and 3x3 systems of linear equations and graphically interprets the solutions; solving systems of linear and quadratic inequalities; solving and graphically interpreting solutions systems of equations involving nonlinear expressions.	M(F&A)-12-4

Alignments of PSAT/NMSQT Skill Categories and State Standards

PSAT/NMSQT Skill Category and Description of Skills	Rhode Island Math: Grade Level and Grade Span Expectations 2006		
	Course/ Level	Standard	Standard ID
Reasoning Develop and use mathematical arguments and proofs to explore the truth of conjectures and justify conclusions.	Grades: 11-12	M(G&M)-12-2 Creates formal proofs of propositions (e.g. angles, lines, circles, distance, midpoint and polygons including triangle congruence and similarity).	M(G&M)-12-2
	Grades: 11-12	M(N&O)-12-8 Applies properties to determine whether a given subset of numbers is closed under a given arithmetic operation.	M(N&O)-12-8
	Advanced	M(DSP)-AM-3 Uses technology to explore the method of least squares and median-median for linear regression.	M(DSP)-AM-3
Representation Use and translate among representations including verbal, numerical, symbolic, and graphical to communicate mathematical ideas and solve problems.	Grades: 9-10	M(G&M)-10-10 Demonstrates conceptual understanding of spatial reasoning and visualization by sketching or using dynamic geometric software to generate three-dimensional objects from two-dimensional perspectives, or to generate two-dimensional perspectives from three-dimensional objects, or by solving related problems.	M(G&M)-10-10
	Advanced	M(G&M)-AM-2 Extends and deepens knowledge and usage of proofs and proof techniques; and uses geometric models to represent and distinguish between Euclidean and non-Euclidean Systems.	M(G&M)-AM-2

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.

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) report¹. 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.

¹ 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 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.