

Alignments of PSAT/NMSQT Skill Categories and State Standards

PSAT/NMSQT Skill Category and Description of Skills	Delaware Math: Grade Level Expectations 2006		
	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.	Grade 9	Explain slope as a rate of change between dependent and independent variables	2.1.1
	Grade 9	Understand and compare the graphs, tables, and equations within linear contexts that are direct variations (proportional) and those that are not	2.1.2
	Grade 9	Describe the effect of parameter changes on linear and exponential functions within a context, table, graph, and equation	2.1.3
	Grade 9	Compare linear with exponential functions using, the context, table, graph, or equation	2.1.4
	Grade 9	Demonstrate and apply recursive thinking to classify linear and exponential functions	2.1.5
	Grade 9	Use a variety of strategies to write expressions that generate the $n$ th term of arithmetic (linear) and geometric (exponential) patterns	2.1.6
	Grade 9	Model and solve real-world linear situations, including linear inequalities, using tables, graphs, and symbols	2.2.1
	Grade 9	Model and solve situations involving systems of equations with tables or graphs using technology	2.2.2
	Grade 9	Analyze data sets using technology to find an appropriate linear or exponential mathematical model	2.2.3
	Grade 9	Demonstrate a conceptual understanding of correlation	2.2.4
	Grade 9	Demonstrate an understanding of the difference between discrete and continuous data	2.2.5
	Grade 9	Analyze the interrelationship among the table, graph and equation of both linear and exponential functions paying particular attention to the meaning of intercept and slope in the context of the problem	2.2.6
	Grade 9	Determine if a given value is a solution to a given equation or inequality	2.2.7
	Grade 9	Make strategic selection of graphing calculator viewing window and scale to solve problems	2.2.8
	Grade 9	Determine symbolically the equation of a line given combinations of point, slope, and intercept information	2.3.1
	Grade 9	Convert between equivalent forms of linear functions	2.3.2

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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.	Grade 9	Solve single variable equations and inequalities algebraically	2.3.3
	Grade 10	Use linear, quadratic, and cubic functions to describe length, area, and volume relationships	2.1.1
	Grade 10	Describe and predict the effect of parameter changes on functions	2.1.2
	Grade 10	Compare linear with exponential and quadratic functions using the context, table, graph, or equation	2.1.3
	Grade 10	Use a variety of strategies to write expressions that generate the $n$ th term of linear, exponential, and quadratic functions	2.1.4
	Grade 10	Distinguish between situations involving direct and inverse variations	2.1.5
	Grade 10	Model and solve situations involving systems of equations and inequalities	2.2.1
	Grade 10	Determine the appropriateness of linear, exponential or quadratic models given a real-world situation	2.2.2
	Grade 10	Convert flexibly among relationships expressed in tables, graphs, and equations for exponential and quadratic functions	2.2.3
	Grade 10	Estimate solutions to exponential and quadratic function using tables and graphs	2.2.4
	Grade 10	Solve systems of linear equations and inequalities both algebraically and using technology	2.3.1
	Grade 11	Use rates of change to classify families of functions	2.1.1
	Grade 11	Describe how a change in one variable affects other variables in a multivariable situation	2.1.2
	Grade 11	Model constraints to solve linear programming problems	2.2.1
	Grade 11	Analyze linear, quadratic, exponential, periodic, trigonometric, or inverse relationships in graphs using best fit lines and curves (regression lines and curve fitting)	2.2.2
	Grade 11	Understand the relationship between the solution to a quadratic equation and its graph	2.2.3

