

Alignments of PSAT/NMSQT Skill Categories and State Standards

PSAT/NMSQT Skill Category and Description of Skills	New Jersey Math: Core Curriculum Content Standards 2002		
	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: 9-12	1. Extend understanding and use of operations to real numbers and algebraic procedures.	4.1.12 B.1
	Grades: 9-12	2. Develop, apply, and explain methods for solving problems involving rational and negative exponents.	4.1.12 B.2
	Grades: 9-12	4. Understand and apply the laws of exponents to simplify expressions involving numbers raised to powers.	4.1.12 B.4
	Grades: 9-12	1. Use models and algebraic formulas to represent and analyze sequences and series. Explicit formulas for nth terms	4.3.12 A.1.a
	Grades: 9-12	1. Use models and algebraic formulas to represent and analyze sequences and series. Sums of finite arithmetic series	4.3.12 A.1.b
	Grades: 9-12	1. Use models and algebraic formulas to represent and analyze sequences and series. Sums of finite and infinite geometric series	4.3.12 A.1.c
	Grades: 9-12	2. Develop an informal notion of limit.	4.3.12 A.2
	Grades: 9-12	3. Use inductive reasoning to form generalizations.	4.3.12 A.3
	Grades: 9-12	1. Understand relations and functions and select, convert flexibly among, and use various representations for them, including equations or inequalities, tables, and graphs.	4.3.12 B.1
	Grades: 9-12	2. Analyze and explain the general properties and behavior of functions of one variable, using appropriate graphing technologies. Slope of a line or curve	4.3.12 B.2.a
	Grades: 9-12	2. Analyze and explain the general properties and behavior of functions of one variable, using appropriate graphing technologies. Domain and range	4.3.12 B.2.b
	Grades: 9-12	2. Analyze and explain the general properties and behavior of functions of one variable, using appropriate graphing technologies. Intercepts	4.3.12 B.2.c

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Algebra and Functions Solve problems using algebraic expressions and symbols to represent relationships, patterns and functions of different types.	Grades: 9-12	2. Analyze and explain the general properties and behavior of functions of one variable, using appropriate graphing technologies. Continuity	4.3.12 B.2.d
	Grades: 9-12	2. Analyze and explain the general properties and behavior of functions of one variable, using appropriate graphing technologies. Maximum/minimum	4.3.12 B.2.e
	Grades: 9-12	2. Analyze and explain the general properties and behavior of functions of one variable, using appropriate graphing technologies. Estimating roots of equations	4.3.12 B.2.f
	Grades: 9-12	2. Analyze and explain the general properties and behavior of functions of one variable, using appropriate graphing technologies. Intersecting points as solutions of systems of equations	4.3.12 B.2.g
	Grades: 9-12	2. Analyze and explain the general properties and behavior of functions of one variable, using appropriate graphing technologies. Rates of change	4.3.12 B.2.h
	Grades: 9-12	3. Understand and perform transformations on commonly-used functions. Translations, reflections, dilations	4.3.12 B.3.a
	Grades: 9-12	3. Understand and perform transformations on commonly-used functions. Effects on linear and quadratic graphs of parameter changes in equations	4.3.12 B.3.b
	Grades: 9-12	3. Understand and perform transformations on commonly-used functions. Using graphing calculators or computers for more complex functions	4.3.12 B.3.c
	Grades: 9-12	4. Understand and compare the properties of classes of functions, including exponential, polynomial, rational, and trigonometric functions. Linear vs. non-linear	4.3.12 B.4.a

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Algebra and Functions Solve problems using algebraic expressions and symbols to represent relationships, patterns and functions of different types.	Grades: 9-12	4. Understand and compare the properties of classes of functions, including exponential, polynomial, rational, and trigonometric functions. Symmetry	4.3.12 B.4.b
	Grades: 9-12	4. Understand and compare the properties of classes of functions, including exponential, polynomial, rational, and trigonometric functions. Increasing/decreasing on an interval	4.3.12 B.4.c
	Grades: 9-12	1. Use functions to model real-world phenomena and solve problems that involve varying quantities. Linear, quadratic, exponential, periodic (sine and cosine), and step functions (e.g., price of mailing a first-class letter over the past 200 years)	4.3.12 C.1.a
	Grades: 9-12	1. Use functions to model real-world phenomena and solve problems that involve varying quantities. Direct and inverse variation	4.3.12 C.1.b
	Grades: 9-12	1. Use functions to model real-world phenomena and solve problems that involve varying quantities. Absolute value	4.3.12 C.1.c
	Grades: 9-12	1. Use functions to model real-world phenomena and solve problems that involve varying quantities. Expressions, equations and inequalities	4.3.12 C.1.d
	Grades: 9-12	1. Use functions to model real-world phenomena and solve problems that involve varying quantities. Same function can model variety of phenomena	4.3.12 C.1.e
	Grades: 9-12	1. Use functions to model real-world phenomena and solve problems that involve varying quantities. Growth/decay and change in the natural world	4.3.12 C.1.f
	Grades: 9-12	1. Use functions to model real-world phenomena and solve problems that involve varying quantities. Applications in mathematics, biology, and economics (including compound interest)	4.3.12 C.1.g

