

Alignments of PSAT/NMSQT Skill Categories and State Standards

PSAT/NMSQT Skill Category and Description of Skills	Maine Math: Learning Results: Parameters for Essential Instruction 2007		
	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-Diploma	e. Understand that some quadratic equations do not have real solutions and that there exist other number systems to allow for solutions to these equations.	A.1.e
	Grades 9-Diploma	a. Simplify expressions including those with rational exponents.	D.1.a
	Grades 9-Diploma	b. Add, subtract, and multiply polynomials.	D.1.b
	Grades 9-Diploma	c. Factor the common term out of polynomial expressions.	D.1.c
	Grades 9-Diploma	d. Divide polynomials by $(ax+b)$.	D.1.d
	Grades 9-Diploma	a. Solve systems of linear equations and inequalities in two unknowns and interpret their graphs.	D.2.a
	Grades 9-Diploma	b. Solve quadratic equations graphically, by factoring in cases where factoring is efficient, and by applying the quadratic formula.	D.2.b
	Grades 9-Diploma	c. Solve simple rational equations similar to $1 / 2x + 1 = 5$.	D.2.c
	Grades 9-Diploma	d. Solve absolute value equations and inequalities and interpret the results.	D.2.d
	Grades 9-Diploma	e. Apply the understanding that the solution(s) to equations of the form $f(x) = g(x)$ are the x-value(s) of the point(s) of intersection of the graphs of $f(x)$ and $g(x)$ and common outputs in table of values.	D.2.e
	Grades 9-Diploma	f. Explain why the coordinates of the point of intersection of the lines represented by a system of equations is its solution and apply this understanding to solving problems.	D.2.f
	Grades 9-Diploma	a. Recognize the graphs and sketch graphs of the basic functions $f(x) = x$ to the n power, where $n = 1$ to 3 ;	D.4.a.1
	Grades 9-Diploma	a. Recognize the graphs and sketch graphs of the basic functions $f(x) = ax^2 + bx + c$;	D.4.a.2

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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-Diploma	a. Recognize the graphs and sketch graphs of the basic functions $f(x) = \text{square root of } x;$	D.4.a.3
	Grades 9-Diploma	a. Recognize the graphs and sketch graphs of the basic functions $f(x) = x ;$	D.4.a.4
	Grades 9-Diploma	a. Recognize the graphs and sketch graphs of the basic functions $f(x) = a/x;$	D.4.a.5
	Grades 9-Diploma	a. Recognize the graphs and sketch graphs of the basic functions $f(x) = a \text{ to the } x \text{ power; and}$	D.4.a.6
	Grades 9-Diploma	a. Recognize the graphs and sketch graphs of the basic functions $f(x) = kx + b$	D.4.a.7
	Grades 9-Diploma	b. Apply functions from these families to problem situations.	D.4.b
	Grades 9-Diploma	c. Use concepts such as domain, range, zeros, intercepts, and maximum and minimum values.	D.4.c
	Grades 9-Diploma	d. Use the concepts of average rate of change (table of values) and increasing and decreasing over intervals, and use these characteristics to compare functions.	D.4.d
	Grades 9-Diploma	a. Express the (n+1)st term in terms of the nth term and describe relationships in terms of a starting point and rule followed to transform one term to the next.	D.5.a
	Grades 9-Diploma	b. Use technology to perform repeated calculations to develop solutions to real life problems involving linear, exponential, and other patterns of change.	D.5.b

