



2015 NAEP Science: Summary of State Results

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I. Executive Summary of the 2015 NAEP State Results in Science

Forty-six states took part in the 2015 state administration of the National Assessment of Educational Progress (NAEP) science assessments at grades 4 and 8. In Massachusetts, grade 4 students from 175 schools and grade 8 students from 153 schools participated in the 2015 NAEP science state assessments; 2,300 students were assessed in grade 4, and 2,200 students were assessed in grade 8. This report provides state-level results for the science assessments.

□ Interpreting This Report

When reviewing this report, it is important to keep in mind that the NAEP results are based on a *sample* of students across Massachusetts and not on the *population* of Massachusetts students. In analyzing the results, tests of significance were used to determine differences in the data that could be confidently characterized as *not occurring by chance*. This type of difference is commonly referred to as a statistically *significant* difference. In the report's tables, an asterisk is used to denote a value that is significantly different from the value for the nation's public schools.

□ Overall Performance for Science

Massachusetts was tied for second at grades 4 and 8.

- Based on average scale scores, Massachusetts was tied for second at grades 4 and 8. At grade 4, there was no state that had a higher percentage of students scoring at or above the *Proficient* level. At grade 8, only one state, Utah, had a higher percentage of students scoring at or above the *Proficient* level.

Students in Massachusetts outperformed students nationally on the NAEP science tests.

- The average scale score of Massachusetts grade 4 students on the science assessment was 161, higher than the national average of 153. Eighth-grade Massachusetts students (162) also outscored their counterparts nationwide (153).
- Forty-seven percent of Massachusetts grade 4 students and 44 percent of grade 8 students scored at or above the *Proficient* level. These percentages were higher than the comparable percentages of students nationally who scored at or above the *Proficient* level, 37 percent at grade 4 and 33 percent at grade 8.

□ **Students Performing at or above the *Proficient* Level in the Top-Performing States**

The following table lists the top-performing states on the 2015 science assessments according to the ordinal rank of the percentage of students in each state who scored at or above the *Proficient* level.

**Table 1. 2015 NAEP Science Assessment
Percentage of Students at or above *Proficient* in the Top 10 States**

Grade 4		Grade 8	
New Hampshire	51	Utah	50
Virginia	50	New Hampshire	46
Vermont	48	Minnesota	45
Massachusetts	47	Massachusetts	44
Nebraska	47	Vermont	44
North Dakota	45	North Dakota	42
Wyoming	45	Montana	41
Utah	45	Nebraska	41
Kentucky	44	Idaho	40
Minnesota	43	Virginia	40

□ **Student Subgroup Performance in Science in Massachusetts Compared to the Nation**

- **Race/Ethnicity:** In 2015, at grade 4, African/Black, Asian, and White students in Massachusetts outperformed their counterparts nationally. The performance of Massachusetts Hispanic students did not differ significantly from the performance of their counterparts nationally. At grade 8, Asian and White students outperformed their counterparts nationally. The performance of Massachusetts Hispanic and African/Black students at grade 8 did not differ significantly from the performance of their counterparts nationally.
- **Gender:** At grades 4 and 8, both female and male students in Massachusetts outscored their counterparts nationally.
- **Student Status:** At both grades 4 and 8, students with disabilities and students eligible for free or reduced-price lunch in Massachusetts outscored their counterparts nationally. At both grades 4 and 8, the performance of English language learner students in Massachusetts did not differ significantly from the performance of their counterparts nationally.

II. Background Information on the 2015 NAEP Science Assessments

Students from 46 states participated in the 2015 NAEP state assessments in science. Across the nation, roughly 222,000 fourth and eighth-grade students were assessed in science.

□ Test Content of the Science Assessment

The 2009 NAEP science framework approved by the National Assessment Governing Board replaced the framework used for the 1996, 2000, and 2005 science assessments. A variety of factors made it necessary to create a new framework to guide the assessment of science in 2009 and beyond: the publication of National Standards for science literacy, advances in both science and cognitive research, the growth of national and international science assessments, advances in innovative assessment approaches, and the need to fairly assess the widest possible range of students.

The science content for the 2015 NAEP is defined by a series of statements that describe key facts, concepts, principles, laws, and theories in three broad areas: Earth and Space Sciences; Physical Science; and Life Science.