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	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: 9-12	2. Analyze and describe how a change in an independent variable leads to change in a dependent one.	4.3.12 C.2
	Grades: 9-12	3. Convert recursive formulas to linear or exponential functions (e.g., Tower of Hanoi and doubling).	4.3.12 C.3
	Grades: 9-12	1. Evaluate and simplify expressions. Add and subtract polynomials	4.3.12 D.1.a
	Grades: 9-12	1. Evaluate and simplify expressions. Multiply a polynomial by a monomial or binomial	4.3.12 D.1.b
	Grades: 9-12	1. Evaluate and simplify expressions. Divide a polynomial by a monomial	4.3.12 D.1.c
	Grades: 9-12	2. Select and use appropriate methods to solve equations and inequalities. Linear equations - algebraically	4.3.12 D.2.a
	Grades: 9-12	2. Select and use appropriate methods to solve equations and inequalities. Quadratic equations - factoring (when the coefficient of x^2 is 1) and using the quadratic formula	4.3.12 D.2.b
	Grades: 9-12	2. Select and use appropriate methods to solve equations and inequalities. All types of equations using graphing, computer, and graphing calculator techniques	4.3.12 D.2.c
	Grades: 9-12	3. Judge the meaning, utility, and reasonableness of the results of symbol manipulations, including those carried out by technology.	4.3.12 D.3
	Grades: 9-12	2. Develop, apply, and explain methods for solving problems involving rational and negative exponents.	4.1.12 B.2
	Grades: 9-12	3. Apply the properties of geometric shapes. Parallel lines - transversal, alternate interior angles, corresponding angles	4.2.12 A.3.a

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	Course/ Level	Standard	Standard ID
Communication Express mathematical ideas precisely and communicate them coherently and clearly in the language and notation of mathematics.	Grades: 9-12	3. Apply the properties of geometric shapes. Triangles a. Conditions for congruence	4.2.12 A.3.b.a1
	Grades: 9-12	3. Apply the properties of geometric shapes. Triangles b. Segment joining midpoints of two sides is parallel to and half the length of the third side	4.2.12 A.3.b.b2
	Grades: 9-12	3. Apply the properties of geometric shapes. Triangles c. Triangle Inequality	4.2.12 A.3.b.c3
	Grades: 9-12	3. Apply the properties of geometric shapes. Minimal conditions for a shape to be a special quadrilateral	4.2.12 A.3.c
	Grades: 9-12	3. Apply the properties of geometric shapes. Circles - arcs, central and inscribed angles, chords, tangents	4.2.12 A.3.d
	Grades: 9-12	3. Apply the properties of geometric shapes. Self-similarity	4.2.12 A.3.e
	Grades: 9-12	1. Determine, describe, and draw the effect of a transformation, or a sequence of transformations, on a geometric or algebraic object, and, conversely, determine whether and how one object can be transformed to another by a transformation or a sequence of transformations.	4.2.12 B.1
	Grades: 9-12	1. Use coordinate geometry to represent and verify properties of lines. Distance between two points	4.2.12 C.1.a
	Grades: 9-12	1. Use coordinate geometry to represent and verify properties of lines. Midpoint and slope of a line segment	4.2.12 C.1.b

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Skill Category and Description of Skills	Course/ Level	Standard	Standard ID
Communication Express mathematical ideas precisely and communicate them coherently and clearly in the language and notation of mathematics.	Grades: 9-12	1. Use coordinate geometry to represent and verify properties of lines. Finding the intersection of two lines	4.2.12 C.1.c
	Grades: 9-12	1. Understand and use the concept of significant digits.	4.2.12 D.1
	Grades: 9-12	2. Analyze and describe how a change in an independent variable leads to change in a dependent one.	4.3.12 C.2
	Grades: 9-12	1. Use surveys and sampling techniques to generate data and draw conclusions about large groups. Advantages/disadvantages of sample selection methods (e.g., convenience sampling, responses to survey, random sampling)	4.4.12 A.1.a
	Grades: 9-12	2. Evaluate the use of data in real-world contexts. Statistical claims based on sampling	4.4.12 A.2.c
	Grades: 9-12	3. Design a statistical experiment, conduct the experiment, and interpret and communicate the outcome.	4.4.12 A.3
	Grades: 9-12	2. Apply the multiplication rule of counting in complex situations, recognize the difference between situations with replacement and without replacement, and recognize the difference between ordered and unordered counting situations.	4.4.12 C.2
	Grades: 9-12	1. Use communication to organize and clarify their mathematical thinking. Reading and writing	4.5.12 B.1.a
	Grades: 9-12	1. Use communication to organize and clarify their mathematical thinking. Discussion, listening, and questioning	4.5.12 B.1.b
	Grades: 9-12	2. Communicate mathematical thinking coherently and clearly to peers, teachers, and others, both orally and in writing.	4.5.12 B.2
	Grades: 9-12	3. Analyze and evaluate the mathematical thinking and strategies of others.	4.5.12 B.3
	Grades: 9-12	4. Use the language of mathematics to express mathematical ideas precisely.	4.5.12 B.4