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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.	Grade 11	Use functional notation to represent and evaluate functions	2.3.1
	Grade 11	Write equivalent symbolic forms of linear, quadratic, or exponential functions	2.3.2
	Grade 11	Use geometric models and/or algebraic symbols to multiply binomials and complete the square	2.3.3
	Grade 11	Use algebraic techniques to identify the vertex and intercepts for quadratic functions	2.3.4
	Grade 11	Apply the quadratic formula and/or factor to solve problems	2.3.5
	Grade 11	Use expressions or equations to describe arithmetic and geometric sequences (nth term) and series (using sigma notation) to represent the sum	2.3.6
	Grade 12	Apply and use an understanding of rates of change to solve real world problems involving applications of finance such as but not limited to, savings, compound interest, continuous interest, depreciation, loans, credit cards, mortgages, reading amortization tables, home buying, etc.	2.1.1
	Grade 12	Explore and analyze real world problem situations involving non-financial applications of rates	2.1.2
	Grade 12	Interpret maximum and minimum values of functions in problem situations	2.2.1
	Grade 12	Understand the relationship between the zeros (roots) of a polynomial function and its factors	2.2.2
	Grade 12	Use symbolic, numeric or graphical methods to solve systems of equations and/or inequalities involving linear and nonlinear contexts	2.3.1
	Grade 12	Solve everyday problems that can be modeled using polynomial rational, exponential, logarithmic, and/or step functions, absolute value and square roots	2.3.2
	<b>Communication</b> Express mathematical ideas precisely and communicate them coherently and clearly in the language and notation of mathematics.	Grade 9	Demonstrate an understanding of numbers as rational or irrational
Grade 9		Extend the "order of operations" to include absolute value	1.2.2
Grade 9		Explain slope as a rate of change between dependent and independent variables	2.1.1
Grade 9		Demonstrate and apply recursive thinking to classify linear and exponential functions	2.1.5

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<b>Communication</b> Express mathematical ideas precisely and communicate them coherently and clearly in the language and notation of mathematics.	Grade 9	Demonstrate a conceptual understanding of correlation	2.2.4
	Grade 9	Demonstrate an understanding of the difference between discrete and continuous data	2.2.5
	Grade 9	Classify 3-dimensional figures according to the shapes of their base(s) and faces	3.1.2
	Grade 9	Describe and explain how the validity of predictions are affected by number of trials, sample size, and the population	4.1.1
	Grade 9	Describe the effect of outliers in both one-variable and two-variable contexts	4.3.2
	Grade 9	Define a sample space to compare probabilities using the Fundamental Counting Principle	4.4.2
	Grade 10	Describe and predict the effect of parameter changes on functions	2.1.2
	Grade 10	Distinguish between situations involving direct and inverse variations	2.1.5
	Grade 10	Identify necessary and sufficient conditions that define parallelograms or triangles	3.1.2
	Grade 10	Demonstrate the effects of scaling on volume and surface area of three-dimensional solids	3.3.7
	Grade 11	Extend the development of the properties of numbers in the real number system	1.1.1
	Grade 11	Use rates of change to classify families of functions	2.1.1
	Grade 11	Describe how a change in one variable affects other variables in a multivariable situation	2.1.2
Grade 11	Use algebraic techniques to identify the vertex and intercepts for quadratic functions	2.3.4	
<b>Connections</b> Connect ideas from different areas of mathematics (particularly geometry and algebra) to state or solve abstract or applied problems.	Grade 9	Analyze the interrelationship among the table, graph and equation of both linear and exponential functions paying particular attention to the meaning of intercept and slope in the context of the problem	2.2.6
	Grade 10	Draw geometric figures in the coordinate plane and justify the properties of the figure (e.g., slope, side length)	3.2.3
	Grade 10	Develop and apply the distance and midpoint formulas	3.3.5

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<b>Connections</b> Connect ideas from different areas of mathematics (particularly geometry and algebra) to state or solve abstract or applied problems.	Grade 11	Recognize and use inverse operations to solve equations, powers, and their corresponding roots	1.2.4
	Grade 11	Recognize approximate norm distributions	4.3.3
<b>Data, Statistics, and Probability</b> Analyze data, understand descriptive statistics, make inferences and determine the likelihood that certain events will occur.	Grade 9	Describe and explain how the validity of predictions are affected by number of trials, sample size, and the population	4.1.1
	Grade 9	Select and interpret the most appropriate display for a given purpose and set(s) of data (e.g., histograms, parallel box plots, stem-and-leaf plots, scatter plots)	4.2.1
	Grade 9	Find an appropriate mathematical model of a linear or exponential function and use the model to make predictions recognizing the limitations of the model	4.2.2
	Grade 9	Analyze the validity of statistical conclusions on both one- and two-variable data	4.3.1
	Grade 9	Describe the effect of outliers in both one-variable and two-variable contexts	4.3.2
	Grade 9	Use and design simulations or experiments to determine probabilities of independent and dependent events	4.4.1
	Grade 9	Define a sample space to compare probabilities using the Fundamental Counting Principle	4.4.2
	Grade 9	Compare event experimental probability with theoretical probability (Law of Large Numbers)	4.4.3
	Grade 10	Use permutations and combinations as counting techniques	4.1.1
	Grade 10	N/A	4.2.1
	Grade 10	Recognize how linear transformations of one variable data affect shape, center, and spread	4.3.1
	Grade 10	Compute and interpret expected value	4.4.1
	Grade 10	Compute the probability of both independent and dependent events	4.4.2
	Grade 11	Understand the differences among the various kinds of studies (e.g., survey, controlled experiment)	4.1.1
	Grade 11	Determine factors which may affect the outcome of a survey	4.1.2

