

Alignments of PSAT/NMSQT Skill Categories and State Standards

PSAT/NMSQT Skill Category and Description of Skills	Illinois Math: Learning Standards 1997		
	Course/ Level	Standard	Standard ID
Algebra and Functions Solve problems using algebraic expressions and symbols to represent relationships, patterns and functions of different types.	Early High School	8.A.4a Use algebraic methods to convert repeating decimals to fractions.	8.A.4a
	Early High School	8.A.4b Represent mathematical patterns and describe their properties using variables and mathematical symbols.	8.A.4b
	Early High School	8.B.4a Represent algebraic concepts with physical materials, words, diagrams, tables, graphs, equations and inequalities and use appropriate technology.	8.B.4a
	Early High School	8.B.4b Use the basic functions of absolute value, square root, linear, quadratic and step to describe numerical relationships.	8.B.4b
	Early High School	8.C.4a Analyze and report the effects of changing coefficients, exponents and other parameters on functions and their graphs.	8.C.4a
	Early High School	8.C.4b Apply algebraic properties and procedures with matrices, vectors, functions and sequences using data found in business, industry and consumer situations.	8.C.4b
	Early High School	8.D.4 Formulate and solve linear and quadratic equations and linear inequalities algebraically and investigate nonlinear inequalities using graphs, tables, calculators and computers.	8.D.4
	Late High School	8.A.5 Solve mathematical problems involving recursive patterns and use models that employ such relationships.	8.A.5
	Late High School	8.B.5 Use functions including exponential, polynomial, rational, parametric, logarithmic, and trigonometric to describe numerical relationships.	8.B.5
	Late High School	8.C.5 Use polynomial, exponential, logarithmic and trigonometric functions to model situations.	8.C.5
Late High School	8.D.5 Formulate and solve nonlinear equations and systems including problems involving inverse variation and exponential and logarithmic growth and decay.	8.D.5	
Communication Express mathematical ideas precisely and communicate them coherently and clearly in the language and notation of mathematics.	Early High School	10.B.4 Design and execute surveys or experiments, gather data to answer relevant questions, and communicate results and conclusions to an audience using traditional methods and contemporary technology.	10.B.4
	Early High School	10.C.4c Propose and interpret discrete probability distributions, with and without the use of technology.	10.C.4c
	Early High School	7.A.4a Apply units and scales to describe and compare numerical data and physical objects.	7.A.4a

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Communication Express mathematical ideas precisely and communicate them coherently and clearly in the language and notation of mathematics.	Early High School	7.C.4b Interpret scale drawings and models using maps and blueprints.	7.C.4b
	Early High School	8.B.4b Use the basic functions of absolute value, square root, linear, quadratic and step to describe numerical relationships.	8.B.4b
	Late High School	10.A.5 Construct a statistics-based presentation, individually and as members of a team, to communicate and justify the results of a project.	10.A.5
	Late High School	10.B.5 Design a statistical experiment to answer a question about a realistic situation, conduct the experiment, use statistics to interpret the data, and communicate the results, individually and as members of a team.	10.B.5
	Late High School	8.B.5 Use functions including exponential, polynomial, rational, parametric, logarithmic, and trigonometric to describe numerical relationships.	8.B.5
Connections Connect ideas from different areas of mathematics (particularly geometry and algebra) to state or solve abstract or applied problems.	Early High School	6.B.4 Select and use appropriate arithmetic operations in practical situations including calculating wages after taxes, developing a budget and balancing a checkbook.	6.B.4
	Early High School	8.C.4b Apply algebraic properties and procedures with matrices, vectors, functions and sequences using data found in business, industry and consumer situations.	8.C.4b
	Late High School	9.C.5b Apply physical models, graphs, coordinate systems, networks and vectors to develop solutions in applied contexts (e.g., bus routing, areas of irregular shapes, describing forces and other physical quantities).	9.C.5b
Data, Statistics, and Probability Analyze data, understand descriptive statistics, make inferences and determine the likelihood that certain events will occur.	Early High School	10.A.4a Represent and organize data by creating lists, charts, tables, frequency distributions, graphs, scatterplots and box-plots.	10.A.4a
	Early High School	10.A.4b Analyze data using mean, median, mode, range, variance and standard deviation of a data set, with and without the use of technology.	10.A.4b
	Early High School	10.A.4c Predict from data using interpolation, extrapolation and trend lines, with and without the use of technology.	10.A.4c
	Early High School	10.B.4 Design and execute surveys or experiments, gather data to answer relevant questions, and communicate results and conclusions to an audience using traditional methods and contemporary technology.	10.B.4
	Early High School	10.C.4a Solve problems of chance using the principles of probability including conditional settings.	10.C.4a