**Table 3. 2015 NAEP Science Assessment
Distribution of Questions By Content Area Across the Test**

Field of Science	Grade 4	Grade 8
Earth and space sciences include concepts related to objects in the universe, the history of the earth, properties of Earth materials, tectonics, energy in Earth systems, climate and weather, and biogeochemical cycles.	33%	40%
Physical science includes concepts related to properties and changes of matter, forms of energy, energy transfer and conservation, position and motion of objects, and forces affecting motion.	33%	30%
Life science includes concepts related to organization and development, matter and energy transformations, interdependence, heredity and reproduction, and evolution and diversity.	33%	30%

In addition, there are four separate science practices which were assessed:

- Identifying Science Principles, which demonstrates knowledge of science principles
- Using Science Principles, which focuses on what makes science knowledge valuable

- Using Scientific Inquiry, which focuses on key inquiry practices that are practical to measure
- Using Technological Design, which involves the systematic process of applying science principles and skills to solve design problems in a real-world context

□ **Types of Questions on the Reading and Mathematics Assessments**

The NAEP science assessments contained three types of questions, or items: multiple-choice, short constructed-response, and extended constructed-response. Approximately 50% of the assessment are constructed-response items.

□ **Student Participation**

Each student selected for NAEP participates in only one subject-area test, and he/she takes only a portion of the entire test in that subject. For instance, a student chosen for the 2015 science test took two 25-minute blocks or sets of test items out of a total of 13 blocks of items at that grade level.

NAEP spirals blocks of items into different test booklets, administers them to representative samples of students, and combines the results in order to produce average scale scores for the entire group and for subgroups of student populations. This approach reduces the burden on each individual student.

□ **Reporting**

Student performance on NAEP is indicated in two ways—scale scores and achievement levels. The NAEP scale for science ranges from 0 to 300. Performance for each grade is scaled separately. Therefore, average scale scores cannot be compared across grades.

Achievement levels are used to describe expectations for student performance according to a set of standards for what students should know and be able to do. The three achievement levels are *Basic*, *Proficient*, and *Advanced*.

- **Basic** denotes partial mastery of prerequisite knowledge and skills that are fundamental for proficient work at a given grade. Examples of skills demonstrated by students performing at the *Basic* level include the following:
 - In science, fourth-grade students should be able to explain the benefit of an adaptation for an organism, recognize how the Sun affects the Earth’s surface, and predict the relative motion of an object based on a diagram.
 - In science, eighth-grade students should be able to describe the competition between two species, relate oxygen level to atmospheric conditions at higher elevations, and read a motion graph.

- ***Proficient*** denotes solid academic performance. Students reaching this level have demonstrated competency over challenging subject matter. Examples of skills demonstrated by students performing at the *Proficient* level include the following:
 - In science, fourth-grade students should be able to predict an environmental effect of the use of a chemical, recognize the cycle of Moon phases, and predict the motion of an object when different forces act on it.
 - In science, eighth-grade students should be able to recognize that plants produce their own food, predict the long-term pattern in the volcanic activity of a region, and select and explain the useful properties of a material used in an industrial process.

- ***Advanced*** denotes superior performance. Students reaching this level should be able to develop alternative representations of science principles and explanations of observations. Examples of skills demonstrated by students performing at the *Advanced* level include the following:
 - In science, fourth-grade students should be able to identify what an organism needs to live, predict the shape of the Moon, and investigate the speed of a runner.
 - In science, eighth-grade students should be able to form a conclusion based on data about the behavior of an organism, explain the formation of a rock based on its features, and recognize the direction of the force of friction.

III. 2015 NAEP Science Results by Subgroup

Student performance data are reported for public school students in Massachusetts and the nation according to the following demographic characteristics:

- Race/ethnicity
- Gender
- Student eligibility for the National School Lunch Program
- Type of school location
- Parents' highest level of education (grade 8 only)

Results for each of the characteristics are reported in tables that include the percentage of students in each subgroup in the first column. The columns to the right show the average scale score and the percentage of students at each achievement level.

The reader is cautioned against making causal inferences about subgroup differences, as a complex mix of educational and socioeconomic factors may affect student performance.

□ Race/Ethnicity

Information on student race/ethnicity is reported by the student's school when rosters of the students eligible to be assessed are submitted to NAEP. The next two tables show science average scale scores, achievement-level data, and population percentages for public school students at grades 4 and 8 in Massachusetts and the nation by race/ethnicity.