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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.	Grade 11	Interpret least squares regression line as the line that minimizes the sum of the squared errors	4.2.1
	Grade 11	Compute and use standard deviation to analyze data variability	4.3.1
	Grade 11	Apply benchmark percents described by the "empirical rule" (68%-95%-99.7% rule) in a normal distribution	4.3.2
	Grade 11	Recognize approximate norm distributions	4.3.3
	Grade 11	Understand and use the addition rule to calculate probabilities for mutually exclusive and non-mutually exclusive events	4.4.1
	Grade 12	Apply principles of data collection and experimental design that aim to minimize bias and variability of resulting data	4.1.1
	Grade 12	Apply and interpret z scores	4.2.1
	Grade 12	Interpret margin of error and confidence intervals	4.2.2
	Grade 12	Use discrete probability models such as the binomial model to represent real world phenomena	4.3.1
	Grade 12	Use conditional probabilities to solve problems from health, public policy, and other areas	4.4.1
Grade 12	Use the normal distribution to calculate probabilities	4.4.2	
<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.	Grade 9	Represent and verify parallel and perpendicular relationships in linear functions	3.1.1
	Grade 9	Classify 3-dimensional figures according to the shapes of their base(s) and faces	3.1.2
	Grade 9	Use properties of triangles and quadrilaterals to construct them in the coordinate plane	3.2.1
	Grade 9	Demonstrate an understanding of and apply formulas for area, surface area, and volume of geometric figures including pyramids, cones, spheres, and cylinders	3.3.1
	Grade 9	Solve problems which require an understanding of the Pythagorean Theorem relationships.	3.3.2

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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.	Grade 9	Compare the relationship between the volume of different shapes with the same base and height (e.g., cylinder and cone, prism and pyramid)	3.3.3
	Grade 10	Determine whether a triangle is a right triangle (e.g., Converse of Pythagorean Theorem, slopes of adjacent sides)	3.1.1
	Grade 10	Identify necessary and sufficient conditions that define parallelograms or triangles	3.1.2
	Grade 10	Justify whether two figures are similar or congruent	3.1.3
	Grade 10	Use and justify angle relationships created by intersecting and parallel lines	3.1.4
	Grade 10	Reason deductively to justify a conclusion or to create a counter-example	3.1.5
	Grade 10	Determine the results of multiple transformations and determine the transformations required to obtain the finished product from the original shape	3.2.1
	Grade 10	Use appropriate technologies to model geometric figures and to develop conjectures about them	3.2.2
	Grade 10	Draw geometric figures in the coordinate plane and justify the properties of the figure (e.g., slope, side length)	3.2.3
	Grade 10	Determine the impact of measurement and rounding error on subsequent computations	3.3.2
	Grade 10	Find missing dimensions of a shape given the area, volume, or surface area	3.3.3
	Grade 10	Apply the Pythagorean Theorem and its converse	3.3.4
	Grade 10	Develop and apply the distance and midpoint formulas	3.3.5
	Grade 10	Use partitioning and formulas to find the surface area and volume of complex shapes	3.3.6
	Grade 10	Demonstrate the effects of scaling on volume and surface area of three-dimensional solids	3.3.7
	Grade 11	Identify and apply the properties of circles as they relate to central angles, inscribed angles, and tangents	3.1.3
Grade 11	Stretch and shrink periodic functions by changing parameters	3.2.1	

