NCES 2010-462

U.S. DEPARTMENT OF EDUCATION

NAEP
NATIONAL ASSESSMENT OF EDUCATIONAL PROGRESS

2009

National Indian Education Study 2009

Part I

Performance of American Indian and Alaska Native Students at Grades 4 and 8 on NAEP 2009 Reading and Mathematics Assessments

ies NATIONAL CENTER FOR EDUCATION STATISTICS
Institute of Education Sciences

Contents

1 Executive Summary

4 Introduction

10 Reading

47 Mathematics

84 Technical Notes

94 Appendix Tables

98 Acknowledgments

STUDENT ARTWORK
Front cover: "White Mountain Apache Tribe" by Michelle Zahgotah
Back cover: "Tradition Guides My Future" by Aubrey Brown (Cherokee)

The National Indian Education Study (NIES) is a two-part study designed to describe the condition of education for American Indian and Alaska Native students in the United States. NIES is authorized under Executive Order 13336, American Indian and Alaska Native Education, which was issued in 2004 to improve education efforts for American Indian and Alaska Native students nationwide. NIES is conducted under the direction of the National Center for Education Statistics on behalf of the U.S. Department of Education's Office of Indian Education.

Part I of the NIES is conducted through the National Assessment of Educational Progress (NAEP) and provides in-depth information on the academic performance of American Indian/Alaska Native students in reading and mathematics. Part II of the NIES, which is reported separately, provides information on the educational experiences of the fourth- and eighth-grade American Indian and Alaska Native students based on a survey administered as part of the NAEP assessments.

NAEP is a congressionally authorized project of the National Center for Education Statistics within the Institute of Education Sciences of the U.S. Department of Education. The Commissioner of Education Statistics is responsible for carrying out the NAEP project. The National Assessment Governing Board oversees and sets policy for NAEP.

NAEP is an integral part of our nation's evaluation of the condition and progress of education. Only information related to academic achievement and relevant variables is collected. The privacy of individual students and their families is protected, and the identities of participating schools are not released.

Executive Summary

The National Indian Education Study (NIES) is administered as part of the National Assessment of Educational Progress (NAEP), which was expanded to allow more in-depth reporting on the achievement and experiences of American Indian/Alaska Native (AI/AN) students. It fulfills a mandate of Executive Order 13336 issued in 2004 calling for closer examination of the educational experiences and progress of AI/AN students as well as the promotion of research opportunities and collaboration with tribal communities.

This report, the first in a two-part series in 2009, presents results on the achievement of AI/AN fourth- and eighth-graders in reading and mathematics. Results are reported for AI/AN students in the nation and for 12 states with relatively large populations of AI/AN students. The performance of AI/AN students is compared to that of other race/ethnicity groups as well as among AI/AN students based on gender, eligibility for the National School Lunch Program, region of the country, type of school location, and the proportion of AI/AN students in the schools they attend. Results from the 2009 assessments are also compared to the results from 2007 and 2005.

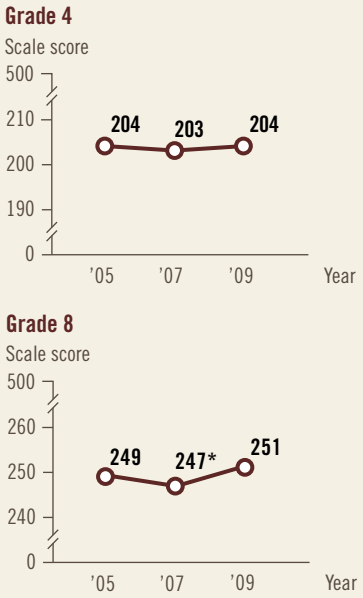
Reading

Nationally representative samples of about 5,100 AI/AN students at grade 4 and 4,200 students at grade 8 participated in the 2009 NAEP reading assessment. At each grade, students responded to questions based on literary and informational texts they were given to read. The questions were aligned to three reading behaviors or cognitive targets: locate and recall information; integrate and interpret what was read; and critique and evaluate.

Average reading scores increase since 2007 at grade 8 but show no significant change at grade 4

The average reading score for AI/AN fourth-graders in 2009 was not significantly different from the scores in either 2007 or 2005 (**figure A**). The average score for AI/AN students at grade 8 was higher in 2009 than in 2007 but was not significantly different from the score in 2005.

Figure A. Trend in average scores for fourth- and eighth-grade AI/AN students in NAEP reading



* Significantly different ($p < .05$) from 2009.

In 2009, the percentages of AI/AN students performing at or above the *Basic* level were 50 percent at grade 4 and 62 percent at grade 8. Twenty percent of AI/AN students at grade 4 and 21 percent at grade 8 performed at or above the *Proficient* level in 2009. There were no significant changes in the percentages of students at or above *Basic* or at or above *Proficient* in comparison to earlier assessment years at either grade.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2005, 2007, and 2009 National Indian Education Studies.

Performance of AI/AN students in reading sometimes differs from other race/ethnicity groups and by demographic characteristics

Average reading scores for fourth-grade AI/AN students were

- not significantly different from the scores for Black and Hispanic students, and lower than the scores for White and Asian/Pacific Islander students;
- lower for students eligible for free school lunch than for those eligible for reduced-price lunch and not eligible for the National School Lunch Program;
- higher for students attending schools in city, suburban, and town locations than for those attending schools in rural locations; and
- higher for students in low density public schools (i.e., less than 25 percent AI/AN students) than in high density public schools (25 percent or more AI/AN students), and higher in both low and high density public schools than in Bureau of Indian Education (BIE) schools.

Average reading scores for eighth-grade AI/AN students were

- higher than the score for Black students, not significantly different from the score for Hispanic students, and lower than the scores for White and Asian/Pacific Islander students;
- lower for students eligible for free school lunch than for those eligible for reduced-price lunch or not eligible for the National School Lunch Program;
- higher for students attending schools in suburban locations than for those in city, town, and rural schools; and
- higher for students in low density public schools than in high density public schools, and higher in low and high density public schools than in BIE schools.

Reading scores decrease since 2007 for AI/AN students in one state and increase in another

Among the 11 states with samples large enough to report results for AI/AN students in both 2009 and 2007, Alaska had an 8-point decrease at grade 4, and Arizona had a 10-point increase at grade 8. Of the 7 states with samples large enough to report results in both 2009 and 2005, none had a significant change in average reading scores at grade 4 or grade 8.

Average reading score gaps between White and AI/AN students ranged from 8 to 47 points at grade 4 and from 6 to 35 points at grade 8 in the 12 states selected in 2009.

Mathematics

Nationally representative samples of about 4,800 AI/AN students at grade 4 and 4,100 students at grade 8 participated in the 2009 NAEP mathematics assessment. At each grade, students responded to questions designed to measure their knowledge and abilities across five mathematics content areas: number properties and operations; measurement; geometry; data analysis, statistics, and probability; and algebra.

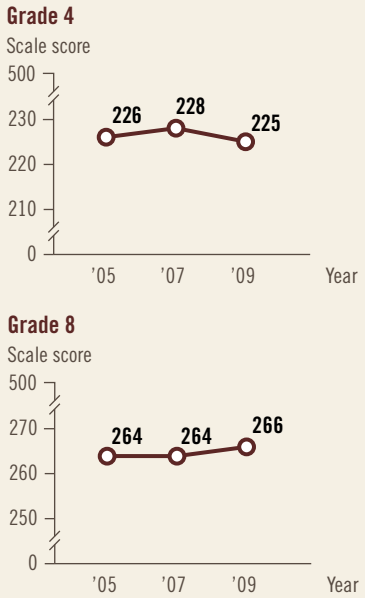
Average mathematics scores show no significant change for AI/AN fourth- and eighth-graders

Average mathematics scores in 2009 for AI/AN fourth- and eighth-graders were not significantly different from the scores in either 2007 or 2005 (figure **B**). Although there was no significant change in the average score for eighth-grade AI/AN students overall, scores were higher in 2009 than in 2005 for higher-performing students (those scoring at the 75th and 90th percentiles).

In 2009, the percentages of AI/AN students performing at or above the *Basic* level were 66 percent at grade 4 and 56 percent at grade 8. There were no significant changes in the percentages of students at or above *Basic* in comparison to earlier assessment years at either grade.

Twenty-one percent of AI/AN students at grade 4 and 18 percent at grade 8 performed at or above the *Proficient* level in 2009. While the percentage of fourth-graders at or above *Proficient* in 2009 was not significantly different from the percentages in earlier assessments, the percentage of eighth-graders was higher in 2009 than in 2005. The percentage of eighth-graders at *Advanced* also increased from 2 percent in 2005 to 3 percent in 2009.

Figure B. Trend in average scores for fourth- and eighth-grade AI/AN students in NAEP mathematics



Performance of AI/AN students in mathematics sometimes differs from other race/ethnicity groups and by demographic characteristics

Average mathematics scores for fourth-grade AI/AN students were

- higher than the score for Black students, and lower than the scores for Hispanic, White, and Asian/Pacific Islander students;
- lower for students eligible for free school lunch than for those not eligible for the National School Lunch Program;
- higher for students attending schools in city, suburban, and town locations than for those attending schools in rural locations; and
- higher for students in low density public schools than in high density public schools, and higher in low and high density public schools than in BIE schools.

Average mathematics scores for eighth-grade AI/AN students were

- higher than the score for Black students, not significantly different from the score for Hispanic students, and lower than the scores for White and Asian/Pacific Islander students;
- lower for students eligible for free school lunch than for those eligible for reduced-price lunch or not eligible for the National School Lunch Program; and
- higher for students in low density public schools than in high density public schools, and higher in low and high density public schools than in BIE schools.

AI/AN students in Oklahoma and South Dakota make gains in mathematics

Although there were no significant changes in the overall national scores for AI/AN fourth- and eighth-graders in comparison to earlier assessment years, scores did change in some states. Of the 7 states with samples large enough to report results in both 2009 and 2005, Oklahoma had a 5-point increase at grade 4, and South Dakota had a 10-point increase at grade 8. Among the 11 states with samples large enough to report results for AI/AN students in both 2009 and 2007, none had a significant change in average mathematics scores at grade 4, and South Dakota had a 6-point increase at grade 8.

Average mathematics score gaps between White and AI/AN students ranged from 7 to 33 points at grade 4 and from 13 to 41 points at grade 8 in the 12 states selected in 2009.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2005, 2007, and 2009 National Indian Education Studies.

Introduction

Since 2005, the National Indian Education Study (NIES) has provided educators, policymakers, and the public with information about the background and academic performance of fourth- and eighth-grade American Indian and Alaska Native (AI/AN) students in the United States.

This 2009 report, the first in a two-part series, focuses on the achievement of AI/AN students in reading and mathematics. Part II of the series describes AI/AN students, their teachers and schools, and the integration of native culture and language in their education.

NIES was administered in 2005, 2007, and 2009 as part of the National Assessment of Educational Progress (NAEP), which was expanded to allow for more in-depth reporting on the achievement and experiences of AI/AN students. It fulfills a mandate of Executive Order 13336 issued in 2004 to assist AI/AN students in meeting challenging academic standards set forth in the Elementary and Secondary Education Act reauthorized in 2001 (Public Law 107-110) in a manner consistent with tribal traditions, languages, and cultures. In addition, NIES reports present findings that are of interest to educational researchers and potentially relevant to research and collaborative provisions of the Executive Order.[1] Results from the 2005 and 2007 NIES reports are available at http://nces.ed.gov/nationsreportcard/nies.

AI/AN Sample

AI/AN students make up about 1 percent of the students at grades 4 and 8 nationally. Each of the five geographic regions based on U.S. Census divisions or aggregations of Census divisions presented in figure **1** contains some proportion of the AI/AN student population. About one-half of AI/AN students attend schools in the South Central and Mountain regions (table **1**).

At least one state in each of these regions (12 states total) had samples of AI/AN students large enough to report results separately for the state. Over one-half of the nation's AI/AN students reside in the 12 states listed in table **2**.

Figure 1. NIES geographic regions

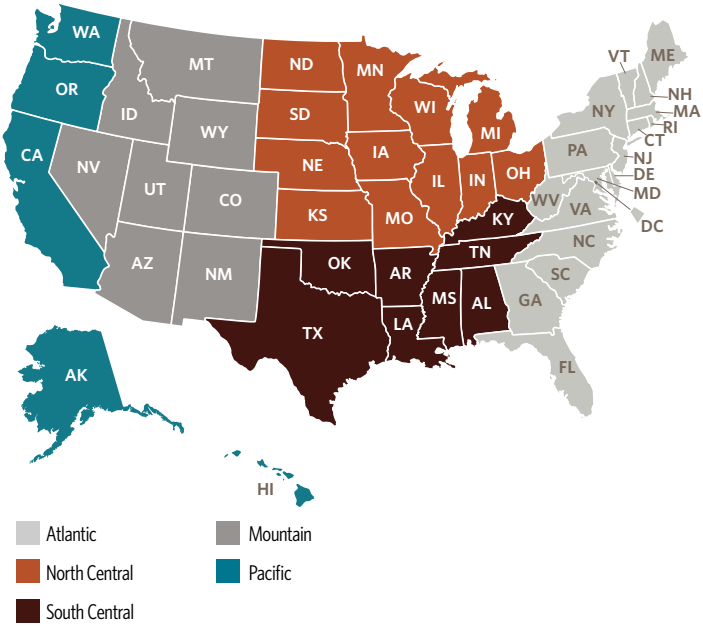


Table 1. Percentage of fourth- and eighth-grade AI/AN students, by region: 2009

Region	Grade 4	Grade 8
Atlantic	8	10
North Central	17	17
South Central	25	25
Mountain	30	27
Pacific	20	20

NOTE: AI/AN = American Indian/Alaska Native. Detail may not sum to totals because of rounding.

[1] Sec. 4. Enhancement of Research Capabilities of Tribal-Level Educational Institutions. The Secretary of Education and the Secretary of the Interior shall consult with the entities set forth in section 2(a) of this order and tribally controlled colleges and universities to seek ways to develop and enhance the capacity of tribal governments, tribal universities and colleges, and schools and educational programs serving American Indian and Alaska Native students and communities to carry out, disseminate, and implement education research, as well as to develop related partnerships or collaborations with non-tribal universities, colleges, and research organizations.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2009 National Indian Education Study.

Table 2. Total enrollment, AI/AN enrollment, and AI/AN students as a percentage of total enrollment in public elementary and secondary schools, by selected states: 2007–08

State	Total enrollment (all students)	AI/AN enrollment	AI/AN as percent of total
Nation	49,292,507	587,046	1.2
Total for selected states	**7,048,216**	**373,836**	**5.3**
Alaska	131,029	31,244	23.8
Arizona	1,087,447	59,139	5.4
Minnesota	837,578	17,759	2.1
Montana	142,823	16,260	11.4
New Mexico	329,040	35,954	10.9
North Carolina	1,489,492	21,278	1.4
North Dakota	95,059	8,396	8.8
Oklahoma	642,065	123,098	19.2
Oregon	565,586	11,926	2.1
South Dakota	121,606	13,655	11.2
Utah	576,244	9,047	1.6
Washington	1,030,247	26,080	2.5

NOTE: AI/AN = American Indian/Alaska Native.
SOURCE: U.S. Department of Education, National Center for Education Statistics, Common Core of Data (CCD), "State Nonfiscal Survey of Public Elementary/Secondary Education," 2007–08.

To obtain samples of AI/AN students large enough to report reliable results, schools in selected states with higher proportions of AI/AN students were selected at a higher rate than they would otherwise be selected for NAEP assessments. All Bureau of Indian Education (BIE) schools were also selected. To compensate for oversampling, the results for AI/AN students were weighted to reflect their actual contribution to the total population of students in grades 4 and 8 nationwide.