**Table 4-A. 2015 NAEP Science Assessment
Grade 4 Performance by Race/Ethnicity**

Race/Ethnicity		Percentage of Students	Average Scale Score	Percentage of Students			
				Below Basic	At or Above Basic	At or Above Proficient	At Advanced
White							
	Nation	49	165	12	88	50	1
	Massachusetts	65	169	9	91	56	1
African American/Black							
	Nation	15	132	47	53	14	#
	Massachusetts	7	140	35	65	21	#
Hispanic							
	Nation	26	138	39	61	20	#
	Massachusetts	19	140	36	64	20	#
Asian/Pacific Islander							
	Nation	5	166	15	85	52	3
	Massachusetts	6	174	8	92	63	4

Rounds to zero

**Table 4-B. 2015 NAEP Science Assessment:
Grade 8 Performance by Race/Ethnicity**

				Percentage of Students			
Race/Ethnicity		Percentage of Students	Average Scale Score	Below Basic	At or Above Basic	At or Above Proficient	At Advanced
White							
	Nation	51	165	19	81	46	3
	Massachusetts	67	170	15	85	53	4
African American/Black							
	Nation	15	131	60	40	11	#
	Massachusetts	9	134	55	45	13	#
Hispanic							
	Nation	25	139	49	51	18	1
	Massachusetts	15	136	54	46	16	1
Asian/Pacific Islander							
	Nation	6	163	22	78	46	4
	Massachusetts	7	174	14	86	62	8

Rounds to zero

□ **Gender**

Information on student gender is reported by the student's school when rosters of the students eligible to be assessed are submitted to NAEP. The next two tables show science average scale scores, achievement-level data, and population percentages for public school students at grades 4 and 8 in Massachusetts and the nation by gender.

**Table 5-A. 2015 NAEP Science Assessment:
Grade 4 Performance by Gender**

				Percentage of Students			
Gender		Percentage of Students	Average Scale Score	Below Basic	At or Above Basic	At or Above Proficient	At Advanced
Male							
	Nation	51	153	25	75	38	1
	Massachusetts	51	163	16	84	48	1
Female							
	Nation	49	153	25	75	36	1
	Massachusetts	49	160	17	83	45	1

**Table 5-B. 2015 NAEP Science Assessment:
Grade 8 Performance by Gender**

				Percentage of Students			
Gender		Percentage of Students	Average Scale Score	Below Basic	At or Above Basic	At or Above Proficient	At Advanced
Male							
	Nation	51	154	32	68	36	2
	Massachusetts	50	164	24	76	47	4
Female							
	Nation	49	151	35	65	31	1
	Massachusetts	50	160	26	74	41	3

□ **Economically Disadvantaged**

NAEP collects data on student eligibility for the federal program providing free or reduced-price school lunches. The free/reduced-price lunch component of the National School Lunch Program (NSLP) offered through the U.S. Department of Agriculture (USDA) is designed to ensure that children near or below the poverty line receive nourishing meals. Eligibility is determined through the USDA's Income Eligibility Guidelines and is included as an indicator of lower family income. The next two tables show science average scale scores, achievement-level data, and population percentages for public school students at grades 4 and 8 in Massachusetts and the nation by eligibility for the NSLP.

**Table 6-A. 2015 NAEP Science Assessment:
Grade 4 Performance by Free/Reduced-Price Lunch Eligibility**

Eligibility Status		Percentage of Students	Average Scale Score	Percentage of Students			
				Below Basic	At or Above Basic	At or Above Proficient	At Advanced
Eligible							
	Nation	55	140	37	63	22	#
	Massachusetts	42	145	32	68	26	#
Not Eligible							
	Nation	44	169	10	90	55	2
	Massachusetts	58	173	6	94	62	2

Rounds to zero

**Table 6-B. 2015 NAEP Science Assessment:
Grade 8 Performance by Free/Reduced-Price Lunch Eligibility**

Eligibility Status		Percentage of Students	Average Scale Score	Percentage of Students			
				Below Basic	At or Above Basic	At or Above Proficient	At Advanced
Eligible							
	Nation	51	140	48	52	18	#
	Massachusetts	43	145	43	57	24	1
Not Eligible							
	Nation	47	167	17	83	49	3
	Massachusetts	57	175	11	89	60	5

Rounds to zero

□ **Students with Disabilities and/or English Language Learners**

To ensure that samples are representative, NAEP has established policies and procedures to maximize the inclusion of all students in the assessment. Every effort is made to ensure that all selected students who are capable of participating meaningfully in NAEP are assessed. While some students with disabilities (SD) and/or English language learner (ELL) students can be assessed without any special procedures, others require accommodations to participate. Still other SD and/or ELL students selected by NAEP may not be able to participate.