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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>	Grades: 9-12	2. Recognize three-dimensional figures obtained through transformations of two-dimensional figures (e.g., cone as rotating an isosceles triangle about an altitude), using software as an aid to visualization.	4.2.12 B.2
	Grades: 9-12	1. Use coordinate geometry to represent and verify properties of lines.	4.2.12 C.1.d
		Lines with the same slope are parallel	
	Grades: 9-12	1. Use coordinate geometry to represent and verify properties of lines.	4.2.12 C.1.e
		Lines that are perpendicular have slopes whose product is -1	
	Grades: 9-12	3. Understand and perform transformations on commonly-used functions.	4.3.12 B.3.c
		Using graphing calculators or computers for more complex functions	
	Grades: 9-12	1. Use functions to model real-world phenomena and solve problems that involve varying quantities.	4.3.12 C.1.g
		Applications in mathematics, biology, and economics (including compound interest)	
	Grades: 9-12	1. Recognize recurring themes across mathematical domains (e.g., patterns in number, algebra, and geometry).	4.5.12 C.1
Grades: 9-12	2. Use connections among mathematical ideas to explain concepts (e.g., two linear equations have a unique solution because the lines they represent intersect at a single point).	4.5.12 C.2	
Grades: 9-12	3. Recognize that mathematics is used in a variety of contexts outside of mathematics.	4.5.12 C.3	
Grades: 9-12	4. Apply mathematics in practical situations and in other disciplines.	4.5.12 C.4	
Grades: 9-12	5. Trace the development of mathematical concepts over time and across cultures (cf. world languages and social studies standards).	4.5.12 C.5	

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Data, Statistics, and Probability Analyze data, understand descriptive statistics, make inferences and determine the likelihood that certain events will occur.	Grades: 9-12	1. Use surveys and sampling techniques to generate data and draw conclusions about large groups. Advantages/disadvantages of sample selection methods (e.g., convenience sampling, responses to survey, random sampling)	4.4.12 A.1.a
	Grades: 9-12	2. Evaluate the use of data in real-world contexts. Accuracy and reasonableness of conclusions drawn	4.4.12 A.2.a
	Grades: 9-12	2. Evaluate the use of data in real-world contexts. Bias in conclusions drawn (e.g., influence of how data is displayed)	4.4.12 A.2.b
	Grades: 9-12	2. Evaluate the use of data in real-world contexts. Statistical claims based on sampling	4.4.12 A.2.c
	Grades: 9-12	3. Design a statistical experiment, conduct the experiment, and interpret and communicate the outcome.	4.4.12 A.3
	Grades: 9-12	4. Estimate or determine lines of best fit (or curves of best fit if appropriate) with technology, and use them to interpolate within the range of the data.	4.4.12 A.4
	Grades: 9-12	5. Analyze data using technology, and use statistical terminology to describe conclusions. Measures of dispersion: variance, standard deviation, outliers	4.4.12 A.5.a
	Grades: 9-12	1. Calculate the expected value of a probability-based game, given the probabilities and payoffs of the various outcomes, and determine whether the game is fair.	4.4.12 B.1
	Grades: 9-12	2. Use concepts and formulas of area to calculate geometric probabilities.	4.4.12 B.2
	Grades: 9-12	3. Model situations involving probability with simulations (using spinners, dice, calculators and computers) and theoretical models, and solve problems using these models.	4.4.12 B.3

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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: 9-12	4. Determine probabilities in complex situations. Conditional events	4.4.12 B.4.a
	Grades: 9-12	4. Determine probabilities in complex situations. Complementary events	4.4.12 B.4.b
	Grades: 9-12	4. Determine probabilities in complex situations. Dependent and independent events	4.4.12 B.4.c
	Grades: 9-12	5. Estimate probabilities and make predictions based on experimental and theoretical probabilities.	4.4.12 B.5
	Grades: 9-12	6. Understand and use the "law of large numbers" (that experimental results tend to approach theoretical probabilities after a large number of trials).	4.4.12 B.6
	Grades: 9-12	1. Calculate combinations with replacement (e.g., the number of possible ways of tossing a coin 5 times and getting 3 heads) and without replacement (e.g., number of possible delegations of 3 out of 23 students).	4.4.12 C.1
	Grades: 9-12	2. Apply the multiplication rule of counting in complex situations, recognize the difference between situations with replacement and without replacement, and recognize the difference between ordered and unordered counting situations.	4.4.12 C.2
	Grades: 9-12	3. Justify solutions to counting problems.	4.4.12 C.3
	Grades: 9-12	4. Recognize and explain relationships involving combinations and Pascal's Triangle, and apply those methods to situations involving probability.	4.4.12 C.4
	Grades: 9-12	2. Explore strategies for making fair decisions. Combining individual preferences into a group decision (e.g., determining winner of an election or selection process)	4.4.12 D.2.a
Grades: 9-12	2. Explore strategies for making fair decisions. Determining how many Student Council representatives each class (9th, 10th, 11th, and 12th grade) gets when the classes have unequal sizes (apportionment)	4.4.12 D.2.b	