Students were identified as AI/AN based on official school records (see the Technical Notes for more information). About 9,900 AI/AN fourth-graders and 8,400 eighth-graders were assessed in either reading or mathematics in 2009 (table **3**).

Table 3. Number of participating schools with AI/AN students and number of participating fourth- and eighth-grade AI/AN students in NAEP reading and mathematics, by type of school: 2009

	Reading		Mathematics	
Type of school	Schools	Students	Schools	Students
Grade 4				
Total	**1,490**	**5,100**	**1,450**	**4,800**
Public	1,350	3,900	1,320	3,800
BIE	110	1,100	110	1,000
Private	‡	‡	10	‡
DoDEA[1]	10	‡	‡	‡
Grade 8				
Total	**1,200**	**4,200**	**1,210**	**4,100**
Public	1,090	3,400	1,100	3,300
BIE	90	800	90	800
Private	‡	‡	10	‡
DoDEA[1]	10	‡	10	‡

‡ Reporting standards not met.
[1] Department of Defense Education Activity (overseas and domestic schools).
NOTE: AI/AN = American Indian/Alaska Native. The number of schools is rounded to the nearest ten. The number of students is rounded to the nearest hundred. Detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2009 National Indian Education Study.

2009 NAEP Assessments in Reading and Mathematics

The National Assessment Governing Board oversees the creation of the NAEP frameworks, which describe the specific knowledge and skills that should be assessed. Frameworks incorporate ideas and input from subject area experts, school administrators, policymakers, teachers, parents, and others. NAEP frameworks also describe the types of questions that should be included, and how they should be designed and scored. An overview of the subject framework is provided in the reading and mathematics sections of this report.

Reporting Student Performance

SCALE SCORES

NAEP reading and mathematics results for grades 4 and 8 are reported as average scores on separate 0–500 scales. Because NAEP scales are developed independently for each subject, scores cannot be compared across subjects. Although results for both grades 4 and 8 were analyzed together the first time they were reported on the 0 to 500 cross-grade scale, results in subsequent years were analyzed separately for each grade. Over time, comparisons of scores across grades are not as strongly supported by the data, especially for subgroups, and are therefore discouraged.

In addition to reporting an overall average score in each subject for each grade, scores are reported at five percentiles. A percentile indicates the percentage of students whose scores fell at or below a particular score on the NAEP scale. Percentile scores show trends in results for students performing at lower (10th and 25th percentiles), middle (50th percentile), and higher (75th and 90th percentiles) levels, and how the performance of AI/AN students at different levels compares to lower-, middle-, and higher-performing students in other race/ethnicity groups.

ACHIEVEMENT LEVELS

Based on recommendations from policymakers, educators, and members of the general public, the Governing Board sets specific achievement levels for each subject area and grade. Achievement levels are performance standards showing what students should know and be able to do. NAEP results are reported as percentages of students performing at or above the *Basic* and *Proficient* levels and at the *Advanced* level.

As provided by law, NCES, upon review of congressionally mandated evaluations of NAEP, has determined that achievement levels are to be used on a trial basis and should be interpreted with caution. The NAEP achievement levels have been widely used by national and state officials.

NAEP Achievement Levels

Basic denotes partial mastery of prerequisite knowledge and skills that are fundamental for proficient work at each grade.

Proficient represents solid academic performance. Students reaching this level have demonstrated competency over challenging subject matter.

Advanced represents superior performance.

Subject-specific descriptions of what students should know and be able to do at the *Basic*, *Proficient*, and *Advanced* levels are included in the reading section (pages 32 and 40) and mathematics section (pages 69 and 77) of the report.

Interpreting Results

Results from the 2009 NAEP assessments are compared to results from 2005 and 2007 for both grades 4 and 8. NAEP reports results using widely accepted statistical standards; findings are reported based on a statistical significance level set at .05 with appropriate adjustments for multiple comparisons (see the Technical Notes for more information). The symbol (*) is used in tables and figures to indicate that the scores or percentages being compared are significantly different. Only those differences that are found to be statistically significant are discussed as higher or lower. The same standard applies when comparing the performance of one student group to another.

Comparisons over time or between groups are based on statistical tests that consider both the size of the differences and the standard errors of the statistics being compared. Standard errors represent the amount of uncertainty in estimates that are based on a sample instead of the entire population of interest. Estimates based on smaller groups are likely to have larger standard errors. The size of the standard errors may also be influenced by other factors such as how representative the students assessed are of the entire population. When an estimate has a large standard error, a numerical difference that seems large may not be statistically significant. Differences of the same magnitude may or may not be statistically significant depending upon the size of the standard errors of the estimates.

Score differences or gaps cited in this report are based on differences between unrounded numbers. Therefore, the reader may find that the score difference cited in the text may not be identical to the difference obtained from subtracting the rounded values shown in the accompanying tables or figures.

COMPARISONS BY SCHOOL TYPE AND DENSITY

AI/AN students differ in terms of the types of schools they attend. In 2009, most AI/AN students attended public schools (91 percent at grade 4 and 90 percent at grade 8). The percentages of AI/AN students attending federally supported BIE schools were 7 percent at grade 4 and 6 percent at grade 8. The remaining students (2 percent at grade 4 and 4 percent at grade 8) attended other types of schools, including private schools.

While national and regional results reflect the performance of students in public schools, Bureau of Indian Education (BIE) schools, Department of Defense schools, and private schools, state-level results presented in this report reflect the performance of public and BIE school students only. For comparison purposes within the state results section, the national sample is composed of public and BIE school students only.

The proportion of AI/AN students in the schools they attended also differed. Forty-six percent of AI/AN fourth-graders and 44 percent of eighth-graders attended "high density" schools where 25 percent or more of the students were AI/AN, including those in BIE schools. The remaining AI/AN students (54 percent at grade 4 and 56 percent at grade 8) attended "low density" schools where less than 25 percent of the students were AI/AN.

Because AI/AN students' experiences might vary depending on the types of schools they attend, results are reported for three mutually exclusive categories: low density public schools, high density public schools, and BIE schools. The results presented in this report compare the performance of students in each of the three types of schools.

CAUTIONS IN INTERPRETATION

NAEP is not designed to identify the causes of changes or differences in student achievement or characteristics. Further, the many factors that may influence average student achievement scores also change across time and vary according to geographic location. These include, for example, educational policies and practices, the quality of teachers, available resources, and the demographic characteristics of the student body.

Characteristics of AI/AN Students

Information about how student characteristics differ across groups helps to provide some context for interpreting results. Information collected from the NAEP questionnaires show differences between AI/AN students and non-AI/AN students and between AI/AN students attending different types of schools.

At both grades 4 and 8, higher percentages of AI/AN students than non-AI/AN students overall attended schools in rural locations and were eligible for the National School Lunch Program (an indicator of low family income), and lower percentages of AI/AN students had a computer in the home (**table 4**). When compared to other specific race/ethnicity groups, the percentages of fourth- and eighth-grade AI/AN students eligible for school lunch were higher than the percentages of White and Asian/Pacific Islander students, but lower than the percentages of Black and Hispanic students. The percentages of AI/AN students reporting having more than 25 books in the home were higher than the percentages of Black and Hispanic students and lower than the percentages of White and Asian/Pacific Islander students at both grades.

Table 4. Percentage of fourth- and eighth-grade students, by race/ethnicity and selected student characteristics: 2009

Characteristic	AI/AN	Non-AI/AN	Other race/ethnicity groups			
			Black	Hispanic	White	Asian/Pacific Islander
Grade 4						
Attend rural schools	46	21*	12*	11*	29*	8*
English language learners	8	9	1*	36*	1*	17*
Students with disabilities	12	11*	12	9*	12	6*
Eligible for free/reduced-price school lunch	67	44*	72*	75*	26*	32*
More than 25 books in home	55	67*	52*	46*	79*	72*
Computer in home	78	89*	85*	81	93*	93*
No days absent from school	43	52*	51*	51*	53*	65*
Grade 8						
Attend rural schools	49	21*	14*	10*	28*	8*
English language learners	6	5	1*	21*	#*	11*
Students with disabilities	14	10*	12	9*	10*	4*
Eligible for free/reduced-price school lunch	59	39*	67*	70*	22*	35*
Parental education beyond high school	55	65*	64*	38*	74*	68*
More than 25 books in home	57	65*	52*	40*	77*	69*
Computer in home	82	92*	88*	86*	95*	97*
No days absent from school	35	45*	45*	45*	44*	63*

Rounds to zero.
* Significantly different ($p < .05$) from AI/AN students.
NOTE: AI/AN = American Indian/Alaska Native. Black includes African American, Hispanic includes Latino, and Pacific Islander includes Native Hawaiian. Race categories exclude Hispanic origin. Results are not shown for students whose race/ethnicity was unclassified, but they are included in the results for non-AI/AN students. Information on parental education was not collected at grade 4.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2009 Mathematics Assessment.

At both grades 4 and 8, comparisons between AI/AN students attending different types of schools showed higher percentages of students in rural schools, English language learners, and students eligible for the National School Lunch Program in high density public schools and BIE schools than in low density public schools (table **5**).

The percentages of students in these groups were also higher in BIE schools than in high density public schools. The percentages of students who reported having a computer in the home were higher among those attending low density public schools than those in high density public schools or BIE schools.

Table 5. Percentage of fourth- and eighth-grade AI/AN students, by school type/density and selected student characteristics: 2009

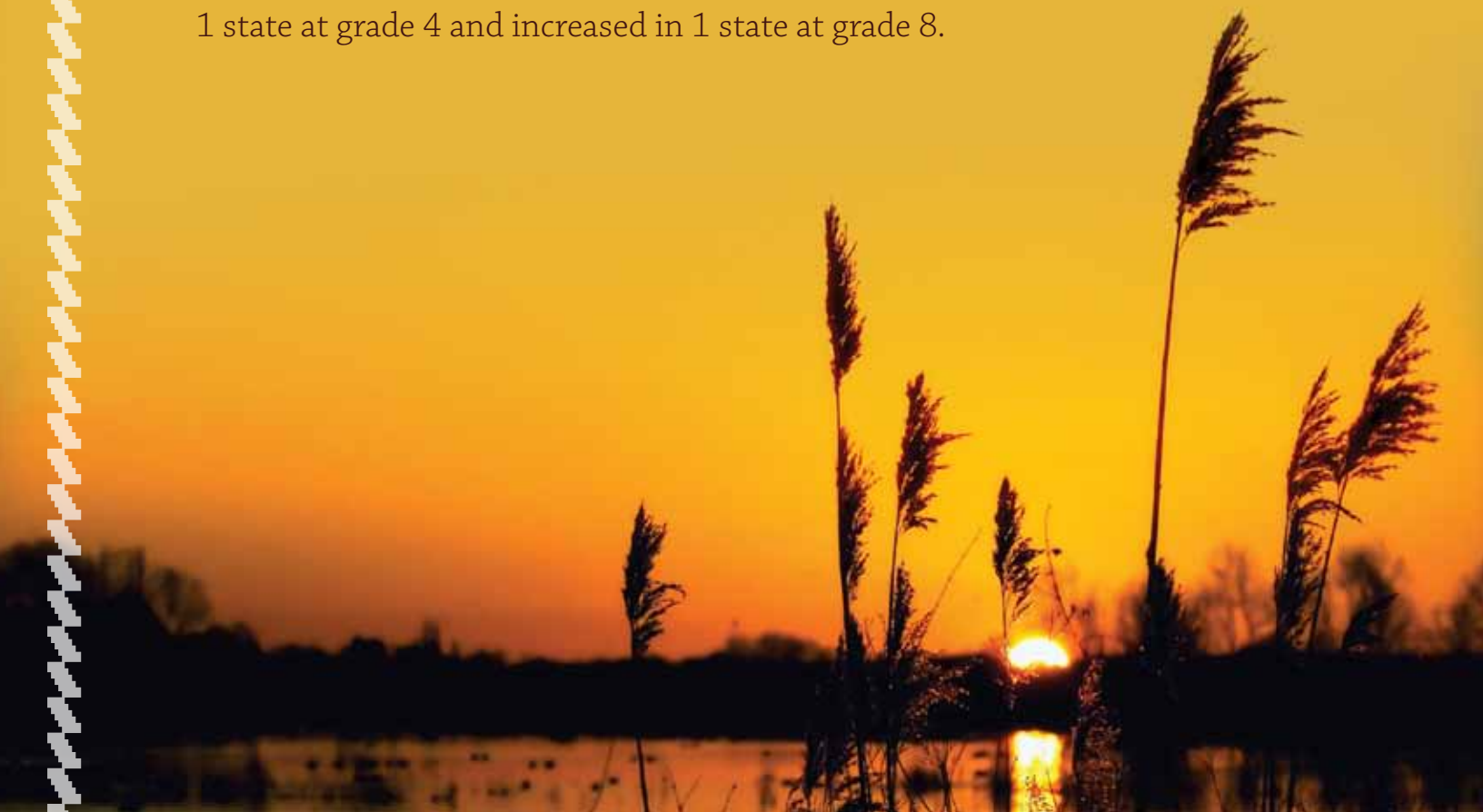
	School type/density		
Characteristic	Low density public schools	High density public schools	BIE schools
Grade 4			
Attend rural schools	25	70*	91*,**
English language learners	3	12*	35*,**
Students with disabilities	15	14	13*
Eligible for free/reduced-price school lunch	58	79*	87*,**
More than 25 books in home	63	47*	36*,**
Computer in home	82	74*	63*,**
No days absent from school	43	40	37*,**
Grade 8			
Attend rural schools	30	72*	88*,**
English language learners	1	11*	34*,**
Students with disabilities	17	13*	16**
Eligible for free/reduced-price school lunch	53	74*	83*,**
Parental education beyond high school	56	51	43*,**
More than 25 books in home	61	48*	35*,**
Computer in home	85	76*	64*,**
No days absent from school	35	34	37

* Significantly different ($p < .05$) from low density public schools.
** Significantly different ($p < .05$) from high density public schools.
NOTE: AI/AN = American Indian/Alaska Native. BIE = Bureau of Indian Education. School density indicates the proportion of AI/AN students enrolled. Low density schools have less than 25 percent AI/AN students. High density schools have 25 percent or more. Results are not shown for Department of Defense and private schools. Information on parental education was not collected at grade 4.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2009 National Indian Education Study.

Reading

Gains were made since 2007 for American Indian/Alaska Native (AI/AN) students at grade 8 but not at grade 4. In 2009, the average score for AI/AN fourth-graders in the nation was not significantly different from the scores in either 2007 or 2005. At grade 8, the average reading score for AI/AN students was higher in 2009 than in 2007 but was not significantly different from the score in 2005. Among the 11 states with samples large enough to report results for AI/AN students in both 2007 and 2009, scores decreased in 1 state at grade 4 and increased in 1 state at grade 8.



Overview of the 2009 Reading Assessment

Information about the assessment content helps to provide some context for interpreting results for AI/AN students. The *Reading Framework for the 2009 National Assessment of Educational Progress* describes the types of texts and questions that should be included in the assessment, as well as how the questions should be designed and scored. The development of the NAEP reading framework was guided by scientifically based reading research that defines reading as a dynamic cognitive process that allows students to

- understand written text;
- develop and interpret meaning; and
- use meaning as appropriate to the type of text, purpose, and situation.

The NAEP reading framework specifies the use of both literary and informational texts. Literary texts include three types at each grade: fiction, literary nonfiction, and poetry. Informational texts include three broad categories: exposition; argumentation and persuasive text; and procedural text and documents. The inclusion of distinct text types recognizes that students read different texts for different purposes.