Tables 7-A and 7-B show science average scale scores, achievement level data, and population percentages for public school students at grades 4 and 8 in Massachusetts and the nation by disability status. Tables 8-A and 8-B show science average scale scores, achievement-level data, and population percentages for public school students at grades 4 and 8 in Massachusetts and the nation by ELL status.

**Table 7-A. 2015 NAEP Science Assessment:
Grade 4 Performance by Disability Status**

				Percentage of Students			
Disability Status		Percentage of Students	Average Scale Score	Below Basic	At or Above Basic	At or Above Proficient	At Advanced
SD							
	Nation	14	131	47	53	18	#
	Massachusetts	19	144	34	66	26	#
Not SD							
	Nation	86	156	21	79	39	1
	Massachusetts	81	165	13	87	51	1

Rounds to zero

**Table 7-B. 2015 NAEP Science Assessment:
Grade 8 Performance by Disability Status**

				Percentage of Students			
Disability Status		Percentage of Students	Average Scale Score	Below Basic	At or Above Basic	At or Above Proficient	At Advanced
SD							
	Nation	12	124	66	34	11	#
	Massachusetts	18	138	52	48	16	1
Not SD							
	Nation	88	157	29	71	36	2
	Massachusetts	82	167	19	81	51	4

Rounds to zero

**Table 8-A. NAEP 2015 Science Assessment:
Grade 4 Performance by ELL Status**

ELL Status		Percentage of Students	Average Scale Score	Percentage of Students			
				Below Basic	At or Above Basic	At or Above Proficient	At Advanced
ELL							
	Nation	11	121	59	41	9	#
	Massachusetts	9	124	57	43	9	#
Not ELL							
	Nation	89	157	21	79	40	1
	Massachusetts	91	165	13	87	51	1

Rounds to zero

**Table 8-B. NAEP 2015 Science Assessment:
Grade 8 Performance by ELL Status**

ELL Status		Percentage of Students	Average Scale Score	Percentage of Students			
				Below Basic	At or Above Basic	At or Above Proficient	At Advanced
ELL							
	Nation	6	110	82	18	3	#
	Massachusetts	5	109	79	21	4	#
Not ELL							
	Nation	94	156	30	70	35	2
	Massachusetts	95	165	22	78	47	3

Rounds to zero

IV. 2015 NAEP Science Results by School Location

Schools that participated in the assessment were classified as being located in three mutually exclusive types of communities: city, suburb, and rural. These categories indicate the geographic locations of schools. The next two tables show science average scale scores, achievement-level data, and population percentages for public school students at grades 4 and 8 in Massachusetts and the nation by type of location.

**Table 9-A. NAEP 2015 Science Assessment:
Grade 4 Performance by School Location**

		Percentage of Students					
Location		Percentage of Students	Average Scale Score	Below Basic	At or Above Basic	At or Above Proficient	At Advanced
City							
	Nation	31	146	33	67	30	1
	Massachusetts	18	151	27	73	36	1
Suburb							
	Nation	40	156	21	79	41	1
	Massachusetts	74	163	15	85	47	1
Rural							
	Nation	18	157	20	80	40	1
	Massachusetts	7	173	8	92	62	2

**Table 9-B. NAEP 2015 Science Assessment:
Grade 8 Performance by School Location**

		Percentage of Students					
Location		Percentage of Students	Average Scale Score	Below Basic	At or Above Basic	At or Above Proficient	At Advanced
City							
	Nation	29	145	42	58	26	2
	Massachusetts	17	148	42	58	29	2
Suburb							
	Nation	41	157	29	71	37	2
	Massachusetts	72	164	21	79	48	4
Rural							
	Nation	19	156	29	71	35	1
	Massachusetts	11	163	22	78	45	3

V. 2015 NAEP Science Results by Parents' Level of Education

Eighth-grade students who participated in the NAEP 2015 assessment were asked to indicate the highest level of education they thought their father and mother had completed. Five response options—did not finish high school, graduated from high school, some education after high school, graduated from college, and “I don’t know”—were offered. The highest level of education reported for either parent was used in the analysis. The results by highest level of parental education are shown in Table 10. Fourth-graders were not asked about their parents’ education level because their responses in previous NAEP assessments were not reliable, and a large percentage of them chose the “I don’t know” option.