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Data, Statistics, and Probability Analyze data, understand descriptive statistics, make inferences and determine the likelihood that certain events will occur.	Early High School	10.C.4b Design and conduct simulations (e.g., waiting times at restaurant, probabilities of births, likelihood of game prizes), with and without the use of technology.	10.C.4b
	Early High School	10.C.4c Propose and interpret discrete probability distributions, with and without the use of technology.	10.C.4c
	Late High School	10.A.5 Construct a statistics-based presentation, individually and as members of a team, to communicate and justify the results of a project.	10.A.5
	Late High School	10.B.5 Design a statistical experiment to answer a question about a realistic situation, conduct the experiment, use statistics to interpret the data, and communicate the results, individually and as members of a team.	10.B.5
	Late High School	10.C.5a Compute conditional probabilities and the probabilities of independent events.	10.C.5a
	Late High School	10.C.5b Compute probabilities in counting situations involving permutations and combinations.	10.C.5b
	Late High School	10.C.5c Make predictions using probabilities associated with normally distributed events.	10.C.5c
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.	Early High School	7.A.4a Apply units and scales to describe and compare numerical data and physical objects.	7.A.4a
	Early High School	7.A.4b Apply formulas in a wide variety of theoretical and practical real-world measurement applications involving perimeter, area, volume, angle, time, temperature, mass, speed, distance, density and monetary values.	7.A.4b
	Early High School	7.B.4 Estimate and measure the magnitude and directions of physical quantities (e.g., velocity, force, slope) using rulers, protractors and other scientific instruments including timers, calculators and computers.	7.B.4
	Early High School	7.C.4a Make indirect measurements, including heights and distances, using proportions (e.g., finding the height of a tower by its shadow).	7.C.4a
	Early High School	7.C.4b Interpret scale drawings and models using maps and blueprints.	7.C.4b
	Early High School	7.C.4c Convert within and between measurement systems and monetary systems using technology where appropriate.	7.C.4c
	Early High School	9.A.4a Construct a model of a three-dimensional figure from a two-dimensional pattern.	9.A.4a

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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.	Early High School	9.A.4b Make perspective drawings, tessellations and scale drawings, with and without the use of technology.	9.A.4b
	Early High School	9.B.4 Recognize and apply relationships within and among geometric figures.	9.B.4
	Early High School	9.C.4a Construct and test logical arguments for geometric situations using technology where appropriate.	9.C.4a
	Early High School	9.C.4b Construct and communicate convincing arguments for geometric situations.	9.C.4b
	Early High School	9.C.4c Develop and communicate mathematical proofs (e.g., two-column, paragraph, indirect) and counter examples for geometric statements.	9.C.4c
	Late High School	7.A.5 Apply nonlinear scales (e.g., Richter, decibel, pH) to solve practical problems.	7.A.5
	Late High School	7.B.5 Estimate perimeter, area, volume, and capacity of irregular shapes, regions and solids and explain the reasoning supporting the estimate.	7.B.5
	Late High School	7.C.5a Use dimensional analysis to determine units and check answers in applied measurement problems.	7.C.5a
	Late High School	7.C.5b Determine how changes in one measure may affect other measures (e.g., what happens to the volume and surface area of a cube when the side of the cube is halved).	7.C.5b
	Late High School	9.A.5 Use geometric figures and their properties to solve problems in the arts, the physical and life sciences and the building trades, with and without the use of technology.	9.A.5
	Late High School	9.B.5 Construct and use two- and three-dimensional models of objects that have practical applications (e.g., blueprints, topographical maps, scale models).	9.B.5
	Late High School	9.C.5a Perform and describe an original investigation of a geometric problem and verify the analysis and conclusions to an audience.	9.C.5a
	Late High School	9.C.5b Apply physical models, graphs, coordinate systems, networks and vectors to develop solutions in applied contexts (e.g., bus routing, areas of irregular shapes, describing forces and other physical quantities).	9.C.5b