The *Reading Framework for the 2009 National Assessment of Educational Progress* replaces the framework first used for the 1992 reading assessment and then for subsequent reading assessments through 2007. Compared to the previous framework, the 2009 reading framework includes more emphasis on cognitive processes, a wider variety of literary and informational texts, and a new systematic assessment of vocabulary knowledge. Results from special analyses determined the 2009 reading assessment results could be compared with those from earlier assessment years. These special analyses started in 2007 and included in-depth comparisons of the frameworks and the test questions, as well as a close examination of how the same students performed on the 2009 assessment and the earlier assessment. A summary of these special analyses and an overview of the differences between the previous framework and the 2009 framework are available on the Web at http://nces.ed.gov/nationsreportcard/reading/trend_study.asp.

The framework specifies three reading behaviors, or *cognitive targets*: locate/recall, integrate/interpret, and critique/evaluate. The term *cognitive target* refers to the mental processes or kinds of thinking that underlie reading comprehension. Reading questions are developed to measure these cognitive targets for both literary and informational texts.

In addition, the framework calls for a systematic assessment of *meaning vocabulary*. Meaning vocabulary questions measure readers' knowledge of specific word meaning as used in the passage by the author and also measure passage comprehension. The complete reading framework for 2009 is available at http://www.nagb.org/publications/frameworks/reading09.pdf.

Reading Cognitive Targets

Locate and Recall: When locating or recalling information from what they have read, students may identify explicitly stated main ideas or may focus on specific elements of a story.

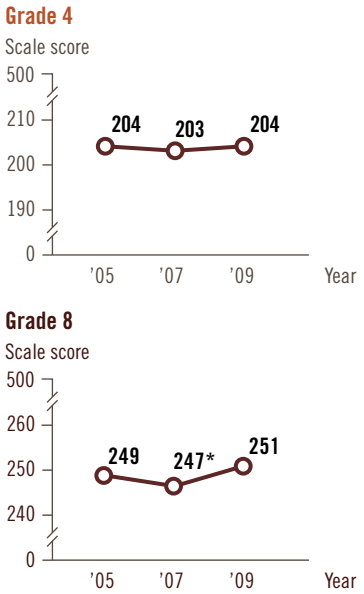
Integrate and Interpret: When integrating and interpreting what they have read, students may make comparisons, explain character motivation, or examine relations of ideas across the text.

Critique and Evaluate: When critiquing or evaluating what they have read, students view the text critically by examining it from numerous perspectives or may evaluate overall text quality or the effectiveness of particular aspects of the text.

Scores for AI/AN students increase since 2007 at grade 8 but not at grade 4

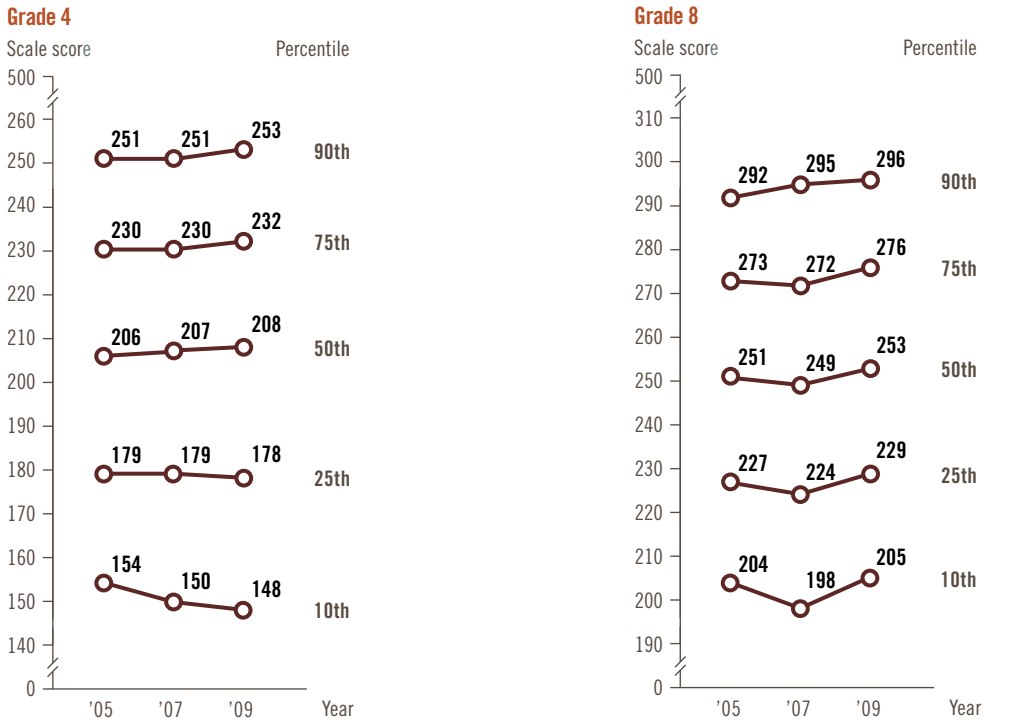
There were no significant changes in the overall average reading score (figure **R-1**) for AI/AN fourth-graders or in the scores at any of the five percentiles (figure **R-2**) in comparison to either 2007 or 2005. Although the overall average score for AI/AN eighth-graders was higher in 2009 than in 2007, there were no significant changes in the scores for students at any of the five percentiles in comparison to either 2007 or 2005.

Figure **R-1.** Trend in average scores for fourth- and eighth-grade AI/AN students in NAEP reading



* Significantly different ($p < .05$) from 2009.
NOTE: AI/AN = American Indian/Alaska Native. For consistency with performance results for AI/AN students presented in other 2009 NAEP reports, comparisons between the results for 2009 and those in previous years presented in this figure are based on multiple comparison procedures that limit the likelihood of finding significant differences by chance by considering all six NAEP race/ethnicity categories simultaneously.

Figure **R-2.** Trend in percentile scores for fourth- and eighth-grade AI/AN students in NAEP reading

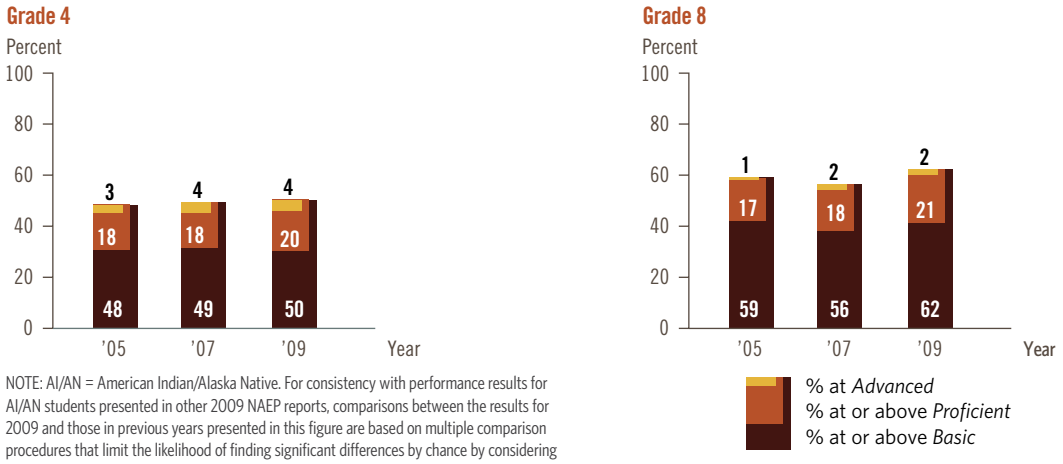


NOTE: AI/AN = American Indian/Alaska Native. For consistency with performance results for AI/AN students presented in other 2009 NAEP reports, comparisons between the results for 2009 and those in previous years presented in this figure are based on multiple comparison procedures that limit the likelihood of finding significant differences by chance by considering all six NAEP race/ethnicity categories simultaneously.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2005, 2007, and 2009 National Indian Education Studies.

In 2009, the percentages of AI/AN students performing at or above the *Basic* level were 50 percent at grade 4 and 62 percent at grade 8 (figure **R-3**). Twenty percent of AI/AN students at grade 4 and 21 percent at grade 8 performed at or above the *Proficient* level in 2009. There were no significant changes in the percentages of students at or above *Basic*, at or above *Proficient*, or at *Advanced* in comparison to earlier assessment years at either grade.

Figure **R-3.** Trend in achievement-level results for fourth- and eighth-grade AI/AN students in NAEP reading



NOTE: AI/AN = American Indian/Alaska Native. For consistency with performance results for AI/AN students presented in other 2009 NAEP reports, comparisons between the results for 2009 and those in previous years presented in this figure are based on multiple comparison procedures that limit the likelihood of finding significant differences by chance by considering all six NAEP race/ethnicity categories simultaneously.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2005, 2007, and 2009 National Indian Education Studies.

AI/AN students score lower than White and Asian/Pacific Islander students and comparably to Hispanic students

In 2009, AI/AN students scored 17 points lower on average than non-AI/AN students at grade 4 and 13 points lower at grade 8 (table **R-1**). When compared to other race/ethnicity groups, the average score for fourth-grade AI/AN students was not significantly different from the scores for Black and Hispanic students and lower than the scores for White and Asian/Pacific Islander students. At grade 8, the score for AI/AN students was higher than the score for Black students, not significantly different from the score for Hispanic students, and lower than the scores for White and Asian/Pacific Islander students.

Like the results that compared overall scale scores for AI/AN students to other race/ethnicity groups, scores at each of the five percentiles were lower for AI/AN students than for White and Asian/Pacific Islander students at both grades. However, differences between AI/AN students and Black and Hispanic students varied for students performing at different points on the scale.

Although there was no significant difference in the overall scores for AI/AN and Black students at grade 4, some differences between the two groups were seen for lower- and higher-performing

Table **R-1.** Percentile scores for fourth- and eighth-grade students in NAEP reading, by race/ethnicity: 2009

			Other race/ethnicity groups			
Percentile	AI/AN	Non-AI/AN	Black	Hispanic	White	Asian/Pacific Islander
Grade 4						
Overall	204	221*	205	205	230*	235*
10th	148	175*	161*	159*	190*	190*
25th	178	199*	184	183	211*	214*
50th	208	224*	206	208	232*	237*
75th	232	246*	228*	229	252*	259*
90th	253	264*	246*	248	269*	277*
Grade 8						
Overall	251	264*	246*	249	273*	274*
10th	205	220*	204	203	233*	229*
25th	229	244*	226	228	254*	254*
50th	253	267*	248*	252	275*	277*
75th	276	288*	269*	273	294*	298*
90th	296	305*	286*	291*	310*	316*

* Significantly different ($p < .05$) from AI/AN students.
NOTE: AI/AN = American Indian/Alaska Native. Black includes African American, Hispanic includes Latino, and Pacific Islander includes Native Hawaiian. Race categories exclude Hispanic origin. Results are not shown for students whose race/ethnicity was unclassified, but they are included in the results for non-AI/AN students.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2009 National Indian Education Study.

students. The reading score for AI/AN students at the 10th percentile was lower than the score for Black students, and scores at the 75th and 90th percentiles were higher.

Differences between AI/AN and Hispanic fourth-graders were seen for lower-performing students but not for middle- and higher-performing students. While the score for AI/AN students at the 10th percentile was lower than the score for Hispanic students, there were no significant differences between the scores for the two groups at the 25th, 50th, 75th, and 90th percentiles.

At grade 8, scores for AI/AN students were higher than for Black students overall and at the 50th, 75th, and 90th percentiles. There were no significant differences between scores for the two groups at the 10th and 25th percentiles.

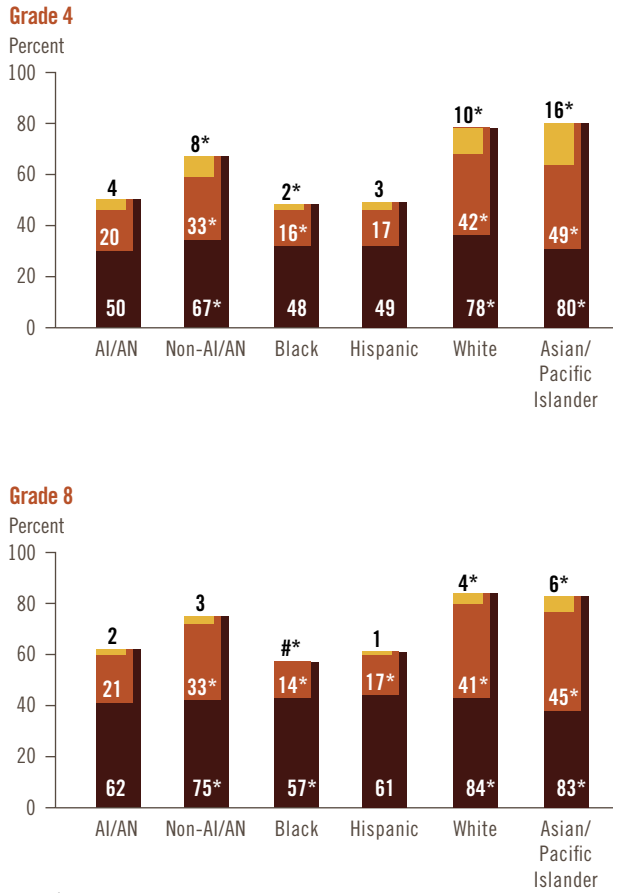
Although there was no significant difference in the overall average scores for AI/AN and Hispanic eighth-graders, the score for AI/AN students at the 90th percentile was higher than the score for Hispanic students.

DIFFERENCES BETWEEN AI/AN STUDENTS AND BLACK AND HISPANIC STUDENTS VARY BY ACHIEVEMENT LEVEL

Although the average reading score for AI/AN fourth-graders was not significantly different from the score for Black students, the percentage of AI/AN students performing at or above the *Proficient* level was higher than the percentage of Black students (figure **R-4**). At grade 8, the percentage of AI/AN students performing at or above the *Proficient* level was higher than the percentage of Hispanic students, although there was no significant difference in the overall scores.

Like the overall scale score results, the percentages of AI/AN students at or above *Basic*, at or above *Proficient*, and at *Advanced* were lower than the percentages of White or Asian/Pacific Islander students at both grades.

Figure **R-4.** Achievement-level results for fourth- and eighth-grade students in NAEP reading, by race/ethnicity: 2009



Rounds to zero.
* Significantly different ($p < .05$) from AI/AN students.
NOTE: AI/AN = American Indian/Alaska Native. Black includes African American, Hispanic includes Latino, and Pacific Islander includes Native Hawaiian. Race categories exclude Hispanic origin. Results are not shown for students whose race/ethnicity was unclassified, but they are included in the results for non-AI/AN students.

Additional results from the 2009 NAEP reading assessment by race/ethnicity and other student and school characteristics are provided in appendix tables **A-1** and **A-2**.

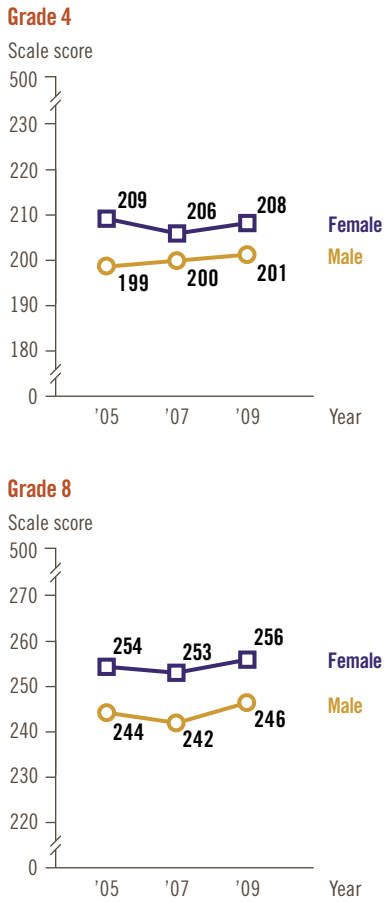
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2009 National Indian Education Study.

No significant change in reading performance of male or female AI/AN students over time

In 2009, average reading scores were higher for AI/AN female students than for male students at both grades 4 and 8 (figure **R-5**). The average score for AI/AN female students was 7 points higher than the score for male students at grade 4, and 10 points higher at grade 8.