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	Course/ Level	Standard	Standard ID
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: 9-12	1. Use geometric models to represent real-world situations and objects and to solve problems using those models (e.g., use Pythagorean Theorem to decide whether an object can fit through a doorway).	4.2.12 A.1
	Grades: 9-12	2. Draw perspective views of 3D objects on isometric dot paper, given 2D representations (e.g., nets or projective views).	4.2.12 A.2
	Grades: 9-12	3. Apply the properties of geometric shapes. Parallel lines - transversal, alternate interior angles, corresponding angles	4.2.12 A.3.a
	Grades: 9-12	3. Apply the properties of geometric shapes. Triangles a. Conditions for congruence	4.2.12 A.3.b.a1
	Grades: 9-12	3. Apply the properties of geometric shapes. Triangles b. Segment joining midpoints of two sides is parallel to and half the length of the third side	4.2.12 A.3.b.b2
	Grades: 9-12	3. Apply the properties of geometric shapes. Triangles c. Triangle Inequality	4.2.12 A.3.b.c3
	Grades: 9-12	3. Apply the properties of geometric shapes. Minimal conditions for a shape to be a special quadrilateral	4.2.12 A.3.c

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	Course/ Level	Standard	Standard ID
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: 9-12	3. Apply the properties of geometric shapes. Circles - arcs, central and inscribed angles, chords, tangents	4.2.12 A.3.d
	Grades: 9-12	3. Apply the properties of geometric shapes. Self-similarity	4.2.12 A.3.e
	Grades: 9-12	4. Use reasoning and some form of proof to verify or refute conjectures and theorems. Verification or refutation of proposed proofs	4.2.12 A.4.a
	Grades: 9-12	4. Use reasoning and some form of proof to verify or refute conjectures and theorems. Simple proofs involving congruent triangles	4.2.12 A.4.b
	Grades: 9-12	4. Use reasoning and some form of proof to verify or refute conjectures and theorems. Counterexamples to incorrect conjectures	4.2.12 A.4.c
	Grades: 9-12	1. Determine, describe, and draw the effect of a transformation, or a sequence of transformations, on a geometric or algebraic object, and, conversely, determine whether and how one object can be transformed to another by a transformation or a sequence of transformations.	4.2.12 B.1
	Grades: 9-12	2. Recognize three-dimensional figures obtained through transformations of two-dimensional figures (e.g., cone as rotating an isosceles triangle about an altitude), using software as an aid to visualization.	4.2.12 B.2
	Grades: 9-12	3. Determine whether two or more given shapes can be used to generate a tessellation.	4.2.12 B.3
	Grades: 9-12	4. Generate and analyze iterative geometric patterns. Fractals (e.g., Sierpinski's Triangle)	4.2.12 B.4.a

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	Course/ Level	Standard	Standard ID
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: 9-12	4. Generate and analyze iterative geometric patterns. Patterns in areas and perimeters of self-similar figures	4.2.12 B.4.b
	Grades: 9-12	4. Generate and analyze iterative geometric patterns. Outcome of extending iterative process indefinitely	4.2.12 B.4.c
	Grades: 9-12	1. Use coordinate geometry to represent and verify properties of lines. Distance between two points	4.2.12 C.1.a
	Grades: 9-12	1. Use coordinate geometry to represent and verify properties of lines. Midpoint and slope of a line segment	4.2.12 C.1.b
	Grades: 9-12	1. Use coordinate geometry to represent and verify properties of lines. Finding the intersection of two lines	4.2.12 C.1.c
	Grades: 9-12	1. Use coordinate geometry to represent and verify properties of lines. Lines with the same slope are parallel	4.2.12 C.1.d
	Grades: 9-12	1. Use coordinate geometry to represent and verify properties of lines. Lines that are perpendicular have slopes whose product is -1	4.2.12 C.1.e
	Grades: 9-12	1. Understand and use the concept of significant digits.	4.2.12 D.1