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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.	Grade 11	Visualize three-dimensional objects from different perspectives	3.2.2
	Grade 11	Develop the conceptual understanding of a radian.	3.3.1
	Grade 11	Understand the relationship between degree measures and radian measures of benchmark angles such as 0°, 30°, 45°, 60°, 90°, and multiples of these angles	3.3.2
	Grade 12	Understand and use periodic functions to model real world phenomena	3.1.1
	Grade 12	Explore and use other coordinate systems to describe directions and location	3.2.1
	Grade 12	Use perspective, proportionality, and patterning to explore real world geometric applications	3.2.2
	Grade 12	Use indirect measurement to find missing lengths of geometric figures	3.3.1
	Grade 12	Use appropriate units to measure a given quantity	3.3.2
<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.	Grade 9	Demonstrate an understanding of numbers as rational or irrational	1.1.1
	Grade 9	Compare relative sizes of real numbers	1.1.2
	Grade 9	Estimate square roots	1.1.3
	Grade 9	Determine the appropriateness of an answer by using number sense or estimation	1.1.4
	Grade 9	Represent and operate with very large and very small numbers to include various representations of them	1.2.1
	Grade 9	Extend the "order of operations" to include absolute value	1.2.2
	Grade 9	Make generalizations about the effect of operations on rational numbers	1.2.3
	Grade 9	Use properties of the real number system to simplify expressions (Associative, Commutative, Identity, Inverse, and Distributive)	1.2.4
	Grade 10	Compare and contrast the properties of numbers in the real number system	1.1.1

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<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.	Grade 10	Determine the effect of using exact values or estimates for repeating decimals and irrational numbers (e.g. $\frac{2}{3}$ or .67, "pi" or 3.14) in a problem solving situation	1.1.2
	Grade 10	Simplify numeric and symbolic expressions involving absolute value, square roots, and exponents	1.1.3
	Grade 10	Solve problems that involve using inverse operations including powers and roots	1.2.2
	Grade 11	Extend the development of the properties of numbers in the real number system	1.1.1
	Grade 11	Simplify expressions with negative and fractional exponents	1.1.2
	Grade 11	Make generalizations about the effect of operations on real numbers	1.2.1
	Grade 11	Perform addition, subtraction, and multiplication on polynomial expressions	1.2.2
	Grade 11	Perform addition, subtraction, and multiplication on irrational expressions	1.2.3
	Grade 11	Recognize and use inverse operations to solve equations, powers, and their corresponding roots	1.2.4
	Grade 11	Analyze the reasonableness of computational strategies and the results	1.2.5
	Grade 12	Understand the magnitude of numbers that are encountered in the real world	1.1.2
	Grade 12	Select and use appropriate methods and tools for computing from among mental computation, estimation, calculators, paper and pencil, and computers according to the context and nature of the computation	1.2.1
<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.	Grade 9	Estimate square roots	1.1.3
	Grade 9	Use a variety of strategies to write expressions that generate the nth term of arithmetic (linear) and geometric (exponential) patterns	2.1.6
	Grade 9	Model and solve real-world linear situations, including linear inequalities, using tables, graphs, and symbols	2.2.1
	Grade 9	Model and solve situations involving systems of equations with tables or graphs using technology	2.2.2

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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.	Grade 9	Determine if a given value is a solution to a given equation or inequality	2.2.7
	Grade 9	Solve single variable equations and inequalities algebraically	2.3.3
	Grade 9	Solve problems which require an understanding of the Pythagorean Theorem relationships.	3.3.2
	Grade 9	Use and design simulations or experiments to determine probabilities of independent and dependent events	4.4.1
	Grade 10	Determine the effect of using exact values or estimates for repeating decimals and irrational numbers (e.g. $\frac{2}{3}$ or .67, "pi" or 3.14) in a problem solving situation	1.1.2
	Grade 10	Solve problems that involve using inverse operations including powers and roots	1.2.2
	Grade 10	Model and solve situations involving systems of equations and inequalities	2.2.1
	Grade 10	Estimate solutions to exponential and quadratic function using tables and graphs	2.2.4
	Grade 10	Solve systems of linear equations and inequalities both algebraically and using technology	2.3.1
	Grade 10	Determine the results of multiple transformations and determine the transformations required to obtain the finished product from the original shape	3.2.1
	Grade 10	Determine the impact of measurement and rounding error on subsequent computations	3.3.2
	Grade 10	Find missing dimensions of a shape given the area, volume, or surface area	3.3.3
	Grade 10	Use partitioning and formulas to find the surface area and volume of complex shapes	3.3.6
	Grade 10	Use permutations and combinations as counting techniques	4.1.1
	Grade 10	N/A	4.2.1
	Grade 10	Compute and interpret expected value	4.4.1
	Grade 10	Compute the probability of both independent and dependent events	4.4.2
Grade 11	Simplify expressions with negative and fractional exponents	1.1.2	