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Number and Operations Understand types of numbers (integers, fractions, decimals), their properties and the correct order of operations (addition, multiplication, division). Perform computations correctly.	Early High School	6.A.4 Identify and apply the associative, commutative, distributive and identity properties of real numbers, including special numbers such as pi and square roots.	6.A.4
	Early High School	6.B.4 Select and use appropriate arithmetic operations in practical situations including calculating wages after taxes, developing a budget and balancing a checkbook.	6.B.4
	Early High School	6.C.4 Determine whether exact values or approximations are appropriate (e.g., bid a job, determine gas mileage for a trip).	6.C.4
	Early High School	6.D.4 Solve problems involving recipes or mixtures, financial calculations and geometric similarity using ratios, proportions and percents.	6.D.4
	Late High School	6.B.5 Identify, represent and apply numbers expressed in exponential, logarithmic and scientific notation using contemporary technology.	6.B.5
	Late High School	6.C.5 Determine the level of accuracy needed for computations involving measurement and irrational numbers.	6.C.5
	Late High School	6.D.5 Solve problems involving loans, mortgages and other practical applications involving geometric patterns of growth.	6.D.5
Problem Solving Solve abstract and practical problems, applying and adapting a variety of strategies. Monitor progress and evaluate answers in terms of questions asked.	Early High School	10.C.4a Solve problems of chance using the principles of probability including conditional settings.	10.C.4a
	Early High School	10.C.4b Design and conduct simulations (e.g., waiting times at restaurant, probabilities of births, likelihood of game prizes), with and without the use of technology.	10.C.4b
	Early High School	6.C.4 Determine whether exact values or approximations are appropriate (e.g., bid a job, determine gas mileage for a trip).	6.C.4
	Early High School	6.D.4 Solve problems involving recipes or mixtures, financial calculations and geometric similarity using ratios, proportions and percents.	6.D.4
	Early High School	7.A.4b Apply formulas in a wide variety of theoretical and practical real-world measurement applications involving perimeter, area, volume, angle, time, temperature, mass, speed, distance, density and monetary values.	7.A.4b

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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>	Early High School	7.B.4 Estimate and measure the magnitude and directions of physical quantities (e.g., velocity, force, slope) using rulers, protractors and other scientific instruments including timers, calculators and computers.	7.B.4
	Early High School	7.C.4a Make indirect measurements, including heights and distances, using proportions (e.g., finding the height of a tower by its shadow).	7.C.4a
	Late High School	10.C.5a Compute conditional probabilities and the probabilities of independent events.	10.C.5a
	Late High School	10.C.5b Compute probabilities in counting situations involving permutations and combinations.	10.C.5b
	Late High School	6.C.5 Determine the level of accuracy needed for computations involving measurement and irrational numbers.	6.C.5
	Late High School	6.D.5 Solve problems involving loans, mortgages and other practical applications involving geometric patterns of growth.	6.D.5
	Late High School	7.A.5 Apply nonlinear scales (e.g., Richter, decibel, pH) to solve practical problems.	7.A.5
	Late High School	7.B.5 Estimate perimeter, area, volume, and capacity of irregular shapes, regions and solids and explain the reasoning supporting the estimate.	7.B.5
	Late High School	7.C.5a Use dimensional analysis to determine units and check answers in applied measurement problems.	7.C.5a
	Late High School	8.A.5 Solve mathematical problems involving recursive patterns and use models that employ such relationships.	8.A.5
	Late High School	8.D.5 Formulate and solve nonlinear equations and systems including problems involving inverse variation and exponential and logarithmic growth and decay.	8.D.5
	Late High School	9.A.5 Use geometric figures and their properties to solve problems in the arts, the physical and life sciences and the building trades, with and without the use of technology.	9.A.5