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	Course/ Level	Standard	Standard ID
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: 9-12	2. Choose appropriate tools and techniques to achieve the specified degree of precision and error needed in a situation. Degree of accuracy of a given measurement tool	4.2.12 D.2.a
	Grades: 9-12	2. Choose appropriate tools and techniques to achieve the specified degree of precision and error needed in a situation. Finding the interval in which a computed measure (e.g., area or volume) lies, given the degree of precision of linear measurements	4.2.12 D.2.b
	Grades: 9-12	1. Use techniques of indirect measurement to represent and solve problems. Similar triangles	4.2.12 E.1.a
	Grades: 9-12	1. Use techniques of indirect measurement to represent and solve problems. Pythagorean theorem	4.2.12 E.1.b
	Grades: 9-12	2. Use a variety of strategies to determine perimeter and area of plane figures and surface area and volume of 3D figures. Approximation of area using grids of different sizes	4.2.12 E.2.a
	Grades: 9-12	2. Use a variety of strategies to determine perimeter and area of plane figures and surface area and volume of 3D figures. Finding which shape has minimal (or maximal) area, perimeter, volume, or surface area under given conditions using graphing calculators, dynamic geometric software, and/or spreadsheets	4.2.12 E.2.b

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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>	Grades: 9-12	<p>2. Use a variety of strategies to determine perimeter and area of plane figures and surface area and volume of 3D figures.</p> <p>Estimation of area, perimeter, volume, and surface area</p>	4.2.12 E.2.c
<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: 9-12	1. Extend understanding of the number system to all real numbers.	4.1.12 A.1
	Grades: 9-12	2. Compare and order rational and irrational numbers.	4.1.12 A.2
	Grades: 9-12	3. Develop conjectures and informal proofs of properties of number systems and sets of numbers.	4.1.12 A.3
	Grades: 9-12	1. Recognize the limitations of estimation, assess the amount of error resulting from estimation, and determine whether the error is within acceptable tolerance limits.	4.1.12 C.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: 9-12	2. Compare and order rational and irrational numbers.	4.1.12 A.2
	Grades: 9-12	4. Understand and apply the laws of exponents to simplify expressions involving numbers raised to powers.	4.1.12 B.4
	Grades: 9-12	1. Use geometric models to represent real-world situations and objects and to solve problems using those models (e.g., use Pythagorean Theorem to decide whether an object can fit through a doorway).	4.2.12 A.1
	Grades: 9-12	4. Generate and analyze iterative geometric patterns.	4.2.12 B.4.a
		Fractals (e.g., Sierpinski's Triangle)	
	Grades: 9-12	4. Generate and analyze iterative geometric patterns.	4.2.12 B.4.b
	Patterns in areas and perimeters of self-similar figures		

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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: 9-12	<p>2. Choose appropriate tools and techniques to achieve the specified degree of precision and error needed in a situation.</p> <p>Finding the interval in which a computed measure (e.g., area or volume) lies, given the degree of precision of linear measurements</p>	4.2.12 D.2.b
	Grades: 9-12	<p>1. Use techniques of indirect measurement to represent and solve problems.</p> <p>Similar triangles</p>	4.2.12 E.1.a
	Grades: 9-12	<p>1. Use techniques of indirect measurement to represent and solve problems.</p> <p>Pythagorean theorem</p>	4.2.12 E.1.b
	Grades: 9-12	<p>2. Use a variety of strategies to determine perimeter and area of plane figures and surface area and volume of 3D figures.</p> <p>Approximation of area using grids of different sizes</p>	4.2.12 E.2.a
	Grades: 9-12	<p>2. Use a variety of strategies to determine perimeter and area of plane figures and surface area and volume of 3D figures.</p> <p>Finding which shape has minimal (or maximal) area, perimeter, volume, or surface area under given conditions using graphing calculators, dynamic geometric software, and/or spreadsheets</p>	4.2.12 E.2.b
	Grades: 9-12	<p>2. Use a variety of strategies to determine perimeter and area of plane figures and surface area and volume of 3D figures.</p> <p>Estimation of area, perimeter, volume, and surface area</p>	4.2.12 E.2.c
	Grades: 9-12	<p>3. Understand and perform transformations on commonly-used functions.</p> <p>Translations, reflections, dilations</p>	4.3.12 B.3.a

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Problem Solving Solve abstract and practical problems, applying and adapting a variety of strategies. Monitor progress and evaluate answers in terms of questions asked.	Grades: 9-12	1. Use functions to model real-world phenomena and solve problems that involve varying quantities. Linear, quadratic, exponential, periodic (sine and cosine), and step functions (e.g., price of mailing a first-class letter over the past 200 years)	4.3.12 C.1.a
	Grades: 9-12	1. Use functions to model real-world phenomena and solve problems that involve varying quantities. Direct and inverse variation	4.3.12 C.1.b
	Grades: 9-12	1. Use functions to model real-world phenomena and solve problems that involve varying quantities. Absolute value	4.3.12 C.1.c
	Grades: 9-12	1. Use functions to model real-world phenomena and solve problems that involve varying quantities. Expressions, equations and inequalities	4.3.12 C.1.d
	Grades: 9-12	1. Use functions to model real-world phenomena and solve problems that involve varying quantities. Same function can model variety of phenomena	4.3.12 C.1.e
	Grades: 9-12	1. Use functions to model real-world phenomena and solve problems that involve varying quantities. Growth/decay and change in the natural world	4.3.12 C.1.f
	Grades: 9-12	1. Evaluate and simplify expressions. Add and subtract polynomials	4.3.12 D.1.a