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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.	Grade 11	Make generalizations about the effect of operations on real numbers	1.2.1
	Grade 11	Perform addition, subtraction, and multiplication on polynomial expressions	1.2.2
	Grade 11	Perform addition, subtraction, and multiplication on irrational expressions	1.2.3
	Grade 11	Model constraints to solve linear programming problems	2.2.1
	Grade 11	Use functional notation to represent and evaluate functions	2.3.1
	Grade 11	Use geometric models and/or algebraic symbols to multiply binomials and complete the square	2.3.3
	Grade 11	Apply the quadratic formula and/or factor to solve problems	2.3.5
	Grade 11	Stretch and shrink periodic functions by changing parameters	3.2.1
	Grade 11	Compute and use standard deviation to analyze data variability	4.3.1
	Grade 11	Understand and use the addition rule to calculate probabilities for mutually exclusive and non-mutually exclusive events	4.4.1
	Grade 12	Select and use appropriate methods and tools for computing from among mental computation, estimation, calculators, paper and pencil, and computers according to the context and nature of the computation	1.2.1
	Grade 12	Apply and use an understanding of rates of change to solve real world problems involving applications of finance such as but not limited to, savings, compound interest, continuous interest, depreciation, loans, credit cards, mortgages, reading amortization tables, home buying, etc.	2.1.1
	Grade 12	Use symbolic, numeric or graphical methods to solve systems of equations and/or inequalities involving linear and nonlinear contexts	2.3.1
	Grade 12	Solve everyday problems that can be modeled using polynomial rational, exponential, logarithmic, and/or step functions, absolute value and square roots	2.3.2
	Grade 12	Use indirect measurement to find missing lengths of geometric figures	3.3.1
	Grade 12	Use appropriate units to measure a given quantity	3.3.2

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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.	Grade 12	Use conditional probabilities to solve problems from health, public policy, and other areas	4.4.1
	Grade 12	Use the normal distribution to calculate probabilities	4.4.2
<b>Reasoning</b> Develop and use mathematical arguments and proofs to explore the truth of conjectures and justify conclusions.	Grade 9	Compare relative sizes of real numbers	1.1.2
	Grade 9	Determine the appropriateness of an answer by using number sense or estimation	1.1.4
	Grade 9	Make generalizations about the effect of operations on rational numbers	1.2.3
	Grade 9	Understand and compare the graphs, tables, and equations within linear contexts that are direct variations (proportional) and those that are not	2.1.2
	Grade 9	Describe the effect of parameter changes on linear and exponential functions within a context, table, graph, and equation	2.1.3
	Grade 9	Compare linear with exponential functions using, the context, table, graph, or equation	2.1.4
	Grade 9	Make strategic selection of graphing calculator viewing window and scale to solve problems	2.2.8
	Grade 9	Demonstrate an understanding of and apply formulas for area, surface area, and volume of geometric figures including pyramids, cones, spheres, and cylinders	3.3.1
	Grade 9	Compare the relationship between the volume of different shapes with the same base and height (e.g., cylinder and cone, prism and pyramid)	3.3.3
	Grade 9	Select and interpret the most appropriate display for a given purpose and set(s) of data (e.g., histograms, parallel box plots, stem-and-leaf plots, scatter plots)	4.2.1
	Grade 9	Analyze the validity of statistical conclusions on both one- and two-variable data	4.3.1
	Grade 9	Compare event experimental probability with theoretical probability (Law of Large Numbers)	4.4.3
	Grade 10	Compare and contrast the properties of numbers in the real number system	1.1.1
Grade 10	Compare linear with exponential and quadratic functions using the context, table, graph, or equation	2.1.3	