Neither male nor female students had a significant change in scores in comparison to earlier assessments at either grade.

Figure **R-5.** Trend in average scores for fourth- and eighth-grade AI/AN students in NAEP reading, by gender



NOTE: AI/AN = American Indian/Alaska Native.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2005, 2007, and 2009 National Indian Education Studies.

AI/AN students eligible for free school lunch score lower than those eligible for reduced-price lunch at both grades 4 and 8

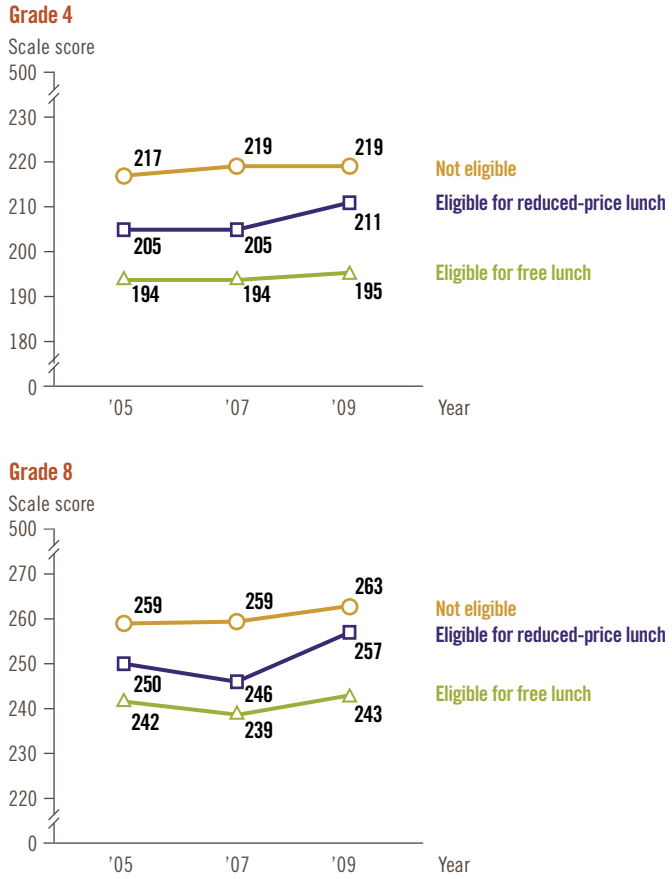
NAEP uses students' eligibility for the National School Lunch Program as an indicator of low income (see the Technical Notes for eligibility criteria). Sixty-six percent[2] of AI/AN fourth-graders and 62 percent[2] of eighth-graders participating in the 2009 reading assessment were eligible for the National School Lunch Program (see appendix table **A-2**). The majority of these students were eligible for free school lunches (59 percent of AI/AN students at grade 4 and 55 percent at grade 8).

At both grades 4 and 8, AI/AN students who were not eligible for the program and those eligible for reduced-price lunch scored higher on average in reading than those eligible for free lunch in 2009 (figure **R-6**). Scores for fourth- and eighth-graders who were eligible for reduced-price lunch were not significantly different from the scores for students who were not eligible.

In comparison to previous assessment years, there were no significant changes in average reading scores for AI/AN students in any of the three eligibility groups at either grade 4 or grade 8.

[2] The percentage is calculated based on the sum of the unrounded numbers rather than the rounded numbers shown in the table.

Figure **R-6.** Trend in average scores for fourth- and eighth-grade AI/AN students in NAEP reading, by eligibility for National School Lunch Program



NOTE: AI/AN = American Indian/Alaska Native.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2005, 2007, and 2009 National Indian Education Studies.

AI/AN students' performance in reading varies by region of the country

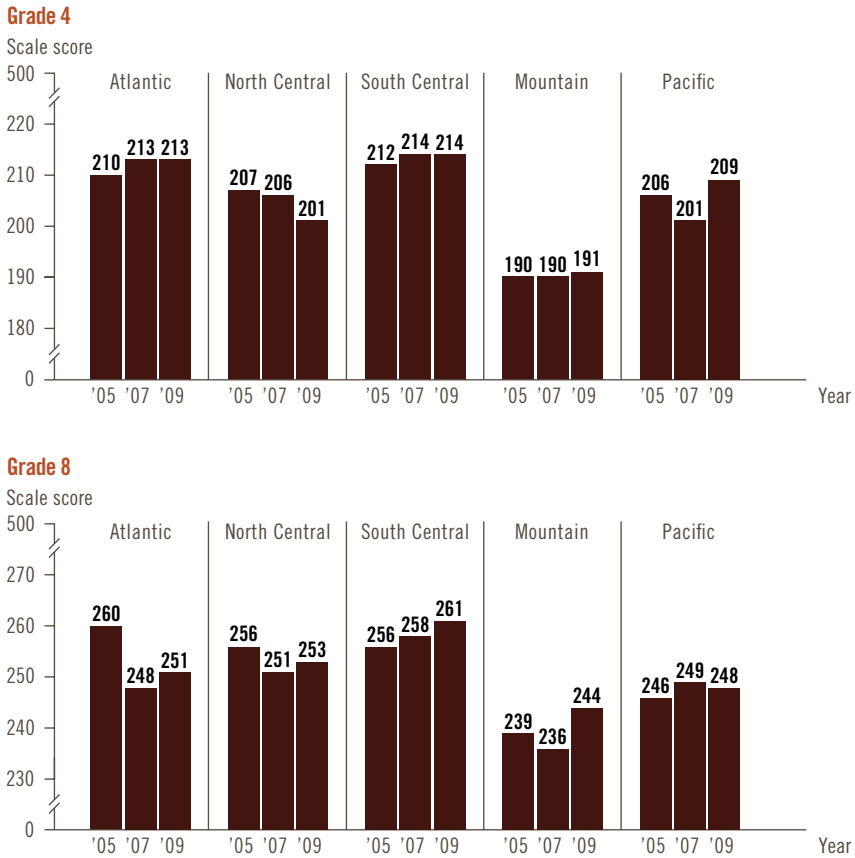
NAEP results for AI/AN students are reported for five regions of the country: Atlantic, North Central, South Central, Mountain, and Pacific. These regions, which differ from the typical regions used in other NAEP reports, are based on U.S. Census divisions, and each contains some proportion of the AI/AN student population.

At grade 4, AI/AN students in the Atlantic and South Central regions scored higher on average in 2009 than students in the North Central and Mountain regions (figure **R-7**). Scores for students in the North Central and Pacific regions were higher than the score for fourth-graders in the Mountain region.

At grade 8, AI/AN students in the South Central region scored higher on average in 2009 than students in the Pacific, North Central, and Mountain regions; those in the North Central region scored higher than those in the Mountain region.

Average reading scores for AI/AN students in each of the regions in 2009 were not significantly different from the scores in earlier assessment years at either grade.

Figure **R-7.** Trend in average scores for fourth- and eighth-grade AI/AN students in NAEP reading, by region



NOTE: AI/AN = American Indian/Alaska Native.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2005, 2007, and 2009 National Indian Education Studies.

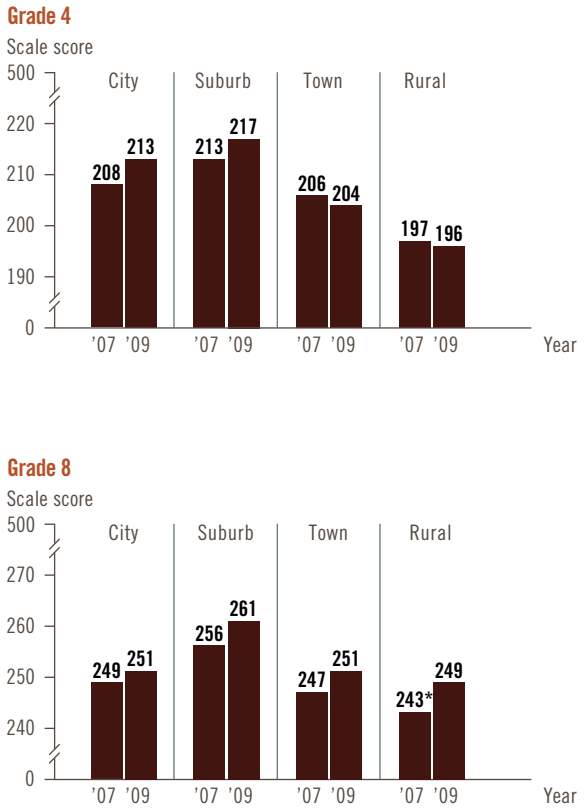
Eighth-grade AI/AN students in suburban schools score higher than in other locations

AI/AN students' performance in reading varied by the location of their school at both grades 4 and 8. In 2009, average scores for AI/AN fourth-graders attending schools in city, suburb, and town locations were higher than the score for students attending schools in rural locations (figure **R-8**). The score for eighth-grade students attending suburban schools was higher than the scores for students attending schools in city, town, and rural locations.

Average scores for fourth-grade students attending schools in each of the different locations in 2009 were not significantly different from the scores in 2007. The average score for eighth-graders attending schools in rural locations was 5 points[3] higher in 2009 than in 2007. Because of changes in location classifications in 2007, comparisons cannot be made to the results by type of location for 2005 (see the Technical Notes).

[3] The score-point difference is based on the difference between the unrounded scores as opposed to the rounded scores shown in the figure.

Figure **R-8.** Average scores for fourth- and eighth-grade AI/AN students in NAEP reading, by school location: 2007 and 2009



* Significantly different ($p < .05$) from 2009.
NOTE: AI/AN = American Indian/Alaska Native.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2007 and 2009 National Indian Education Studies.

AI/AN students in public schools score higher than those in BIE schools

AI/AN students' performance in reading varied by the proportion of AI/AN students in the schools they attended. In 2009, overall average scores for both fourth- and eighth-grade AI/AN students who attended low density public schools (where less than 25 percent of the students were AI/AN) were higher than the scores for students in high density schools (where 25 percent or more of the students were AI/AN), and scores for students in low and high density public schools were higher than the scores for students in BIE schools (table **R-2**).

Table **R-2.** Percentage of fourth- and eighth-grade AI/AN students and average scores in NAEP reading, by type of school and selected student and school characteristics: 2009

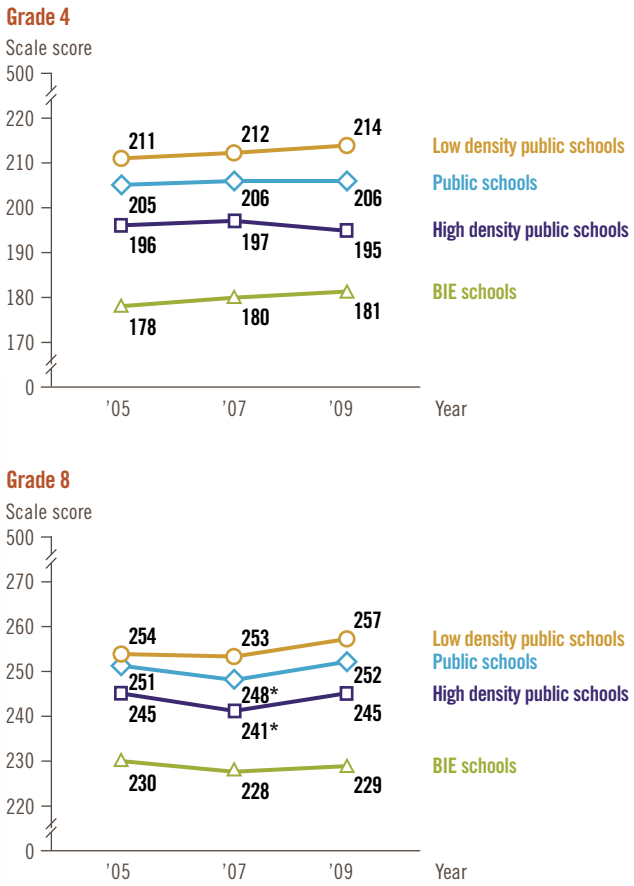
Characteristic	Type of school							
	Public		Low density public		High density public		BIE	
	Percentage of students	Average score	Percentage of students	Average score	Percentage of students	Average score	Percentage of students	Average score
Grade 4								
Overall	100	206	100	214	100	195*	100	181*,**
Eligibility for school lunch								
Eligible for free lunch	57	197	46	206	74*	189*	85*,**	180*,**
Eligible for reduced-price lunch	7	211	8	212	6	209	2*,**	‡
Not eligible	35	220	45	222	20*	213	4*,**	‡
School location								
City	19	212	30	214	3*	186*	#	‡
Suburb	17	217	28	217	1*	‡	4*,**	‡
Town	22	204	18	208	27*	201	5*,**	‡
Rural	43	200	23	215	69*	193*	91*,**	179*,**
Students with disabilities	12	175	12	187	12	156*	12	148*
English language learners	6	170	2	‡	11*	165	34*,**	169
Grade 8								
Overall	100	252	100	257	100	245*	100	229*,**
Eligibility for school lunch								
Eligible for free lunch	54	245	47	249	66*	239*	83*,**	228*,**
Eligible for reduced-price lunch	7	256	8	255	5*	258	1*,**	‡
Not eligible	38	263	44	265	29*	257*	4*,**	‡
School location								
City	16	250	25	251	2*	‡	#	‡
Suburb	15	261	25	262	1	‡	3*	‡
Town	21	252	20	254	23	250	9*,**	230*,**
Rural	48	250	31	259	75*	244*	88*,**	228*,**
Students with disabilities	13	218	15	223	11	207*	15	199*
English language learners	5	216	1	‡	11*	215	34*,**	216

Rounds to zero.
‡ Reporting standards not met.
* Significantly different ($p < .05$) from low density public schools.
** Significantly different ($p < .05$) from high density public schools.
NOTE: AI/AN = American Indian/Alaska Native. BIE = Bureau of Indian Education. School density indicates the proportion of AI/AN students enrolled. Low density schools have less than 25 percent AI/AN students. High density schools have 25 percent or more. Results are not shown for Department of Defense and private schools. For the eligibility for school lunch category, results are not shown for students whose eligibility status was not available. For the school location category, detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2009 National Indian Education Study.

Results by school type and density over time are presented in figure **R-9**. In comparison to the scores in 2005 and 2007, there were no significant changes in average scores in 2009 for fourth-grade AI/AN students attending low or high density public schools, or BIE schools. The average score for eighth-grade AI/AN students in high density public schools was higher in 2009 than in 2007 but not significantly different from the score in 2005.

Figure R-9. Trend in average scores for fourth- and eighth-grade AI/AN students in NAEP reading, by school type/density



* Significantly different ($p < .05$) from 2009.
NOTE: AI/AN = American Indian/Alaska Native. BIE = Bureau of Indian Education. School density indicates the proportion of AI/AN students enrolled. Low density schools have less than 25 percent AI/AN students. High density schools have 25 percent or more.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2005, 2007, and 2009 National Indian Education Studies.

Reading Results for AI/AN Students in Selected States

Results are presented in this section for 12 states with relatively large populations of AI/AN students. The AI/AN student enrollment in these states represents more than 50 percent of the AI/AN student enrollment in the nation. NIES state-level data include results from AI/AN students who attended public and BIE schools. The national AI/AN sample referenced as a point of comparison to these state results was also made up of public and BIE school students only.

When comparing the performance of AI/AN students in different states, it is important to consider how these states differ in school and student characteristics. For example, states varied in the percentages of AI/AN students attending certain types of schools and schools in certain locations (table **R-3**). In four of the states (Arizona, New Mexico, North Dakota, and South Dakota), the percentages of AI/AN students who attended BIE schools ranged from 18 to 27 percent at grade 4, and from 15 to 31 percent at grade 8, while 6 percent or less of AI/AN students in the remaining eight states attended BIE schools.