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Communication Express mathematical ideas precisely and communicate them coherently and clearly in the language and notation of mathematics.	Grades 9-Diploma	a. Use the concept of nth root.	A.1.a
	Grades 9-Diploma	c. Know that most measurements are approximations and explain why it is useful to take the mean of repeated measurements.	B.1.c
	Grades 9-Diploma	a. Find and apply range, quartiles, mean absolute deviation, and standard deviation (using technology) of a set of data.	B.3.a
	Grades 9-Diploma	b. Interpret, give examples of, and describe key differences among different types of distributions: uniform, normal, and skewed.	B.3.b
	Grades 9-Diploma	c. For the sample mean of normal distributions, use the standard deviation for a group of observations to establish 90%, 95%, or 99% confidence intervals.	B.3.c
	Grades 9-Diploma	a. Describe and account for the difference between sample statistics and statistics describing the distribution of the entire population.	B.4.a
	Grades 9-Diploma	a. Solve systems of linear equations and inequalities in two unknowns and interpret their graphs.	D.2.a
	Grades 9-Diploma	d. Solve absolute value equations and inequalities and interpret the results.	D.2.d
	Grades 9-Diploma	c. Use concepts such as domain, range, zeros, intercepts, and maximum and minimum values.	D.4.c
Connections Connect ideas from different areas of mathematics (particularly geometry and algebra) to state or solve abstract or applied problems.	Grades 9-Diploma	c. Recognize positive and negative correlations based on data from a table or scatter plot.	B.2.c
	Grades 9-Diploma	d. Use the distance formula.	C.1.d
	Grades 9-Diploma	b. Solve quadratic equations graphically, by factoring in cases where factoring is efficient, and by applying the quadratic formula.	D.2.b
	Grades 9-Diploma	e. Apply the understanding that the solution(s) to equations of the form $f(x) = g(x)$ are the x-value(s) of the point(s) of intersection of the graphs of $f(x)$ and $g(x)$ and common outputs in table of values.	D.2.e
	Grades 9-Diploma	b. Apply functions from these families to problem situations.	D.4.b

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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-Diploma	a. Recognize when correlation has been confused with cause and effect.	B.2.a
	Grades 9-Diploma	b. Create and interpret scatter plots and estimate correlation and lines of best fit.	B.2.b
	Grades 9-Diploma	c. Recognize positive and negative correlations based on data from a table or scatter plot.	B.2.c
	Grades 9-Diploma	d. Estimate the strength of correlation based upon a scatter plot.	B.2.d
	Grades 9-Diploma	a. Find and apply range, quartiles, mean absolute deviation, and standard deviation (using technology) of a set of data.	B.3.a
	Grades 9-Diploma	b. Interpret, give examples of, and describe key differences among different types of distributions: uniform, normal, and skewed.	B.3.b
	Grades 9-Diploma	c. For the sample mean of normal distributions, use the standard deviation for a group of observations to establish 90%, 95%, or 99% confidence intervals.	B.3.c
	Grades 9-Diploma	a. Describe and account for the difference between sample statistics and statistics describing the distribution of the entire population.	B.4.a
	Grades 9-Diploma	b. Recognize that sample statistics produce estimates for the distribution of an entire population and recognize that larger sample sizes will produce more reliable estimates.	B.4.b
	Grades 9-Diploma	c. Apply methods of creating random samples and recognize possible sources of bias in samples.	B.4.c
	Grades 9-Diploma	a. Find the expected frequency of an event.	B.5.a
	Grades 9-Diploma	b. Find the expected value of events.	B.5.b
	Grades 9-Diploma	c. Find the probability of compound events including independent and dependent events.	B.5.c
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-Diploma	a. Express answers to a reasonable degree of precision in the context of a given problem.	B.1.a
	Grades 9-Diploma	b. Represent an approximate measurement using appropriate numbers of significant figures.	B.1.b
	Grades 9-Diploma	c. Know that most measurements are approximations and explain why it is useful to take the mean of repeated measurements.	B.1.c

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Geometry and Measurement Solve problems based on understanding the properties of shapes, such as triangles and circles, and the spatial relationships between angles and lines.	Grades 9-Diploma	a. Use the properties of triangles to prove theorems about figures and relationships among figures.	C.1.a
	Grades 9-Diploma	b. Solve for missing dimensions based on congruence and similarity.	C.1.b
	Grades 9-Diploma	c. Use the Pythagorean Theorem in situations where right triangles are created by adding segments to figures.	C.1.c
	Grades 9-Diploma	d. Use the distance formula.	C.1.d
	Grades 9-Diploma	a. Use the concepts of central and inscribed angles to solve problems and justify statements.	C.2.a
	Grades 9-Diploma	b. Use the relationships among arc length and circumference, and areas of circles and sectors to solve problems and justify statements.	C.2.b
	Grades 9-Diploma	a. Find the volume and surface area of three-dimensional figures including cones and spheres.	C.4.a
	Grades 9-Diploma	b. Determine the effect of changes in linear dimensions on the volume and surface area of similar and other three-dimensional figures.	C.4.b
Number and Operations Understand types of numbers (integers, fractions, decimals), their properties and the correct order of operations. Perform computations correctly.	Grades 9-Diploma	a. Use the concept of nth root.	A.1.a
	Grades 9-Diploma	b. Estimate the value(s) of roots and use technology to approximate them.	A.1.b
	Grades 9-Diploma	c. Compute using laws of exponents.	A.1.c
	Grades 9-Diploma	d. Multiply and divide numbers expressed in scientific notation.	A.1.d
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-Diploma	c. Compute using laws of exponents.	A.1.c
	Grades 9-Diploma	d. Multiply and divide numbers expressed in scientific notation.	A.1.d
	Grades 9-Diploma	b. Create and interpret scatter plots and estimate correlation and lines of best fit.	B.2.b
	Grades 9-Diploma	a. Find the expected frequency of an event.	B.5.a