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<b>Reasoning</b> Develop and use mathematical arguments and proofs to explore the truth of conjectures and justify conclusions.	Grade 10	Determine the appropriateness of linear, exponential or quadratic models given a real-world situation	2.2.2
	Grade 10	Determine whether a triangle is a right triangle (e.g., Converse of Pythagorean Theorem, slopes of adjacent sides)	3.1.1
	Grade 10	Justify whether two figures are similar or congruent	3.1.3
	Grade 10	Use and justify angle relationships created by intersecting and parallel lines	3.1.4
	Grade 10	Reason deductively to justify a conclusion or to create a counter-example	3.1.5
	Grade 10	Use appropriate technologies to model geometric figures and to develop conjectures about them	3.2.2
	Grade 10	Apply the Pythagorean Theorem and its converse	3.3.4
	Grade 10	Recognize how linear transformations of one variable data affect shape, center, and spread	4.3.1
	Grade 11	Analyze the reasonableness of computational strategies and the results	1.2.5
	Grade 11	Analyze linear, quadratic, exponential, periodic, trigonometric, or inverse relationships in graphs using best fit lines and curves (regression lines and curve fitting)	2.2.2
	Grade 11	Understand the relationship between the solution to a quadratic equation and its graph	2.2.3
	Grade 11	Identify and apply the properties of circles as they relate to central angles, inscribed angles, and tangents	3.1.3
	Grade 11	Develop the conceptual understanding of a radian.	3.3.1
	Grade 11	Understand the relationship between degree measures and radian measures of benchmark angles such as 0°, 30°, 45°, 60°, 90°, and multiples of these angles	3.3.2
	Grade 11	Understand the differences among the various kinds of studies (e.g., survey, controlled experiment)	4.1.1
	Grade 11	Determine factors which may affect the outcome of a survey	4.1.2

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<b>Reasoning</b> Develop and use mathematical arguments and proofs to explore the truth of conjectures and justify conclusions.	Grade 11	Interpret least squares regression line as the line that minimizes the sum of the squared errors	4.2.1
	Grade 11	Apply benchmark percents described by the "empirical rule" (68%-95%-99.7% rule) in a normal distribution	4.3.2
	Grade 12	Understand the magnitude of numbers that are encountered in the real world	1.1.2
	Grade 12	Explore and analyze real world problem situations involving non-financial applications of rates	2.1.2
	Grade 12	Interpret maximum and minimum values of functions in problem situations	2.2.1
	Grade 12	Understand the relationship between the zeros (roots) of a polynomial function and its factors	2.2.2
	Grade 12	Understand and use periodic functions to model real world phenomena	3.1.1
	Grade 12	Explore and use other coordinate systems to describe directions and location	3.2.1
	Grade 12	Use perspective, proportionality, and patterning to explore real world geometric applications	3.2.2
	Grade 12	Apply principles of data collection and experimental design that aim to minimize bias and variability of resulting data	4.1.1
	Grade 12	Apply and interpret z scores	4.2.1
	Grade 12	Interpret margin of error and confidence intervals	4.2.2
<b>Representation</b> Use and translate among representations including verbal, numerical, symbolic and graphical to communicate mathematical ideas and solve problems.	Grade 9	Represent and operate with very large and very small numbers to include various representations of them	1.2.1
	Grade 9	Use properties of the real number system to simplify expressions (Associative, Commutative, Identity, Inverse, and Distributive)	1.2.4
	Grade 9	Analyze data sets using technology to find an appropriate linear or exponential mathematical model	2.2.3
	Grade 9	Determine symbolically the equation of a line given combinations of point, slope, and intercept information	2.3.1

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<b>Representation</b>	Grade 9	Convert between equivalent forms of linear functions	2.3.2
Use and translate among representations including verbal, numerical, symbolic and graphical to communicate mathematical ideas and solve problems.	Grade 9	Represent and verify parallel and perpendicular relationships in linear functions	3.1.1
	Grade 9	Use properties of triangles and quadrilaterals to construct them in the coordinate plane	3.2.1
	Grade 9	Find an appropriate mathematical model of a linear or exponential function and use the model to make predictions recognizing the limitations of the model	4.2.2
	Grade 10	Simplify numeric and symbolic expressions involving absolute value, square roots, and exponents	1.1.3
	Grade 10	Use linear, quadratic, and cubic functions to describe length, area, and volume relationships	2.1.1
	Grade 10	Use a variety of strategies to write expressions that generate the $n$ th term of linear, exponential, and quadratic functions	2.1.4
	Grade 10	Convert flexibly among relationships expressed in tables, graphs, and equations for exponential and quadratic functions	2.2.3
	Grade 11	Write equivalent symbolic forms of linear, quadratic, or exponential functions	2.3.2
	Grade 11	Use expressions or equations to describe arithmetic and geometric sequences ( $n$ th term) and series (using sigma notation) to represent the sum	2.3.6
	Grade 11	Visualize three-dimensional objects from different perspectives	3.2.2
	Grade 12	Use discrete probability models such as the binomial model to represent real world phenomena	4.3.1

# 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.