Alignments of PSAT/NMSQT Skill Categories and State Standards

PSAT/NMSQT	New Jersey Math: Core Curriculum Content Standards 2002		
Skill Category and Description of Skills	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: 9-12	1. Evaluate and simplify expressions.	4.3.12 D.1.b
		Multiply a polynomial by a monomial or binomial	
	Grades: 9-12	1. Evaluate and simplify expressions.	4.3.12 D.1.c
		Divide a polynomial by a monomial	
	Grades: 9-12	2. Select and use appropriate methods to solve equations and inequalities.	4.3.12 D.2.a
		Linear equations - algebraically	
	Grades: 9-12	2. Select and use appropriate methods to solve equations and inequalities.	4.3.12 D.2.b
		Quadratic equations - factoring (when the coefficient of x^2 is 1) and using the quadratic formula	
	Grades: 9-12	2. Select and use appropriate methods to solve equations and inequalities.	4.3.12 D.2.c
		All types of equations using graphing, computer, and graphing calculator techniques	
Grades: 9-12	3. Judge the meaning, utility, and reasonableness of the results of symbol manipulations, including those carried out by technology.	4.3.12 D.3	
Grades: 9-12	4. Estimate or determine lines of best fit (or curves of best fit if appropriate) with technology, and use them to interpolate within the range of the data.	4.4.12 A.4	
Grades: 9-12	1. Calculate the expected value of a probability-based game, given the probabilities and payoffs of the various outcomes, and determine whether the game is fair.	4.4.12 B.1	
Grades: 9-12	2. Use concepts and formulas of area to calculate geometric probabilities.	4.4.12 B.2	
Grades: 9-12	3. Model situations involving probability with simulations (using spinners, dice, calculators and computers) and theoretical models, and solve problems using these models.	4.4.12 B.3	

Alignments of PSAT/NMSQT Skill Categories and State Standards

PSAT/NMSQT Skill Category and Description of Skills	New Jersey Math: Core Curriculum Content Standards 2002		
	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.	Grades: 9-12	4. Determine probabilities in complex situations. Conditional events	4.4.12 B.4.a
	Grades: 9-12	4. Determine probabilities in complex situations. Complementary events	4.4.12 B.4.b
	Grades: 9-12	4. Determine probabilities in complex situations. Dependent and independent events	4.4.12 B.4.c
	Grades: 9-12	1. Calculate combinations with replacement (e.g., the number of possible ways of tossing a coin 5 times and getting 3 heads) and without replacement (e.g., number of possible delegations of 3 out of 23 students).	4.4.12 C.1
	Grades: 9-12	1. Learn mathematics through problem solving, inquiry, and discovery.	4.5.12 A.1
	Grades: 9-12	2. Solve problems that arise in mathematics and in other contexts. Open-ended problems	4.5.12 A.2.a
	Grades: 9-12	2. Solve problems that arise in mathematics and in other contexts. Non-routine problems	4.5.12 A.2.b
	Grades: 9-12	2. Solve problems that arise in mathematics and in other contexts. Problems with multiple solutions	4.5.12 A.2.c
	Grades: 9-12	2. Solve problems that arise in mathematics and in other contexts. Problems that can be solved in several ways	4.5.12 A.2.d

Alignments of PSAT/NMSQT Skill Categories and State Standards

PSAT/NMSQT Skill Category and Description of Skills	New Jersey Math: Core Curriculum Content Standards 2002		
	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.	Grades: 9-12	3. Select and apply a variety of appropriate problem-solving strategies (e.g., "try a simpler problem" or "make a diagram") to solve problems.	4.5.12 A.3
	Grades: 9-12	4. Pose problems of various types and levels of difficulty.	4.5.12 A.4
	Grades: 9-12	5. Monitor their progress and reflect on the process of their problem solving activity.	4.5.12 A.5
Reasoning Develop and use mathematical arguments and proofs to explore the truth of conjectures and justify conclusions.	Grades: 9-12	1. Extend understanding of the number system to all real numbers.	4.1.12 A.1
	Grades: 9-12	3. Develop conjectures and informal proofs of properties of number systems and sets of numbers.	4.1.12 A.3
	Grades: 9-12	1. Extend understanding and use of operations to real numbers and algebraic procedures.	4.1.12 B.1
	Grades: 9-12	2. Develop, apply, and explain methods for solving problems involving rational and negative exponents.	4.1.12 B.2
	Grades: 9-12	1. Recognize the limitations of estimation, assess the amount of error resulting from estimation, and determine whether the error is within acceptable tolerance limits.	4.1.12 C.1
	Grades: 9-12	4. Use reasoning and some form of proof to verify or refute conjectures and theorems.	4.2.12 A.4.a
		Verification or refutation of proposed proofs	
	Grades: 9-12	4. Use reasoning and some form of proof to verify or refute conjectures and theorems.	4.2.12 A.4.b
		Simple proofs involving congruent triangles	
	Grades: 9-12	4. Use reasoning and some form of proof to verify or refute conjectures and theorems.	4.2.12 A.4.c
	Counterexamples to incorrect conjectures		
Grades: 9-12	3. Determine whether two or more given shapes can be used to generate a tessellation.	4.2.12 B.3	