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	Grades 9-Diploma	c. Find the probability of compound events including independent and dependent events.	B.5.c
	Grades 9-Diploma	b. Solve for missing dimensions based on congruence and similarity.	C.1.b
	Grades 9-Diploma	a. Find the volume and surface area of three-dimensional figures including cones and spheres.	C.4.a
	Grades 9-Diploma	b. Add, subtract, and multiply polynomials.	D.1.b
	Grades 9-Diploma	d. Divide polynomials by $(ax+b)$.	D.1.d
	Grades 9-Diploma	c. Solve simple rational equations similar to $1 / 2x + 1 = 5$.	D.2.c
	Grades 9-Diploma	b. Use technology to perform repeated calculations to develop solutions to real life problems involving linear, exponential, and other patterns of change.	D.5.b
Reasoning Develop and use mathematical arguments and proofs to explore the truth of conjectures and justify conclusions.	Grades 9-Diploma	b. Estimate the value(s) of roots and use technology to approximate them.	A.1.b
	Grades 9-Diploma	e. Understand that some quadratic equations do not have real solutions and that there exist other number systems to allow for solutions to these equations.	A.1.e
	Grades 9-Diploma	a. Express answers to a reasonable degree of precision in the context of a given problem.	B.1.a
	Grades 9-Diploma	a. Recognize when correlation has been confused with cause and effect.	B.2.a
	Grades 9-Diploma	d. Estimate the strength of correlation based upon a scatter plot.	B.2.d
	Grades 9-Diploma	b. Recognize that sample statistics produce estimates for the distribution of an entire population and recognize that larger sample sizes will produce more reliable estimates.	B.4.b
	Grades 9-Diploma	a. Use the properties of triangles to prove theorems about figures and relationships among figures.	C.1.a
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	Grades 9-Diploma	a. Use the concepts of central and inscribed angles to solve problems and justify statements.	C.2.a

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	Grades 9-Diploma	b. Determine the effect of changes in linear dimensions on the volume and surface area of similar and other three-dimensional figures.	C.4.b
	Grades 9-Diploma	f. Explain why the coordinates of the point of intersection of the lines represented by a system of equations is its solution and apply this understanding to solving problems.	D.2.f
Representation Use and translate among representations including verbal, numerical, symbolic and graphical to communicate mathematical ideas and solve problems.	Grades 9-Diploma	b. Represent an approximate measurement using appropriate numbers of significant figures.	B.1.b
	Grades 9-Diploma	c. Apply methods of creating random samples and recognize possible sources of bias in samples.	B.4.c
	Grades 9-Diploma	a. Simplify expressions including those with rational exponents.	D.1.a
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	Grades 9-Diploma	a. Recognize the graphs and sketch graphs of the basic functions $f(x) = ax^2 + bx + c$;	D.4.a.2
	Grades 9-Diploma	a. Recognize the graphs and sketch graphs of the basic functions $f(x) = \text{square root of } x$;	D.4.a.3
	Grades 9-Diploma	a. Recognize the graphs and sketch graphs of the basic functions $f(x) = x $;	D.4.a.4

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	Grades 9-Diploma	a. Recognize the graphs and sketch graphs of the basic functions $f(x) = a$ to the x power; and	D.4.a.6
	Grades 9-Diploma	a. Recognize the graphs and sketch graphs of the basic functions $f(x) = kx + b$	D.4.a.7
	Grades 9-Diploma	a. Express the $(n+1)$ st term in terms of the n th term and describe relationships in terms of a starting point and rule followed to transform one term to the next.	D.5.a

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.