Forty-six percent of AI/AN students attending public and BIE schools at grade 4 and 50 percent at grade 8 attended schools in rural locations. The percentages of students attending schools in rural areas in the 12 selected states ranged from 8 to 69 percent at grade 4, and from 13 to 72 percent at grade 8.

States also varied in the percentages of students eligible for the National School Lunch Program and in the percentages of students with disabilities and English language learners. Nationally, higher percentages of fourth- and eighth-grade AI/AN students were eligible for the National School Lunch Program than were not eligible, and higher percentages were eligible for free lunch than for reduced-price lunch. The percentages of AI/AN students eligible for free school lunch in the 12 selected states ranged from 54 percent to 90 percent at grade 4, and from 48 to 84 percent at grade 8 (table **R-4**).

Among the 12 selected states, the percentages of AI/AN students with disabilities ranged from 6 to 29 percent at grade 4, and from 10 to 21 percent at grade 8. The percentages of English language learners ranged from less than 1 percent to 34 percent at grade 4, and from less than 1 percent to 31 percent at grade 8.

Table **R-3.** Percentage of fourth- and eighth-grade AI/AN students in NAEP reading, by selected school characteristics and jurisdiction: 2009

Jurisdiction	Type of school				School location			
	Public	Low density public	High density public	BIE	City	Suburb	Town	Rural
Grade 4								
Nation	93	54	39	7	18	16	21	46
Alaska	100	28*	72*	#	17	2*	15*	66*
Arizona	82*	34*	48	18*	19	6*	15	60*
Minnesota	94	71*	23*	6	17	7	20	55
Montana	100	38*	61*	#	19	1	25	55
New Mexico	73*	21*	52*	27*	15	4*	23	58*
North Carolina	100	42*	58*	#	4*	7	21	68
North Dakota	79*	34*	44	21*	16	4*	13*	67*
Oklahoma	100*	37*	63*	#*	7*	9*	33*	51
Oregon	100	83*	17*	#	22	12	35*	31*
South Dakota	74*	24*	49*	26*	16	1*	13*	69*
Utah	96*	68*	27*	4*	29	31*	32*	8*
Washington	95*	78*	17*	5*	21	46*	17	17*
Grade 8								
Nation	94	57	37	6	15	15	20	50
Alaska	100	36*	64*	#	19	#	16	65*
Arizona	85*	33*	51*	15*	23	5*	13	59
Minnesota	94	77*	16	6	14	20	15	51
Montana	98*	44*	54*	2*	19	2*	26	54
New Mexico	76*	24*	52*	24*	15	7	10*	67*
North Carolina	100	40	60*	#	4	8	19	69
North Dakota	81*	31*	50*	19*	10	4*	15	71*
Oklahoma	99*	41*	58*	1*	6*	12	33*	50
Oregon	100	84*	16*	#	15	13	34	38
South Dakota	69*	25*	44*	31*	15	#	12*	72*
Utah	100	70*	30	#	3	34*	50*	13
Washington	96*	88*	8*	4*	18	27*	16	39

Rounds to zero.

* Significantly different ($p < .05$) from AI/AN students in the nation.

NOTE: AI/AN = American Indian/Alaska Native. BIE = Bureau of Indian Education. School density indicates the proportion of AI/AN students enrolled. Low density schools have less than 25 percent AI/AN students. High density schools have 25 percent or more. Results are not shown for Department of Defense and private schools. Detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2009 National Indian Education Study.

Table **R-4.** Percentage of fourth- and eighth-grade AI/AN students in NAEP reading, by selected student characteristics and jurisdiction: 2009

Jurisdiction	Eligibility for National School Lunch Program			Students with disabilities	English language learners
	Eligible for free lunch	Eligible for reduced-price lunch	Not eligible		
Grade 4					
Nation	59	7	32	12	8
Alaska	67*	5	27	17*	21*
Arizona	71*	7	20*	11	13*
Minnesota	67	#*	30	29*	#*
Montana	75*	8	17*	8	17*
New Mexico	90*	#*	9*	13	34*
North Carolina	69	#*	31	13	#
North Dakota	80*	1*	20*	11	9
Oklahoma	54	11*	35	9*	#*
Oregon	63	#	35	12	6
South Dakota	73*	4*	13*	11	2*
Utah	63	9	27	6	19*
Washington	62	1	35	20*	1*
Grade 8					
Nation	56	6	36	13	7
Alaska	60	5	31	16	22*
Arizona	74*	4	20*	11	13*
Minnesota	57	3	40	18	#
Montana	63	8	28	12	19*
New Mexico	82*	2*	15*	15	31*
North Carolina	67	1	32	21	#*
North Dakota	84*	1*	15*	17	6
Oklahoma	48*	10*	42*	12	1*
Oregon	53	2*	41	16	3*
South Dakota	68*	4	14*	12	4*
Utah	55	9	33	10	13
Washington	55	4	40	11	#

Rounds to zero.
* Significantly different ($p < .05$) from AI/AN students in the nation.
NOTE: AI/AN = American Indian/Alaska Native. Results are not shown for students whose eligibility status for the National School Lunch Program was not available.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2009 National Indian Education Study.

Scores increase since 2007 for AI/AN students in one state and decrease in another

Among the 11 states with samples large enough to report results for AI/AN students in both 2009 and 2007, Alaska had an 8-point[4] decrease in the average score at grade 4, and Arizona had a 10-point[4] increase at grade 8 (table **R-5**). Of the 7 states with samples large enough to report results in both 2009 and 2005, none had a significant change in average reading scores at grade 4 or grade 8.

[4] The score-point difference is based on the difference between the unrounded scores as opposed to the rounded scores shown in the table.

Table **R-5.** Average scores for fourth- and eighth-grade AI/AN students in NAEP reading, by jurisdiction: 2005, 2007, and 2009

Jurisdiction	2005	2007	2009
Grade 4			
Nation	203	204	204
Alaska	183	188*	179
Arizona	184	184	188
Minnesota	—	205	199
Montana	201	204	206
New Mexico	186	193	188
North Carolina	—	202	202
North Dakota	198	201	202
Oklahoma	211	213	215
Oregon	—	206	210
South Dakota	194	192	190
Utah	—	—	194
Washington	—	204	212
Grade 8			
Nation	249	247*	251
Alaska	240	236	239
Arizona	238	232*	241
Minnesota	—	246	257
Montana	247	249	253
New Mexico	236	233	236
North Carolina	—	236	235
North Dakota	248	246	242
Oklahoma	254	256	258
Oregon	—	260	259
South Dakota	238	241	242
Utah	—	—	235
Washington	—	251	253

— Not available.
* Significantly different ($p < .05$) from 2009.
NOTE: AI/AN = American Indian/Alaska Native.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2005, 2007, and 2009 National Indian Education Studies.

AI/AN fourth-graders in one state perform higher than AI/AN students in the nation, and students in four states score lower

The average reading scores for AI/AN fourth-graders in the 12 selected states with large proportions of AI/AN students are compared to each other and to average scores for AI/AN students in the nation and to the other jurisdictions combined in figure **R-10**. As shown in the first column of the figure, the average reading score for AI/AN fourth-graders in Oklahoma was higher than the score for AI/AN students in the nation. Among the remaining 11 states with samples large enough to report results for AI/AN students, scores were not significantly different from the nation in 7 states, and scores were lower than the nation in 4 states.

Figure **R-10.** Cross-jurisdiction comparison of average scores for fourth-grade AI/AN students in NAEP reading: 2009

Jurisdiction (Average score)	Nation	Oklahoma	Washington	Oregon	Montana	North Carolina	North Dakota	Minnesota	Utah	South Dakota	New Mexico	Arizona	Alaska	Other jurisdictions[1]
Nation (204)		▼								▲	▲	▲	▲	▼
Oklahoma (215)	▲				▲	▲	▲	▲	▲	▲	▲	▲	▲	
Washington (212)										▲	▲	▲	▲	
Oregon (210)										▲	▲	▲	▲	
Montana (206)		▼								▲	▲	▲	▲	
North Carolina (202)		▼									▲	▲	▲	
North Dakota (202)		▼								▲	▲	▲	▲	▼
Minnesota (199)		▼											▲	
Utah (194)		▼												▼
South Dakota (190)	▼	▼	▼	▼	▼		▼						▲	▼
New Mexico (188)	▼	▼	▼	▼	▼	▼	▼							▼
Arizona (188)	▼	▼	▼	▼	▼	▼	▼							▼
Alaska (179)	▼	▼	▼	▼	▼	▼	▼	▼		▼				▼
Other jurisdictions[1] (214)	▲						▲		▲	▲	▲	▲	▲	

[1] The "other jurisdictions" category includes all states not shown and the District of Columbia.
NOTE: AI/AN = American Indian/Alaska Native. Read across the row corresponding to a jurisdiction listed to the left of the chart. Match the shading intensity (and arrow direction) to the chart's key to determine whether the average score for students in this jurisdiction was found to be higher than (up arrow), not significantly different from (blank cell), or lower than (down arrow) the average score for students in the jurisdiction in the column heading.

▲ The jurisdiction had a higher average score than the jurisdiction listed at the top of the column.

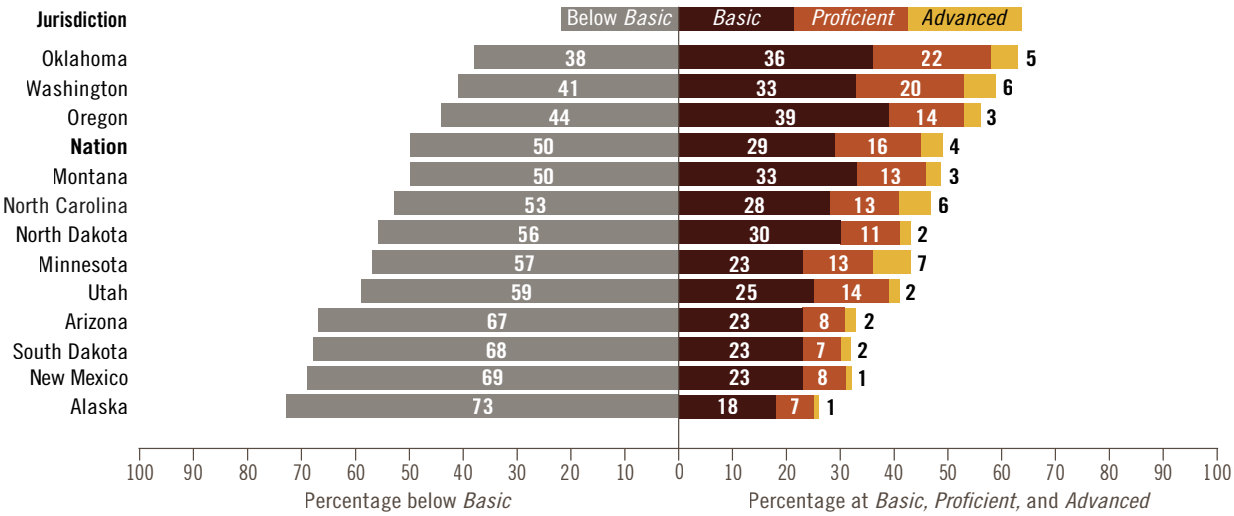
No statistically significant difference detected from the jurisdiction listed at the top of the column.

▼ The jurisdiction had a lower average score than the jurisdiction listed at the top of the column.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2009 National Indian Education Study.

The percentages of AI/AN fourth-graders performing at or above the *Basic* level in 2009 ranged from 27 percent in Alaska to 62 percent in Oklahoma (figure **R-11**). In comparison to the nation, the percentages of AI/AN students at or above *Basic* were higher in Oklahoma and lower in Alaska, Arizona, New Mexico, and South Dakota. All 12 states had some students who performed at or above the *Proficient* level in 2009.

Figure **R-11.** Percentage of fourth-grade AI/AN students in NAEP reading, by achievement level and jurisdiction: 2009



NOTE: AI/AN = American Indian/Alaska Native. Detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2009 National Indian Education Study.

AI/AN eighth-graders in one state perform higher than AI/AN students in the nation, and students in seven states score lower

The average reading score for AI/AN eighth-graders in Oklahoma was higher than the score for AI/AN students in the nation (figure **R-12**). Among the remaining 11 states with samples large enough to report results for AI/AN students, scores were not significantly different from the nation in 4 states, and scores were lower than the nation in 7 states.

Figure **R-12.** Cross-jurisdiction comparison of average scores for eighth-grade AI/AN students in NAEP reading: 2009

Jurisdiction (Average score)	Nation	Oregon	Oklahoma	Minnesota	Washington	Montana	North Dakota	South Dakota	Arizona	Alaska	New Mexico	North Carolina	Utah	Other jurisdictions[1]
Nation (251)			▼				▲	▲	▲	▲	▲	▲	▲	▼
Oregon (259)							▲	▲	▲	▲	▲	▲	▲	
Oklahoma (258)	▲						▲	▲	▲	▲	▲	▲	▲	
Minnesota (257)								▲	▲	▲	▲	▲	▲	
Washington (253)										▲	▲	▲	▲	
Montana (253)							▲	▲	▲	▲	▲	▲	▲	
North Dakota (242)	▼	▼	▼			▼								▼
South Dakota (242)	▼	▼	▼	▼		▼								▼
Arizona (241)	▼	▼	▼	▼		▼								▼
Alaska (239)	▼	▼	▼	▼	▼	▼								▼
New Mexico (236)	▼	▼	▼	▼	▼	▼								▼
North Carolina (235)	▼	▼	▼	▼	▼	▼								▼
Utah (235)	▼	▼	▼	▼	▼	▼								▼
Other jurisdictions[1] (257)	▲						▲	▲	▲	▲	▲	▲	▲	

[1] The "other jurisdictions" category includes all states not shown and the District of Columbia.
NOTE: AI/AN = American Indian/Alaska Native.
Read across the row corresponding to a jurisdiction listed to the left of the chart. Match the shading intensity (and arrow direction) to the chart's key to determine whether the average score for students in this jurisdiction was found to be higher than (up arrow), not significantly different from (blank cell), or lower than (down arrow) the average score for students in the jurisdiction in the column heading.

▲ The jurisdiction had a higher average score than the jurisdiction listed at the top of the column.

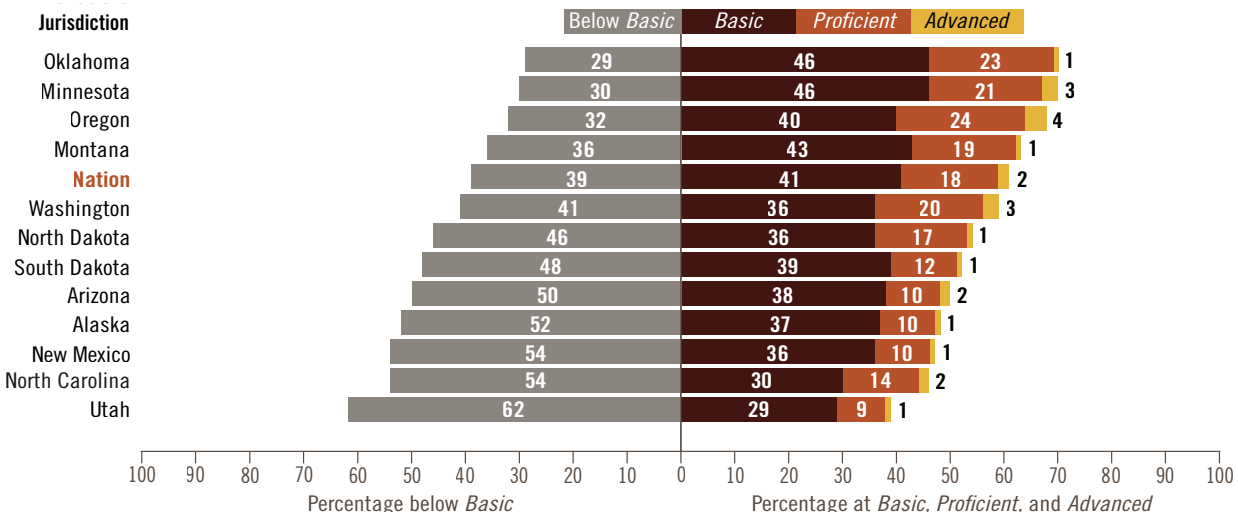
No statistically significant difference detected from the jurisdiction listed at the top of the column.