Alignments of PSAT/NMSQT Skill Categories and State Standards

PSAT/NMSQT Skill Category and Description of Skills	New Jersey Math: Core Curriculum Content Standards 2002		
	Course/ Level	Standard	Standard ID
Reasoning Develop and use mathematical arguments and proofs to explore the truth of conjectures and justify conclusions.	Grades: 9-12	4. Generate and analyze iterative geometric patterns. Outcome of extending iterative process indefinitely	4.2.12 B.4.c
	Grades: 9-12	2. Develop an informal notion of limit.	4.3.12 A.2
	Grades: 9-12	3. Use inductive reasoning to form generalizations.	4.3.12 A.3
	Grades: 9-12	2. Analyze and explain the general properties and behavior of functions of one variable, using appropriate graphing technologies. Slope of a line or curve	4.3.12 B.2.a
	Grades: 9-12	2. Analyze and explain the general properties and behavior of functions of one variable, using appropriate graphing technologies. Domain and range	4.3.12 B.2.b
	Grades: 9-12	2. Analyze and explain the general properties and behavior of functions of one variable, using appropriate graphing technologies. Intercepts	4.3.12 B.2.c
	Grades: 9-12	2. Analyze and explain the general properties and behavior of functions of one variable, using appropriate graphing technologies. Continuity	4.3.12 B.2.d
	Grades: 9-12	2. Analyze and explain the general properties and behavior of functions of one variable, using appropriate graphing technologies. Maximum/minimum	4.3.12 B.2.e

Alignments of PSAT/NMSQT Skill Categories and State Standards

PSAT/NMSQT Skill Category and Description of Skills	New Jersey Math: Core Curriculum Content Standards 2002		
	Course/ Level	Standard	Standard ID
Reasoning Develop and use mathematical arguments and proofs to explore the truth of conjectures and justify conclusions.	Grades: 9-12	2. Analyze and explain the general properties and behavior of functions of one variable, using appropriate graphing technologies. Estimating roots of equations	4.3.12 B.2.f
	Grades: 9-12	2. Analyze and explain the general properties and behavior of functions of one variable, using appropriate graphing technologies. Intersecting points as solutions of systems of equations	4.3.12 B.2.g
	Grades: 9-12	2. Analyze and explain the general properties and behavior of functions of one variable, using appropriate graphing technologies. Rates of change	4.3.12 B.2.h
	Grades: 9-12	3. Understand and perform transformations on commonly-used functions. Effects on linear and quadratic graphs of parameter changes in equations	4.3.12 B.3.b
	Grades: 9-12	4. Understand and compare the properties of classes of functions, including exponential, polynomial, rational, and trigonometric functions. Linear vs. non-linear	4.3.12 B.4.a
	Grades: 9-12	4. Understand and compare the properties of classes of functions, including exponential, polynomial, rational, and trigonometric functions. Symmetry	4.3.12 B.4.b
	Grades: 9-12	4. Understand and compare the properties of classes of functions, including exponential, polynomial, rational, and trigonometric functions. Increasing/decreasing on an interval	4.3.12 B.4.c