**Table 10. NAEP 2015 Science Assessment:
Grade 8 Performance by Parents' Level of Education**

Parent Education	Percentage of Students	Average Scale Score	Percentage of Students			
			Below Basic	At or Above Basic	At or Above Proficient	At Advanced
Did Not Finish High School						
Nation	8	137	52	48	15	#
Massachusetts	4	128	66	34	9	#
Graduated High School						
Nation	16	141	46	54	18	#
Massachusetts	13	146	41	59	25	#
Graduated College						
Nation	49	164	21	79	46	3
Massachusetts	62	172	14	86	57	5

Rounds to zero

VI. 2015 NAEP Grade 4 Science Achievement Level Descriptions

NAEP achievement levels are cumulative; therefore, student performance at the *Proficient* level includes the competencies associated with the *Basic* level, and the *Advanced* level also includes the skills and knowledge associated with both the *Basic* and the *Proficient* levels. The cut score indicating the lower end of the score range for each level is noted in parentheses.

Achievement Level	Description
<i>Basic</i> (131)	Students performing at the <i>Basic</i> level should be able to describe, measure, and classify familiar objects in the world around them, as well as explain and make predictions about familiar processes. These processes include changes of states of matter, movements of objects, basic needs and life cycles of plants and animals, changes in shadows during the day, and changes in weather. They should be able to critique simple observational studies, communicating observations and basic measurements of familiar systems and processes, and look for patterns in their observations. With regard to scientific constraints, they should also be able to propose and critique alternative solutions to problems involving familiar systems and processes.
<i>Proficient</i> (167)	Students performing at the <i>Proficient</i> level should be able to demonstrate relationships among closely related science concepts, as well as analyze alternative explanations or predictions. They should be able to explain how changes in temperature cause changes of state, how forces can change motion, how adaptations help plants and animals meet their basic needs, how environmental changes can affect their growth and survival, how land formations can result from Earth processes, and how recycling can help conserve limited resources. They should be able to identify patterns in data and/or explain these patterns. They should be able to identify and critique alternative responses to design problems.
<i>Advanced</i> (224)	Students performing at the <i>Advanced</i> level should be able to demonstrate relationships among different representations of science principles, as well as propose alternative explanations or predictions of phenomena. They should be able to use numbers, drawings, and graphs to describe and explain motions of objects; analyze how environmental conditions affect growth and survival of plants and animals; describe changes in the Sun's path through the sky at different times of year; and describe how human uses of Earth materials affect the environment. They should be able to design studies that use sampling strategies to obtain evidence. They should be able to propose and critique alternative individual and local community responses to design problems.

VII. 2015 NAEP Grade 8 Science Achievement Level Descriptions

Achievement Level	Description
<i>Basic</i> (141)	Students performing at the <i>Basic</i> level should be able to state or recognize correct science principles. They should be able to explain and predict observations of natural phenomena at multiple scales, from microscopic to global. They should be able to describe properties and common physical and chemical changes in materials; describe changes in potential and kinetic energy of moving objects; describe levels of organization of living systems—cells, multi-cellular organisms, ecosystems; identify related organisms based on hereditary traits; describe a model of the solar system; and describe the processes of the water cycle. They should be able to design observational and experimental investigations employing appropriate tools for measuring variables. They should be able to propose and critique the scientific validity of alternative individual and local community responses to design problems.
<i>Proficient</i> (170)	Students performing at the <i>Proficient</i> level should be able to demonstrate relationships among closely related science principles. They should be able to identify evidence of chemical changes; explain and predict motions of objects using position-time graphs; explain metabolism, growth, and reproduction in cells, organisms, and ecosystems; use observations of the Sun, Earth, and Moon to explain visible motions in the sky; and predict surface and groundwater movements in different regions of the world. They should be able to explain and predict observations of phenomena at multiple scales, from microscopic to macroscopic and local to global, and to suggest examples of observations that illustrate a science principle. They should be able to use evidence from investigations in arguments that accept, revise, or reject scientific models. They should be able to use scientific criteria to propose and critique alternative individual and local community responses to design problems.
<i>Advanced</i> (215)	Students performing at the <i>Advanced</i> level should be able to develop alternative representations of science principles and explanations of observations. They should be able to use information from the periodic table to compare families of elements; explain changes of state in terms of energy flow; trace matter and energy through living systems at multiple scales; predict changes in populations through natural selection and reproduction; use lithospheric plate movement to explain geological phenomena; and identify relationships among regional weather and atmospheric and ocean circulation patterns. They should be able to design and critique investigations involving sampling processes, data quality review processes, and control of variables. They should be able to propose and critique alternative solutions that reflect science-based trade-offs for addressing local and regional problems.