▼ The jurisdiction had a lower average score than the jurisdiction listed at the top of the column.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2009 National Indian Education Study.

The percentages of AI/AN eighth-graders performing at or above the *Basic* level in 2009 ranged from 38 percent in Utah to 71 percent in Oklahoma (figure **R-13**). In comparison to the nation, the percentages of AI/AN students at or above *Basic* were higher in Oklahoma and lower in Alaska, Arizona, New Mexico, North Carolina, South Dakota, and Utah. All 12 states had some students who performed at or above the *Proficient* level in 2009.

Figure **R-13.** Percentage of eighth-grade AI/AN students in NAEP reading, by achievement level and jurisdiction: 2009



NOTE: AI/AN = American Indian/Alaska Native. Detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2009 National Indian Education Study.

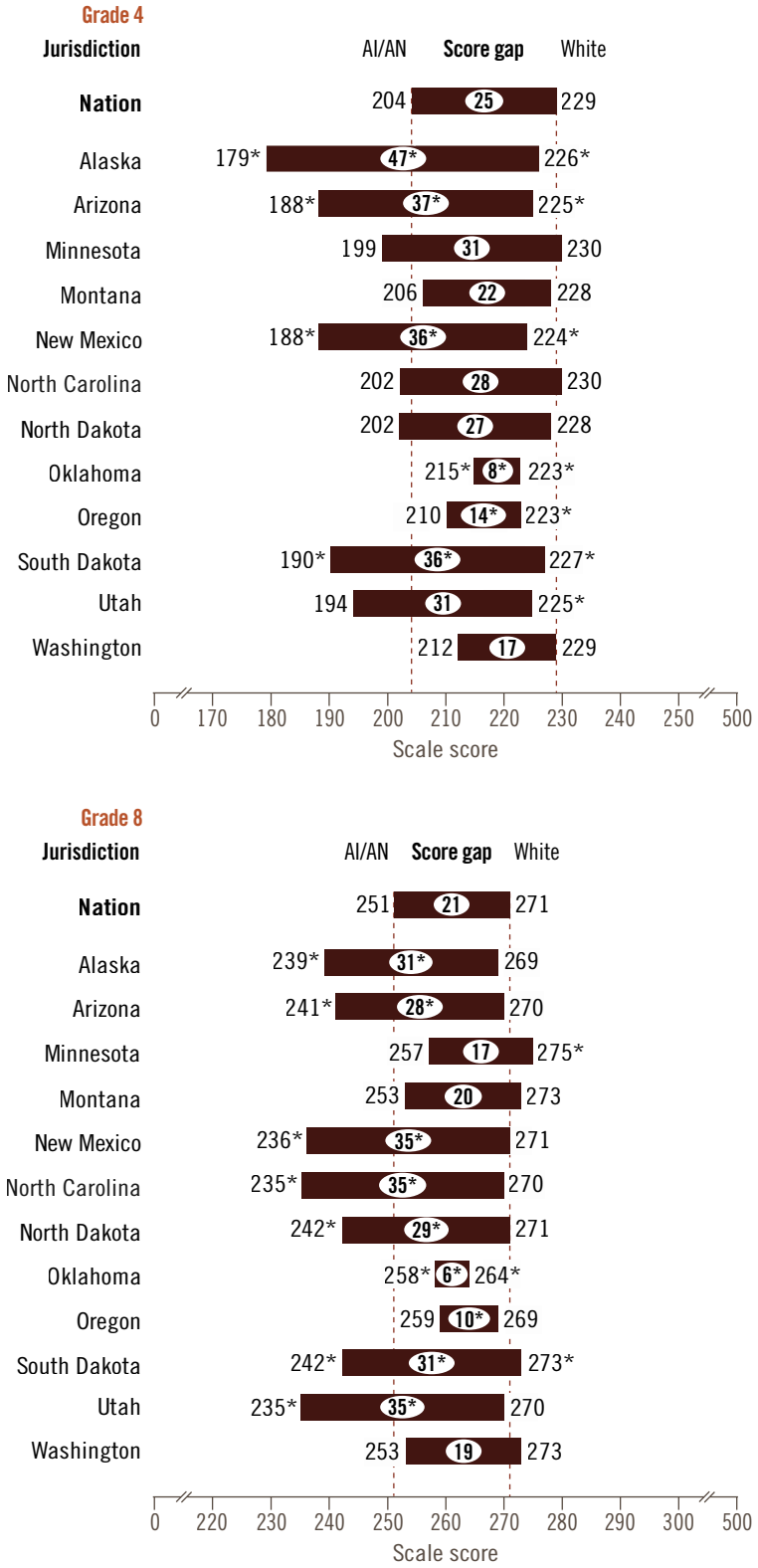
White – AI/AN score gaps in Oklahoma and Oregon smaller than national gaps

In 2009, the reading score gap between AI/AN and White students attending public and BIE schools in the nation was 25 points at grade 4 and 21 points at grade 8 (figure **R-14**). Average reading score gaps between White and AI/AN students in the 12 selected states ranged from 8 to 47 points at grade 4 and from 6 to 35 points at grade 8.

At grade 4, the 8-point gap in Oklahoma and 14-point gap in Oregon were smaller than the White – AI/AN gap for fourth-graders in the nation, while the gaps in Alaska, Arizona, New Mexico, and South Dakota were larger than the gap for the nation.

At grade 8, the 6-point gap in Oklahoma and 10-point gap in Oregon were smaller than the White – AI/AN gap in the nation, and the gaps in Alaska, Arizona, New Mexico, North Carolina, North Dakota, South Dakota, and Utah were larger than the gap for the nation.

Figure **R-14.** White – AI/AN score gaps for fourth- and eighth-grade students in NAEP reading, by jurisdiction: 2009



* Significantly different ($p < .05$) from the nation.
NOTE: AI/AN = American Indian/Alaska Native. Race categories exclude Hispanic origin. Score gaps are calculated based on the difference between unrounded average scores.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2009 National Indian Education Study.

Reading Assessment Content at Grade 4

To reflect developmental differences expected of students at varying grade levels, the proportion of the reading assessment devoted to each of the three cognitive targets varies at each grade assessed.

20% Critique and Evaluate

These questions ask students to consider all or part of the text from a critical perspective and to make judgments about the way meaning is conveyed.

50% Integrate and Interpret

These questions move beyond a focus on discrete information and require readers to make connections across larger portions of text or to explain what they think about the text as a whole.

30% Locate and Recall

These questions focus on specific information contained in relatively small amounts of text and ask students to recognize what they have read.

Because the assessment covered a range of texts and included more questions than any one student could answer, each student took just a portion of the assessment. The 199 questions that made up the entire fourth-grade assessment were distributed across 20 sets of passages and items. Each set typically comprised 10 questions, a mix of multiple choice and constructed response. Each student read and responded to questions in just two 25-minute sets.

Reading Achievement-Level Descriptions for Grade 4

NAEP reading achievement-level descriptions present expectations of student performance in relation to a range of text types and text difficulty and in response to a variety of assessment questions intended to elicit different cognitive processes and reading behaviors. The specific processes and reading behaviors mentioned in the achievement-level descriptions are illustrative of those judged as central to students' successful comprehension of texts. These processes and reading behaviors involve different and increasing cognitive demands from one grade and performance level to the next as they are applied within more challenging contexts and with more complex information. While similar reading behaviors are included at the different performance levels and grades, it should be understood that these skills are being described in relation to texts and assessment questions of varying difficulty.

The specific descriptions of what fourth-graders should know and be able to do at the *Basic*, *Proficient*, and *Advanced* reading achievement levels are presented below. (Note: Shaded text is a short, general summary to describe performance at each achievement level.) 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.

Basic (208)

Fourth-grade students performing at the *Basic* level should be able to locate relevant information, make simple inferences, and use their understanding of the text to identify details that support a given interpretation or conclusion. Students should be able to interpret the meaning of a word as it is used in the text.

When reading **literary** texts such as fiction, poetry, and literary nonfiction, fourth-grade students performing at the *Basic* level should be able to make simple inferences about characters, events, plot, and setting. They should be able to identify a problem in a story and relevant information that supports an interpretation of a text.

When reading **informational** texts such as articles and excerpts from books, fourth-grade students performing at the *Basic* level should be able to identify the main purpose and an explicitly stated main idea, as well as gather information from various parts of a text to provide supporting information.

Proficient (238)

Fourth-grade students performing at the *Proficient* level should be able to integrate and interpret texts and apply their understanding of the text to draw conclusions and make evaluations.

When reading **literary** texts such as fiction, poetry, and literary nonfiction, fourth-grade students performing at the *Proficient* level should be able to identify implicit main ideas and recognize relevant information that supports them. Students should be able to judge elements of an author's craft and provide some support for their judgment. They should be able to analyze character roles, actions, feelings, and motivations.

When reading **informational** texts such as articles and excerpts from books, fourth-grade students performing at the *Proficient* level should be able to locate relevant information, integrate information across texts, and evaluate the way an author presents information. Student performance at this level should demonstrate an understanding of the purpose for text features and an ability to integrate information from headings, text boxes, and graphics and their captions. They should be able to explain a simple cause-and-effect relationship and draw conclusions.

Advanced (268)

Fourth-grade students performing at the *Advanced* level should be able to make complex inferences and construct and support their inferential understanding of the text. Students should be able to apply their understanding of a text to make and support a judgment.

When reading **literary** texts such as fiction, poetry, and literary nonfiction, fourth-grade students performing at the *Advanced* level should be able to identify the theme in stories and poems and make complex inferences about characters' traits, feelings, motivations, and actions. They should be able to recognize characters' perspectives and evaluate characters' motivations. Students should be able to interpret characteristics of poems and evaluate aspects of text organization.

When reading **informational** texts such as articles and excerpts from books, fourth-grade students performing at the *Advanced* level should be able to make complex inferences about main ideas and supporting ideas. They should be able to express a judgment about the text and about text features and support the judgments with evidence. They should be able to identify the most likely cause given an effect, explain an author's point of view, and compare ideas across two texts.

What Fourth-Graders Know and Can Do in Reading

The item map below is useful for understanding performance at different levels on the NAEP scale. The scale scores on the left represent the average scores for students who were likely to get the items correct or complete. The cut score at the lower end of the range for each achievement level is boxed. The descriptions of selected assessment questions indicating what students need to do to answer the question correctly are listed on the right, along with the corresponding cognitive targets. Additional information about NAEP item mapping is available at http://nces.ed.gov/nationsreportcard/tdw/analysis/describing_itemmapping.asp.

With an overall average score of 204, AI/AN fourth-graders were likely to successfully answer those questions described on the map at 201 and below.

GRADE 4 NAEP READING ITEM MAP

	Scale score	Cognitive target	Question description
	500		
	//		
Advanced	332	**Critique/evaluate**	Make and support judgment about author's craft and support with information from text
Advanced	326	**Integrate/interpret**	Use information to explain causal relations in a process (**shown on page 37**)
Advanced	313	**Critique/evaluate**	Evaluate author's purpose in providing pictures (**shown on page 38**)
Advanced	309	**Integrate/interpret**	Use specific information to describe and explain a process
Advanced	301	**Critique/evaluate**	Evaluate subheading and informational text and use information to support evaluation
Advanced	299	**Critique/evaluate**	Make complex inferences about historical person's motivation and support with central idea
Advanced	292	**Integrate/interpret**	Use information across paragraphs to make complex inference about story event
Advanced	279	**Integrate/interpret**	Provide comparison of character traits across two texts of different genres
Advanced	273	**Integrate/interpret**	*Recognize meaning of a word used to describe a story setting*
Advanced	268	**Integrate/interpret**	Describe main story character using text support
	268		
Proficient	264	**Critique/evaluate**	*Recognize technique author uses to develop character*
Proficient	260	**Integrate/interpret**	Infer and provide relationship between main subject and historical movement
Proficient	258	**Integrate/interpret**	*Recognize meaning of a word that describes a character's actions*
Proficient	255	**Critique/evaluate**	Use information from an article to provide and support an opinion
Proficient	251	**Integrate/interpret**	Provide cross-text comparison of two characters' feelings
Proficient	249	**Integrate/interpret**	Provide text-based comparison of change in main character's feelings
Proficient	244	**Locate/recall**	*Recognize explicitly stated information that explains a character's behavior*
Proficient	239	**Locate/recall**	*Recognize specific detail of supporting information* (**shown on page 36**)
	238		
Basic	234	**Critique/evaluate**	Use an example to support opinion about a poem
Basic	229	**Integrate/interpret**	*Recognize main problem faced by historical figure*
Basic	221	**Integrate/interpret**	Interpret character's statement to provide character trait
Basic	220	**Locate/recall**	*Recognize reason for action by a historical figure*
Basic	220	**Integrate/interpret**	*Use information across text to infer and recognize character trait*
Basic	219	**Integrate/interpret**	*Recognize main idea not explicitly stated in article*
Basic	216	**Critique/evaluate**	Provide a relevant fact from an article
Basic	211	**Integrate/interpret**	*Recognize main purpose of informational science text*
	208		
	205	**Integrate/interpret**	*Recognize meaning of word as used by character in a story*
	204		***Overall average score for American Indian/Alaska Native fourth-graders***
	201	**Integrate/interpret**	Provide general comparison of two characters based on story details
	190	**Integrate/interpret**	Retrieve relevant detail that supports main idea
	187	**Locate/recall**	*Make a simple inference to recognize description of character's feeling*
	177	**Locate/recall**	*Recognize details about character in a story*
	//		
	0		

NOTE: Regular type denotes a constructed-response question. *Italic* type denotes a multiple-choice question. The position of a question on the scale represents the average scale score attained by students who had a 65 percent probability of successfully answering a constructed-response question, or a 74 percent probability of correctly answering a four-option multiple-choice question. For constructed-response questions, the question description represents students' performance at the highest scoring level. Scale score ranges for reading achievement levels are referenced on the map.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2009 Reading Assessment.

Grade 4 Sample Reading Passage

What's the Buzz?

by Margery Facklam

Day-active sweat bee

"What do bees do?" Ask most people and they will say, "Bees make honey and they sting." They may even tell you that bees are fuzzy, black-and-yellow insects that live in hives. But there are lots of kinds of bees, and they're not all the same. Some fly at night. Some can't sting. Some live only a few months, and others live several years. Every species of bee has its own story. A species is one of the groups used by scientists to classify, or group, living things. Animals of the same species can mate with each other. And they give birth to young that can mate and give birth, or reproduce.

Scientists have named about 20,000 species of bees. But they think there may be as many as 40,000 species. Why so many?

Stingless bee

Over millions of years, environments change. Animals slowly evolve, or change, too. These changes help the animals survive, or live, so that they can reproduce. And it's reproducing that matters, not how long an animal lives.

To survive, some bee species developed new ways to live together. Some found new ways to "talk" to each other, or communicate. Others developed other new skills and new behaviors. Scientists call these kinds of changes adaptations. Over a long time, a group of bees can change so much it becomes a new species.