Alignments of PSAT/NMSQT Skill Categories and State Standards

PSAT/NMSQT Skill Category and Description of Skills	New Jersey Math: Core Curriculum Content Standards 2002		
	Course/ Level	Standard	Standard ID
Reasoning Develop and use mathematical arguments and proofs to explore the truth of conjectures and justify conclusions.	Grades: 9-12	2. Evaluate the use of data in real-world contexts. Accuracy and reasonableness of conclusions drawn	4.4.12 A.2.a
	Grades: 9-12	2. Evaluate the use of data in real-world contexts. Bias in conclusions drawn (e.g., influence of how data is displayed)	4.4.12 A.2.b
	Grades: 9-12	5. Analyze data using technology, and use statistical terminology to describe conclusions. Measures of dispersion: variance, standard deviation, outliers	4.4.12 A.5.a
	Grades: 9-12	5. Estimate probabilities and make predictions based on experimental and theoretical probabilities.	4.4.12 B.5
	Grades: 9-12	6. Understand and use the "law of large numbers" (that experimental results tend to approach theoretical probabilities after a large number of trials).	4.4.12 B.6
	Grades: 9-12	3. Justify solutions to counting problems.	4.4.12 C.3
	Grades: 9-12	4. Recognize and explain relationships involving combinations and Pascal's Triangle, and apply those methods to situations involving probability.	4.4.12 C.4
	Grades: 9-12	2. Explore strategies for making fair decisions. Combining individual preferences into a group decision (e.g., determining winner of an election or selection process)	4.4.12 D.2.a
	Grades: 9-12	2. Explore strategies for making fair decisions. Determining how many Student Council representatives each class (9th, 10th, 11th, and 12th grade) gets when the classes have unequal sizes (apportionment)	4.4.12 D.2.b
	Grades: 9-12	6. Understand how mathematical ideas interconnect and build on one another to produce a coherent whole.	4.5.12 C.6

Alignments of PSAT/NMSQT Skill Categories and State Standards

PSAT/NMSQT Skill Category and Description of Skills	New Jersey Math: Core Curriculum Content Standards 2002		
	Course/ Level	Standard	Standard ID
Reasoning Develop and use mathematical arguments and proofs to explore the truth of conjectures and justify conclusions.	Grades: 9-12	1. Recognize that mathematical facts, procedures, and claims must be justified.	4.5.12 D.1
	Grades: 9-12	2. Use reasoning to support their mathematical conclusions and problem solutions.	4.5.12 D.2
	Grades: 9-12	3. Select and use various types of reasoning and methods of proof.	4.5.12 D.3
	Grades: 9-12	4. Rely on reasoning, rather than answer keys, teachers, or peers, to check the correctness of their problem solutions.	4.5.12 D.4
	Grades: 9-12	5. Make and investigate mathematical conjectures.	4.5.12 D.5.a
		Counterexamples as a means of disproving conjectures	
	Grades: 9-12	5. Make and investigate mathematical conjectures.	4.5.12 D.5.b
	Verifying conjectures using informal reasoning or proofs.		
	Grades: 9-12	6. Evaluate examples of mathematical reasoning and determine whether they are valid.	4.5.12 D.6
Representation Use and translate among representations including verbal, numerical, symbolic and graphical to communicate mathematical ideas and solve problems.	Grades: 9-12	2. Draw perspective views of 3D objects on isometric dot paper, given 2D representations (e.g., nets or projective views).	4.2.12 A.2
	Grades: 9-12	2. Choose appropriate tools and techniques to achieve the specified degree of precision and error needed in a situation.	4.2.12 D.2.a
		Degree of accuracy of a given measurement tool	
	Grades: 9-12	1. Use models and algebraic formulas to represent and analyze sequences and series.	4.3.12 A.1.a
		Explicit formulas for nth terms	
	Grades: 9-12	1. Use models and algebraic formulas to represent and analyze sequences and series.	4.3.12 A.1.b
		Sums of finite arithmetic series	

Alignments of PSAT/NMSQT Skill Categories and State Standards

PSAT/NMSQT Skill Category and Description of Skills	New Jersey Math: Core Curriculum Content Standards 2002		
	Course/ Level	Standard	Standard ID
Representation Use and translate among representations including verbal, numerical, symbolic and graphical to communicate mathematical ideas and solve problems.	Grades: 9-12	1. Use models and algebraic formulas to represent and analyze sequences and series. Sums of finite and infinite geometric series	4.3.12 A.1.c
	Grades: 9-12	1. Understand relations and functions and select, convert flexibly among, and use various representations for them, including equations or inequalities, tables, and graphs.	4.3.12 B.1
	Grades: 9-12	3. Convert recursive formulas to linear or exponential functions (e.g., Tower of Hanoi and doubling).	4.3.12 C.3
	Grades: 9-12	1. Create and use representations to organize, record, and communicate mathematical ideas. Concrete representations (e.g., base-ten blocks or algebra tiles)	4.5.12 E.1.a
	Grades: 9-12	1. Create and use representations to organize, record, and communicate mathematical ideas. Pictorial representations (e.g., diagrams, charts, or tables)	4.5.12 E.1.b
	Grades: 9-12	1. Create and use representations to organize, record, and communicate mathematical ideas. Symbolic representations (e.g., a formula)	4.5.12 E.1.c
	Grades: 9-12	1. Create and use representations to organize, record, and communicate mathematical ideas. Graphical representations (e.g., a line graph)	4.5.12 E.1.d
	Grades: 9-12	2. Select, apply, and translate among mathematical representations to solve problems.	4.5.12 E.2
	Grades: 9-12	3. Use representations to model and interpret physical, social, and mathematical phenomena.	4.5.12 E.3

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.