NAEP Assessment Reporting Glossary

Accommodations. Accommodations are alterations in the way tasks are presented that allow children with learning disabilities to complete the same assignments as other students. Accommodations do not alter the content of assignments, give students an unfair advantage, or in the case of assessments such as NAEP, change what a test measures.

Achievement levels. Performance standards set by the National Assessment Governing Board that provide a context for interpreting student performance on NAEP, based on recommendations from panels of educators and members of the public. The levels, *Basic*, *Proficient*, and *Advanced*, measure what students should know and be able to do at each grade assessed. See each NAEP subject for a detailed description of what students should know and be able to do at each level at grades 4, 8, or 12.

- ***Basic.*** One of the three NAEP achievement levels, denoting partial mastery of prerequisite knowledge and skills that are fundamental for proficient work at each grade assessed. NAEP also reports the proportion of students whose scores place them below the *Basic* achievement level. See each NAEP subject for a detailed description of what students should know and be able to do at grades 4, 8, or 12 at the *Basic* level. The cut scores determining each level are available with these descriptions.
- ***Proficient.*** One of the three NAEP achievement levels, denoting solid academic performance for each grade assessed. Students reaching this level have demonstrated competency over challenging subject matter, including subject-matter knowledge, application of such knowledge to real-world situations, and analytical skills appropriate to the subject matter. See each NAEP subject for a detailed description of what students should know and be able to do at grades 4, 8, or 12 at the *Proficient* level. The cut scores determining each level are available with the descriptions.
- ***Advanced.*** One of the three NAEP achievement levels, denoting superior performance at each grade assessed. See each NAEP subject for a detailed description of what students should know and be able to do at grades 4, 8, or 12 at the *Advanced* level. The cut scores determining each level are available with these descriptions.

Achievement-level percentages. The percentage of students within the total population, or in a particular student group, who meet or exceed expectations of what students should know and be able to do. Specifically, it is the weighted percentage of students with NAEP composite scores that are equal to, or exceed, the achievement-level cut scores specified by the National Assessment Governing Board.

Gender. NAEP results are reported separately for males and females, based on students' self-reported gender.

English language learners (ELL). A term used to describe students who are in the process of acquiring English language skills and knowledge.

NAEP. The National Assessment of Educational Progress (NAEP), also known as "the Nation's Report Card," is the only nationally representative and continuing assessment of what America's students know and can do in various subject areas. Since 1969, assessments have been conducted periodically in mathematics, reading, science, writing, U.S. history, geography, civics, the arts, and other subjects.

NAEP scales. The scales common across age or grade levels and assessment years used to report NAEP results.

National Assessment Governing Board. An independent organization whose members are appointed by the U.S. Secretary of Education. The Governing Board provides overall policy direction to the NAEP program. It is an independent, bipartisan group whose members include governors, state legislators, local and state school officials, educators, business representatives, and members of the general public.

National School Lunch Program (NSLP). A federally assisted meal program that provides low-cost or free lunches to eligible students. It is sometimes referred to as the free/reduced-price lunch program. Free lunches are offered to those students whose family incomes are at or below 130 percent of the poverty level; reduced-price lunches are offered to those students whose family incomes are between 130 percent and 185 percent of the poverty level.

Parental education. A NAEP reporting group defined by the highest level of education of the mother and father of an assessed student as derived from the student's response to two background questionnaire items.