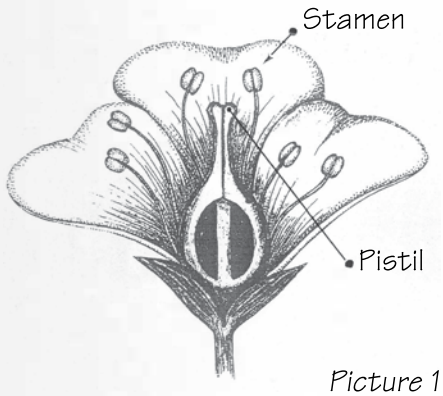
European honeybee

Bees come in different sizes. There are fat bumblebees and bees not much bigger than the tip of a pencil. There are bees of many colors, from dull black to glittering green. Some species of tropical bees are such bright reds and blues that they sparkle in the sun like little jewels.

Most bees play an important role in plant reproduction. Bees collect pollen, a powderlike material that flowers make. By carrying pollen from one flower to another,

bees help plants reproduce. Bees are among the world's most important insects. Without them, many plants might not survive. And for most animals, life would be impossible without plants.

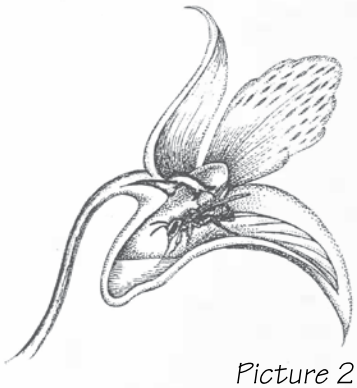
Pollination



Picture 1

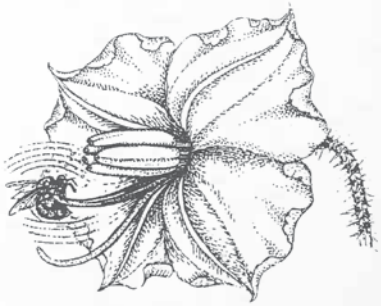
Pollination is the first step in making seeds. The male part of the plant is called the stamen. The female part is called the pistil. A plant can't make seeds until the pollen from the stamen reaches the pistil. Some flowers pollinate themselves when pollen from the stamen falls on the pistil. Other flowers are pollinated when pollen blows from one flower to another.

Many animals spread pollen. But bees are the best pollinators of all. They go to the flowers to gather pollen for food. Bees collect pollen in different ways. Some bees gather pollen from flower stamens by brushing against them. Some of the pollen then rubs off on the next flower the bees visit. In this way, bees spread pollen from flower to flower as they gather food.



Picture 2

Bees also drink nectar, a sweet liquid in flowers. As a bee goes inside this orchid for nectar, its weight makes the orchid's stamen bend over. Pollen from the stamen brushes on the bee.



Picture 3

Stingless bees like this one sometimes shake themselves to gather pollen from flowers. Shaking loosens the pollen and makes it fall on the bee.

Reprinted by permission of author Margery Facklam.
Illustrations by Patricia J. Wynne.

The following sample questions assessed fourth-grade students' comprehension of informational text in the article titled "*What's the Buzz?*", which describes different species of bees and the important role some bees play in plant reproduction.

SAMPLE QUESTION: LOCATE AND RECALL

This sample question from the 2009 fourth-grade reading assessment measures students' performance in recognizing a specific detail from the article that supports the discussion of bees. Sixty-three percent of fourth-graders in the nation and 55 percent of AI/AN students were able to identify the correct response.

SAMPLE QUESTION:

According to the article, what can animals of the same species do?

- (A) Travel in groups over long distances
- (B) Live together in homes such as hives
- (C) Mate with each other and give birth
- (D) Find food for their young

Percentage of fourth-grade students in each response category, by race/ethnicity: 2009

Race/ethnicity	Choice A	Choice B	Choice C	Choice D	Omitted
All students	10	19	63	7	1
AI/AN	11	23	55	11	#
Black	13	21	53	13	#
Hispanic	13	24	51	10	1
White	8	17	69	5	1
Asian/Pacific Islander	8	17	70	5	#

Rounds to zero.
NOTE: AI/AN = American Indian/Alaska Native. Black includes African American, Hispanic includes Latino, and Pacific Islander includes Native Hawaiian. Race categories exclude Hispanic origin. Results are not shown for students whose race/ethnicity was unclassified. Detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2009 Reading Assessment.

SAMPLE QUESTION: INTEGRATE AND INTERPRET

This sample constructed-response question measures fourth-graders' performance in integrating and interpreting the information they have read about bees and pollination. Successful responses demonstrated understanding of a causal relationship between bees helping plants to reproduce and plants feeding animals. Student responses to this question were rated using four scoring levels.

Extensive responses provided a text-based explanation of why bees are important to **both** plants and animals.

Essential responses provided a text-based explanation of why bees are important to **either** plants or animals.

Partial responses provided relevant information from the article without using it to explain why bees are important to plants or animals.

Unsatisfactory responses provided incorrect information or irrelevant details.

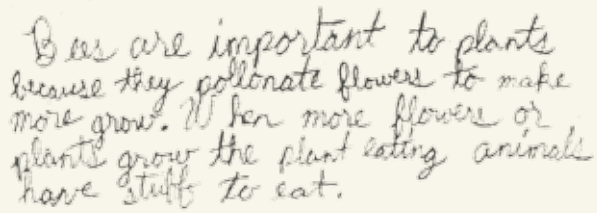
The sample student responses shown on the right were rated as "Extensive" and "Essential." The response rated "Extensive" connects the information about what bees do in pollination to plant growth and to those plants providing food for animals. Twenty percent of fourth-graders in the nation and 10 percent of AI/AN students provided responses to this question that received an "Extensive" rating.

The response rated "Essential" demonstrates understanding that bees are important to plants because they help them to grow, but the response does not explain why helping plants grow is important to animals. The response does not explain that plants are important to the survival of animals.

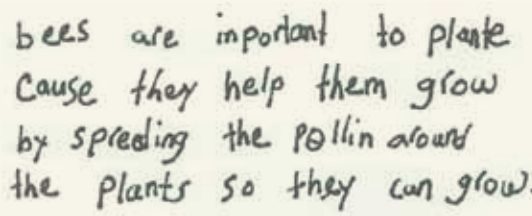
SAMPLE QUESTION:

Explain why bees are important to both plants and animals. Use information from the article to support your answer.

Extensive response:


Bees are important to plants because they pollonate flowers to make more grow. When more flowers or plants grow the plant eating animals have stuff to eat.

Essential response:


bees are important to plants cause they help them grow by spreding the pollin around the plants so they can grow.

Percentage of fourth-grade students in each response category, by race/ethnicity: 2009

Race/ethnicity	Extensive	Essential	Partial	Unsatisfactory	Omitted
All students	20	39	23	16	2
AI/AN	10	37	21	29	3
Black	11	32	28	27	2
Hispanic	12	36	29	21	2
White	24	42	20	12	1
Asian/Pacific Islander	27	43	17	11	1

NOTE: AI/AN = American Indian/Alaska Native. Black includes African American, Hispanic includes Latino, and Pacific Islander includes Native Hawaiian. Race categories exclude Hispanic origin. Results are not shown for students whose race/ethnicity was unclassified. Detail may not sum to totals because the percentage of responses rated as "Off-task" is not shown. Off-task responses are those that do not provide any information related to the assessment task.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2009 Reading Assessment.

SAMPLE QUESTION: CRITIQUE AND EVALUATE

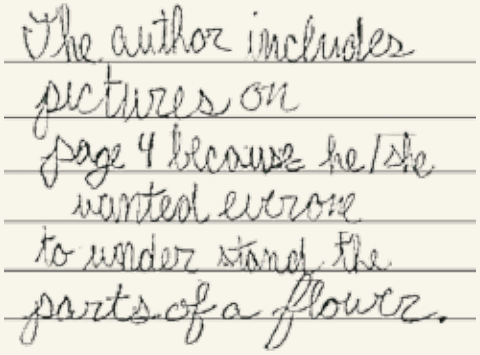
This sample constructed-response question measures fourth-graders' ability to evaluate pictures to determine their intended purpose. Successful responses explained what one or more of the pictures in the article show. Responses to this question were rated using two scoring levels.

> **Acceptable** responses explained why the author included the pictures on page 4.
>
> **Unacceptable** responses provided incorrect information or irrelevant details.

The sample student response shown on the right was rated as "Acceptable." The response explains what information the author wanted readers to learn by looking at the pictures. Forty percent of fourth-graders in the nation and 28 percent of AI/AN students provided responses to this question that received an "Acceptable" rating.

SAMPLE QUESTION:

Why does the author include the pictures on page 4 ?


The author includes pictures on page 4 because he/she wanted everyone to under stand the parts of a flower.

Percentage of fourth-grade students in each response category, by race/ethnicity: 2009

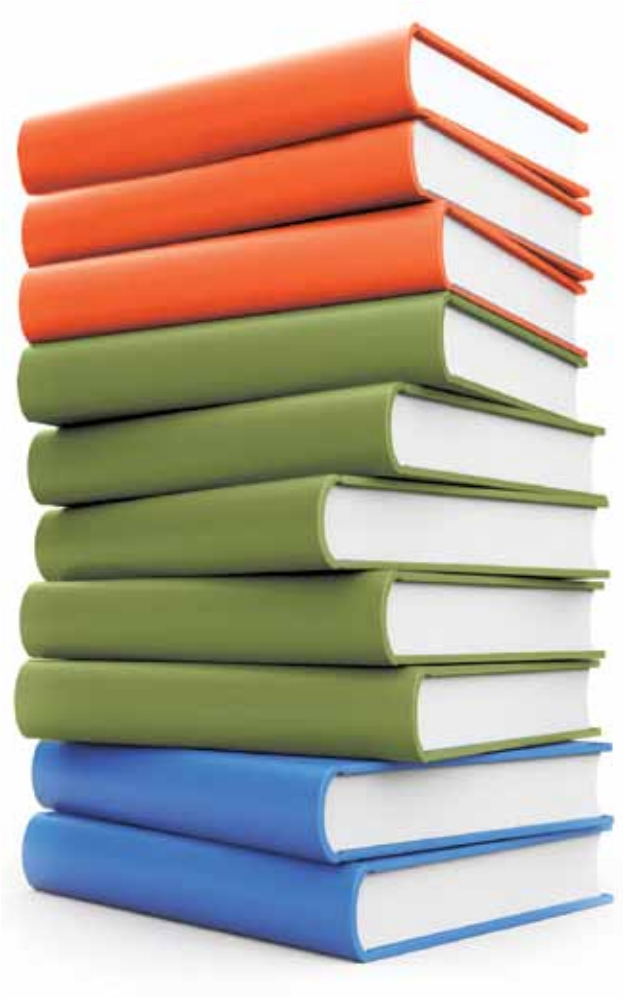
Race/ethnicity	Acceptable	Unacceptable	Omitted
All students	40	57	#
AI/AN	28	68	#
Black	36	61	#
Hispanic	38	58	#
White	42	56	#
Asian/Pacific Islander	47	49	#

Rounds to zero.
NOTE: AI/AN = American Indian/Alaska Native. Black includes African American, Hispanic includes Latino, and Pacific Islander includes Native Hawaiian. Race categories exclude Hispanic origin. Results are not shown for students whose race/ethnicity was unclassified. Detail may not sum to totals because the percentage of responses rated as "Off-task" is not shown. Off-task responses are those that do not provide any information related to the assessment task.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2009 Reading Assessment.

Reading Assessment Content at Grade 8

The distribution of items among the three cognitive targets reflects the different developmental emphases across grade levels as specified in the reading framework.



30% Critique and Evaluate

These questions ask students to consider all or part of the text from a critical perspective and to make judgments about the way meaning is conveyed.

50% Integrate and Interpret

These questions move beyond a focus on discrete information and require readers to make connections across larger portions of text or to explain what they think about the text as a whole.

20% Locate and Recall

These questions focus on specific information contained in relatively small amounts of text and ask students to recognize what they have read.

Because the assessment covered a range of texts and included more questions than any one student could answer, each student took just a portion of the assessment. The 257 questions that made up the entire eighth-grade assessment were distributed across 25 sets of passages and items. Each set typically comprised 10 questions, a mix of multiple choice and constructed response. Each student read and responded to questions in just two 25-minute sets.

Reading Achievement-Level Descriptions for Grade 8

NAEP reading achievement-level descriptions present expectations of student performance in relation to a range of text types and text difficulty and in response to a variety of assessment questions intended to elicit different cognitive processes and reading behaviors. The specific processes and reading behaviors mentioned in the achievement-level descriptions are illustrative of those judged as central to students' successful comprehension of texts. These processes and reading behaviors involve different and increasing cognitive demands from one grade and performance level to the next as they are applied within more challenging contexts and with more complex information. While similar reading behaviors are included at the different performance levels and grades, it should be understood that these skills are being described in relation to texts and assessment questions of varying difficulty.

The specific descriptions of what eighth-graders should know and be able to do at the *Basic*, *Proficient*, and *Advanced* reading achievement levels are presented below. (Note: Shaded text is a short, general summary to describe performance at each achievement level.) 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.

Basic (243)

Eighth-grade students performing at the *Basic* level should be able to locate information; identify statements of main idea, theme, or author's purpose; and make simple inferences from texts. They should be able to interpret the meaning of a word as it is used in the text. Students performing at this level should also be able to state judgments and give some support about content and presentation of content.

When reading **literary** texts such as fiction, poetry, and literary nonfiction, eighth-grade students performing at the *Basic* level should recognize major themes and be able to identify, describe, and make simple inferences about setting and about character motivations, traits, and experiences. They should be able to state and provide some support for judgments about the way an author presents content and about character motivation.

When reading **informational** texts such as exposition and argumentation, eighth-grade students performing at the *Basic* level should be able to recognize inferences based on main ideas and supporting details. They should be able to locate and provide relevant facts to construct general statements about information from the text. Students should be able to provide some support for judgments about the way information is presented.

Proficient (281)

Eighth-grade students performing at the *Proficient* level should be able to provide relevant information and summarize main ideas and themes. They should be able to make and support inferences about a text, connect parts of a text, and analyze text features. Students performing at this level should also be able to fully substantiate judgments about content and presentation of content.

When reading **literary** texts such as fiction, poetry, and literary nonfiction, eighth-grade students performing at the *Proficient* level should be able to make and support a connection between characters from two parts of a text. They should be able to recognize character actions and infer and support character feelings. Students performing at this level should be able to provide and support judgments about characters' motivations across texts. They should be able to identify how figurative language is used.

When reading **informational** texts such as exposition and argumentation, eighth-grade students performing at the *Proficient* level should be able to locate and provide facts and relevant information that support a main idea or purpose, interpret causal relations, provide and support a judgment about the author's argument or stance, and recognize rhetorical devices.

Advanced (323)

Eighth-grade students performing at the *Advanced* level should be able to make connections within and across texts and to explain causal relations. They should be able to evaluate and justify the strength of supporting evidence and the quality of an author's presentation. Students performing at the *Advanced* level also should be able to manage the processing demands of analysis and evaluation by stating, explaining, and justifying.

When reading **literary** texts such as fiction, literary nonfiction, and poetry, eighth-grade students performing at the *Advanced* level should be able to explain the effects of narrative events. Within or across texts, they should be able to make thematic connections and make inferences about characters' feelings, motivations, and experiences.

When reading **informational** texts such as exposition and argumentation, eighth-grade students performing at the *Advanced* level should be able to infer and explain a variety of connections that are intratextual (such as the relation between specific information and the main idea) or intertextual (such as the relation of ideas across expository and argument texts). Within and across texts, students should be able to state and justify judgments about text features, choice of content, and the author's use of evidence and rhetorical devices.

What Eighth-Graders Know and Can Do in Reading

The item map below illustrates the range of reading comprehension skills demonstrated by eighth-graders. The scale scores on the left represent the average scores for students who were likely to get the items correct or complete. The cut score at the lower end of the range for each achievement level is boxed.