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Reasoning Develop and use mathematical arguments and proofs to explore the truth of conjectures and justify conclusions.	Early High School	10.A.4b Analyze data using mean, median, mode, range, variance and standard deviation of a data set, with and without the use of technology.	10.A.4b
	Early High School	10.A.4c Predict from data using interpolation, extrapolation and trend lines, with and without the use of technology.	10.A.4c
	Early High School	8.C.4a Analyze and report the effects of changing coefficients, exponents and other parameters on functions and their graphs.	8.C.4a
	Early High School	9.B.4 Recognize and apply relationships within and among geometric figures.	9.B.4
	Early High School	9.C.4a Construct and test logical arguments for geometric situations using technology where appropriate.	9.C.4a
	Early High School	9.C.4b Construct and communicate convincing arguments for geometric situations.	9.C.4b
	Early High School	9.C.4c Develop and communicate mathematical proofs (e.g., two-column, paragraph, indirect) and counter examples for geometric statements.	9.C.4c
	Late High School	10.C.5c Make predictions using probabilities associated with normally distributed events.	10.C.5c
	Late High School	7.C.5b Determine how changes in one measure may affect other measures (e.g., what happens to the volume and surface area of a cube when the side of the cube is halved).	7.C.5b
Late High School	9.C.5a Perform and describe an original investigation of a geometric problem and verify the analysis and conclusions to an audience.	9.C.5a	
Representation Use and translate among representations including verbal, numerical, symbolic and graphical to communicate mathematical ideas and solve problems.	Early High School	10.A.4a Represent and organize data by creating lists, charts, tables, frequency distributions, graphs, scatterplots and box-plots.	10.A.4a
	Early High School	6.A.4 Identify and apply the associative, commutative, distributive and identity properties of real numbers, including special numbers such as pi and square roots.	6.A.4
	Early High School	7.C.4c Convert within and between measurement systems and monetary systems using technology where appropriate.	7.C.4c
	Early High School	8.A.4a Use algebraic methods to convert repeating decimals to fractions.	8.A.4a
	Early High School	8.A.4b Represent mathematical patterns and describe their properties using variables and mathematical symbols.	8.A.4b

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Representation Use and translate among representations including verbal, numerical, symbolic and graphical to communicate mathematical ideas and solve problems.	Early High School	8.B.4a Represent algebraic concepts with physical materials, words, diagrams, tables, graphs, equations and inequalities and use appropriate technology.	8.B.4a
	Early High School	8.D.4 Formulate and solve linear and quadratic equations and linear inequalities algebraically and investigate nonlinear inequalities using graphs, tables, calculators and computers.	8.D.4
	Early High School	9.A.4a Construct a model of a three-dimensional figure from a two-dimensional pattern.	9.A.4a
	Early High School	9.A.4b Make perspective drawings, tessellations and scale drawings, with and without the use of technology.	9.A.4b
	Early High School	9.C.4b Construct and communicate convincing arguments for geometric situations.	9.C.4b
	Late High School	6.B.5 Identify, represent and apply numbers expressed in exponential, logarithmic and scientific notation using contemporary technology.	6.B.5
	Late High School	8.C.5 Use polynomial, exponential, logarithmic and trigonometric functions to model situations.	8.C.5
	Late High School	9.B.5 Construct and use two- and three-dimensional models of objects that have practical applications (e.g., blueprints, topographical maps, scale models).	9.B.5

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.