Percentile. A score location below which a specified percentage of the population falls. For example, in 1998, the tenth percentile of fourth-grade reading scores was 167. This means that in 1998, ten percent of fourth-graders had NAEP reading scores below 167, while 90 percent scored at or above 167.

Race/ethnicity. In order to allow comparisons across years, assessment results presented are based on information for six mutually exclusive racial/ethnic categories: White, Black, Hispanic, Asian/Pacific Islander, American Indian (including Alaska Native), and Other. Students who identified with more than one of the first five categories or had a background other than the ones listed were categorized as Other. In all NAEP assessments, data about student race/ethnicity is collected from two sources: school records and student self-reports. Before 2002, NAEP used students' self-reports of their race and ethnicity on a background questionnaire as the source of race/ethnicity data. In 2002, it was decided to change the student race/ethnicity variable highlighted in NAEP reports. Starting in 2002, NAEP reports of students' race and ethnicity are based on the school records, with students' self-reports used only if school data are missing. Information based on student self-reported race/ethnicity will continue to be reported in the NAEP Data Explorer for assessments after 2001.

Reporting group. Groups within the national population for which NAEP data are reported; for example, gender, race/ethnicity, grade, age, level of parental education, region, and type of location.

Sample. A subset of a population whose characteristics are studied to gain information about the entire population. NAEP assesses a representative sample of students each year, rather than the entire population of students.

Sampling error. The error in survey estimates that occurs because only a sample of the population is observed. Measured by sampling standard error.

Scale score. A score derived from student responses to assessment items that summarizes the overall level of performance attained by that student. While NAEP does not produce scale scores for individual students, NAEP does produce summary statistics describing scale scores for groups of students. NAEP subject area scales typically range from 0 to 500 (reading, mathematics, U.S. history, and geography) or from 0 to 300 (science, writing, and civics).

School location. The physical location of a school. NAEP reporting includes city, suburb, town, and rural.

Significantly different, statistically significant, statistically significant difference. Statistical tests are conducted to determine whether the changes or differences between two result numbers are statistically significant. The term "significant" does not imply a judgment about the absolute magnitude or educational relevance of changes in student performance. Rather, it is used to indicate that the observed changes are not likely to be associated with sampling and measurement error, but are statistically dependable population differences. NAEP uses widely accepted statistical standards in analyzing data. For instance, this website discusses only findings that are statistically significant at the .05 level. However, some differences that are statistically significant appear small, particularly in recent assessment years, when the sample sizes have been larger.

NOTE: Differences between scale scores or percentages are calculated using unrounded values. In some instances, the result of the subtraction differs from what would be obtained by subtracting the rounded values shown in the accompanying figure or table.

Standard error. In NAEP, a measure of sampling variability and measurement error for a NAEP scale score. However, for other statistics, it reflects the sampling variability. Because of NAEP's complex student sampling design, sampling standard errors are estimated by jackknifing the samples from first-stage sample estimates. Standard errors may also include a component due to the error of measurement of individual scores estimated using plausible values.

Student sample. A portion of a population, or a subset from a set of units, that is selected by some probability mechanism for the purpose of investigating the properties of the population.

Students with disabilities (SD). A student with a disability may need specially designed instruction to meet his or her learning goals. A student with a disability will usually have an Individualized Education Plan (IEP), which guides his or her special education instruction. Students with disabilities are often referred to as special education students and may be classified by their school as learning disabled (LD) or emotionally disturbed (ED). The goal of NAEP is that students who are capable of participating meaningfully in the assessment are assessed, but

some students with disabilities selected by NAEP may not be able to participate, even with the accommodations provided.

Subject area. One of the areas assessed by NAEP: the arts, civics, economics, foreign language, geography, mathematics, reading, science, U.S. history, world history, or writing.

Weighted percentage. A percentage that has been calculated by differentially weighting observations to account for complex sampling procedures. It differs from a simple percentage in which all cases are equally weighted.

In NAEP, each sampled student is assigned a weight that makes proper allowances for the sampling design and reflects adjustments for school and student nonparticipation.

Weighted percentages are estimates of the percentages of the total population of the student group that share a specified characteristic. For example, the weighted percentage of fourth-grade students in the NAEP sample that correctly answered a particular NAEP test item is an estimate of the percentage of fourth-grade students in the nation that can correctly answer that question.