The descriptions of selected assessment questions indicating what students need to do to answer the question correctly are listed on the right, along with the corresponding cognitive targets.

With an overall average score of 251, AI/AN eighth-graders were likely to successfully answer those questions described on the map at 243 and below.

GRADE 8 NAEP READING ITEM MAP

	Scale score	Cognitive target	Question description
	500		
	//		
Advanced	364	**Critique/evaluate**	Evaluate presentation of information and support with examples
	353	**Integrate/interpret**	Interpret poetic image in relation to poem's events
	352	**Critique/evaluate**	Explain how setting enhances central idea of essay
	346	**Critique/evaluate**	Evaluate arguments and justify reasoning with support from text
	340	**Integrate/interpret**	Compare two texts of different genres to provide similarity and difference
	336	**Integrate/interpret**	Describe event and explain causal relation in narrative poem (**shown on page 45**)
	330	**Integrate/interpret**	Synthesize across story to provide theme and support with text
	324	**Critique/evaluate**	Make judgment about author's craft and support with information from text
	323	**Critique/evaluate**	Explain relation between information in box and rest of article
	323		
Proficient	318	**Integrate/interpret**	Interpret lines of poem to explain speaker's perspective
	301	**Integrate/interpret**	Analyze to connect character descriptions in story and poem
	297	**Critique/evaluate**	Evaluate subheading and use information to support evaluation
	294	**Integrate/interpret**	*Recognize interpretation of author's point in persuasive essay*
	291	**Integrate/interpret**	*Recognize central purpose of expository text with multiple viewpoints*
	286	**Integrate/interpret**	*Recognize meaning of word describing character's action*
	284	**Critique/evaluate**	*Recognize that poetic lines indicate a change in what the poem describes* (**shown on page 44**)
	281	**Integrate/interpret**	Provide information that defines key concept related to main idea
	281		
Basic	280	**Integrate/interpret**	Provide relevant information from text to support a given argument
	277	**Locate/recall**	*Recognize specific event in narrative poem* (**shown on page 46**)
	268	**Locate/recall**	*Recognize specific information in expository text*
	266	**Integrate/interpret**	*Recognize character motivation related to theme of story*
	264	**Integrate/interpret**	*Recognize meaning of word linked to central argument*
	259	**Critique/evaluate**	Provide and support an opinion about the title of persuasive essay
	257	**Critique/evaluate**	Use information from an article to provide and support an opinion
	251		***Overall average score for American Indian/Alaska Native eighth-graders***
	243	**Integrate/interpret**	Provide text-based comparison of change in main character's feelings
	243		
	239	**Locate/recall**	*Recognize causal relationship between facts in article*
	238	**Integrate/interpret**	Infer trait that describes person in biographical text
	229	**Integrate/interpret**	*Use information across text to infer and recognize character trait*
	226	**Integrate/interpret**	*Recognize main problem faced by historical figure*
	200	**Locate/recall**	*Recognize character motivation based on explicit story details*
	189	**Integrate/interpret**	Provide text-based description of character
	//		
	0		

NOTE: Regular type denotes a constructed-response question. *Italic* type denotes a multiple-choice question. The position of a question on the scale represents the average scale score attained by students who had a 65 percent probability of successfully answering a constructed-response question, or a 74 percent probability of correctly answering a four-option multiple-choice question. For constructed-response questions, the question description represents students' performance at the highest scoring level. Scale score ranges for reading achievement levels are referenced on the map.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2009 Reading Assessment.

Grade 8 Sample Reading Passage

Alligator Poem

by Mary Oliver

I knelt down
at the edge of the water,
and if the white birds standing
in the tops of the trees whistled any warning
I didn't understand,
I drank up to the very moment it came
crashing toward me,
its tail flailing
like a bundle of swords,
slashing the grass,
and the inside of its cradle-shaped mouth
gaping,
and rimmed with teeth—
and that's how I almost died
of foolishness
in beautiful Florida.
But I didn't.
I leaped aside, and fell,
and it streamed past me, crushing everything in its path
as it swept down to the water
and threw itself in,
and, in the end,
this isn't a poem about foolishness
but about how I rose from the ground
and saw the world as if for the second time,
the way it really is.

The water, that circle of shattered glass,
healed itself with a slow whisper
and lay back
with the back-lit light of polished steel,
and the birds, in the endless waterfalls of the trees,
shook open the snowy pleats of their wings, and drifted away
while, for a keepsake, and to steady myself,
I reached out,
I picked the wild flowers from the grass around me—
blue stars
and blood-red trumpets
on long green stems—
for hours in my trembling hands they glittered
like fire.

From *New and Selected Poems* by Mary Oliver
Copyright © 1992 by Mary Oliver
Reprinted by permission of Beacon Press, Boston

The following sample questions assessed eighth-grade students' comprehension of literary text from a first-person narrative poem entitled "*Alligator Poem*," which describes the speaker's encounter with an alligator and her subsequent reaction to that experience.

SAMPLE QUESTION: CRITIQUE AND EVALUATE

This sample question from the 2009 eighth-grade reading assessment measures students' recognition of how two lines function within the poem to shift the emphasis of the content. Sixty-five percent of eighth-graders in the nation and 60 percent of AI/AN students were able to identify the correct response.

SAMPLE QUESTION:

On page 3, the speaker says:

"and, in the end,
this isn't a poem about foolishness"

What is the purpose of these lines in relation to the rest of the poem?

- (A) To signal a turning point in the poem
- (B) To emphasize the speaker's confusion
- (C) To focus the reader on the first part of the poem
- (D) To show the speaker was embarrassed

Percentage of eighth-grade students in each response category, by race/ethnicity: 2009

Race/ethnicity	Choice A	Choice B	Choice C	Choice D	Omitted
All students	65	13	17	4	#
AI/AN	60	17	16	7	#
Black	56	20	18	5	1
Hispanic	59	17	18	5	1
White	68	10	17	4	#
Asian/Pacific Islander	78	7	13	2	#

Rounds to zero.
NOTE: AI/AN = American Indian/Alaska Native. Black includes African American, Hispanic includes Latino, and Pacific Islander includes Native Hawaiian. Race categories exclude Hispanic origin. Results are not shown for students whose race/ethnicity was unclassified. Detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2009 Reading Assessment.

SAMPLE QUESTION: INTEGRATE AND INTERPRET

This sample constructed-response question measures eighth-graders' performance in interpreting a first-person narrative poem. Successful responses demonstrated understanding of both the explicit narrative in the poem and the implicit effect of the narrated event on the speaker. Responses to this question were rated using four scoring levels.

Extensive responses both described what happens to the speaker in the poem and interpreted what the speaker realizes from the experience.

Essential responses described what happens to the speaker and generalized about what the speaker realizes, or responses interpreted what the speaker realizes without describing what happens to her.

Partial responses either described something that happens in the poem or provided text-based generalizations about the speaker.

Unsatisfactory responses provided incorrect information or irrelevant details.

The sample student responses shown on the right were rated as "Extensive" and "Essential." In the response rated "Extensive," the student focuses on the lines of the poem that describe what happens to the speaker and interprets the end of the poem by providing a text-based explanation of what the speaker realizes. Sixteen percent of eighth-graders in the nation and 6 percent of AI/AN students provided responses to this question that received an "Extensive" rating.

The response rated "Essential" describes the speaker's experience but offers only a general explanation of how the speaker's perspective on the world has changed.

SAMPLE QUESTION:

Describe what happens to the speaker of the poem and explain what this experience makes the speaker realize.

Extensive response:

The speaker is drinking water from a river, and an alligator came up behind the speaker at full speed, but the speaker jumped out of the way just in time. Then, she looked around at the area and realized that although nature can be deadly, it is also beautiful.

Essential response:

The speaker is attacked by an alligator and barely survives, so after that the speaker starts seeing the world in a better way.

Percentage of eighth-grade students in each response category, by race/ethnicity: 2009

Race/ethnicity	Extensive	Essential	Partial	Unsatisfactory	Omitted
All students	16	20	55	7	2
AI/AN	6	14	58	20	1
Black	8	15	62	11	4
Hispanic	9	16	58	12	4
White	20	22	52	4	1
Asian/Pacific Islander	20	22	50	7	1

NOTE: AI/AN = American Indian/Alaska Native. Black includes African American, Hispanic includes Latino, and Pacific Islander includes Native Hawaiian. Race categories exclude Hispanic origin. Results are not shown for students whose race/ethnicity was unclassified. Detail may not sum to totals because the percentage of responses rated as "Off-task" is not shown. Off-task responses are those that do not provide any information related to the assessment task.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2009 Reading Assessment.

SAMPLE QUESTION: LOCATE AND RECALL

This sample multiple-choice question measures eighth-graders' ability to recognize a specific action in the poem. Sixty-six percent of students in the nation and 59 percent AI/AN students were able to recognize what the speaker is doing at the beginning of the poem.

SAMPLE QUESTION:

What is the speaker doing at the beginning of the poem?

- (A) Watching the birds
- (B) Wading in a stream
- (C) Drinking the water
- (D) Picking wildflowers

Percentage of eighth-grade students in each response category, by race/ethnicity: 2009

Race/ethnicity	Choice A	Choice B	Choice C	Choice D	Omitted
All students	25	8	66	1	#
AI/AN	36	4	59	1	#
Black	28	9	61	2	#
Hispanic	37	11	50	2	1
White	20	6	72	1	#
Asian/Pacific Islander	17	9	71	2	1

Rounds to zero.
NOTE: AI/AN = American Indian/Alaska Native. Black includes African American, Hispanic includes Latino, and Pacific Islander includes Native Hawaiian. Race categories exclude Hispanic origin. Results are not shown for students whose race/ethnicity was unclassified. Detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2009 Reading Assessment.

Mathematics

Average mathematics scores in 2009 for American Indian/Alaska Native (AI/AN) fourth- and eighth-graders were not significantly different from the scores in either 2007 or 2005. However, among the seven states with samples large enough to report results in both 2005 and 2009, scores increased in one state at grade 4 and one state at grade 8.

Overview of the 2009 Mathematics Assessment

Information about the assessment content helps to provide some context for interpreting results for AI/AN students. The NAEP mathematics assessment measures students' knowledge and skills in mathematics and students' ability to apply their knowledge in problem-solving situations. To ensure an appropriate balance of content along with allowing for a variety of ways of knowing and doing mathematics, the *Mathematics Framework for the 2009 National Assessment of Educational Progress* specifies that each question in the assessment measures one of five mathematical content areas. Although the names of the content areas, as well as some of the topics in those areas, have changed over the years, there has been a consistent focus across frameworks on collecting information on students' performance in five areas: number properties and operations; measurement; geometry; data analysis, statistics, and probability; and algebra. The complete mathematics framework for 2009 is available at http://www.nagb.org/publications/frameworks/math-framework09.pdf.

Mathematics Content Areas

Number properties and operations measures students' understanding of ways to represent, calculate, and estimate with numbers.

Measurement assesses students' knowledge of units of measurement for such attributes as capacity, length, area, volume, time, angles, and rates.

Geometry measures students' knowledge and understanding of shapes in two and three dimensions, and relationships between shapes such as symmetry and transformations.

Data analysis, statistics, and probability measures students' understanding of data representation, characteristics of data sets, experiments and samples, and probability.

Algebra measures students' understanding of patterns, using variables, algebraic representation, and functions.

The three levels of mathematical complexity (low, moderate, and high) described in the framework form an ordered description of the demands that questions make on students' thinking. Mathematical complexity involves *what* a question asks students to do and *not how* they might undertake it. The complexity of a question is not directly related to its format, and therefore it is possible for some multiple-choice questions to assess complex mathematics and for some constructed-response (i.e., open-ended) questions to assess routine mathematical ideas.

Levels of Mathematical Complexity

Low complexity questions typically specify what a student is to do, which is often to carry out a routine mathematical procedure.

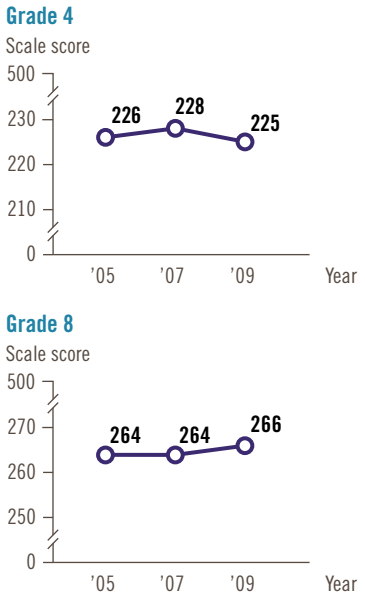
Moderate complexity questions involve more flexibility of thinking and often require a response with multiple steps.

High complexity questions make heavier demands and often require abstract reasoning or analysis in a novel situation.

Gains for higher-performing AI/AN eighth-graders from 2005 to 2009

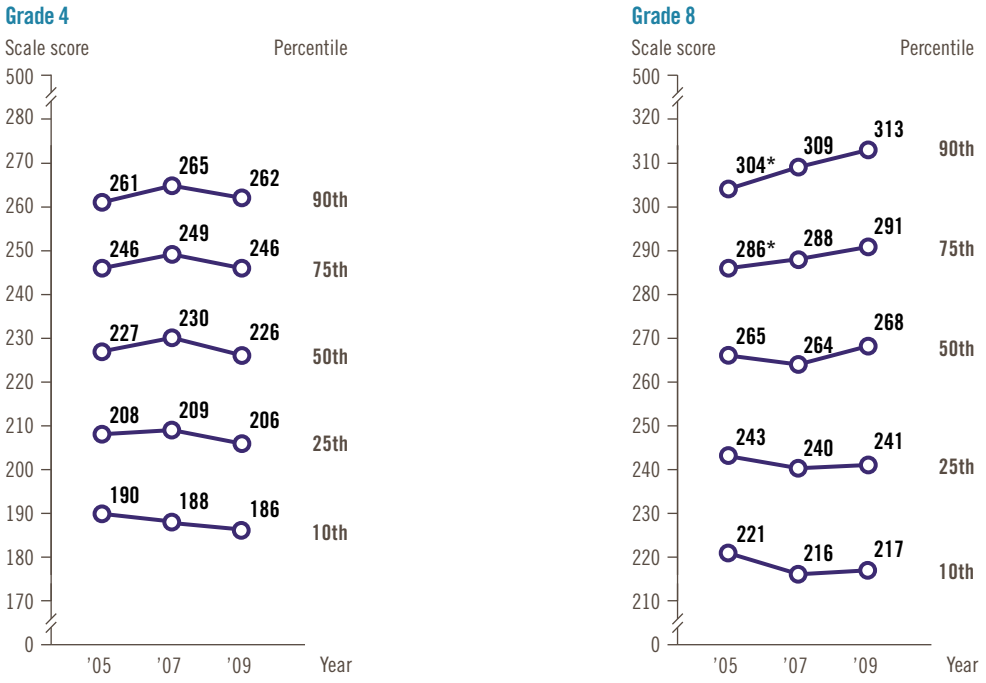
Although there was no significant change in the average scores for AI/AN students overall, scores (figure **M-1**) were higher in 2009 than in 2005 for higher-performing eighth-graders at the 75th and 90th percentiles (figure **M-2**). There were no significant changes in the scores for fourth-grade AI/AN students at any of the five percentiles in comparison to either 2007 or 2005.

Figure **M-1.** Trend in average scores for fourth- and eighth-grade AI/AN students in NAEP mathematics



NOTE: AI/AN = American Indian/Alaska Native. For consistency with performance results for AI/AN students presented in other 2009 NAEP reports, comparisons between the results for 2009 and those in previous years presented in this figure are based on multiple comparison procedures that limit the likelihood of finding significant differences by chance by considering all six NAEP race/ethnicity categories simultaneously.

Figure **M-2.** Trend in percentile scores for fourth- and eighth-grade AI/AN students in NAEP mathematics



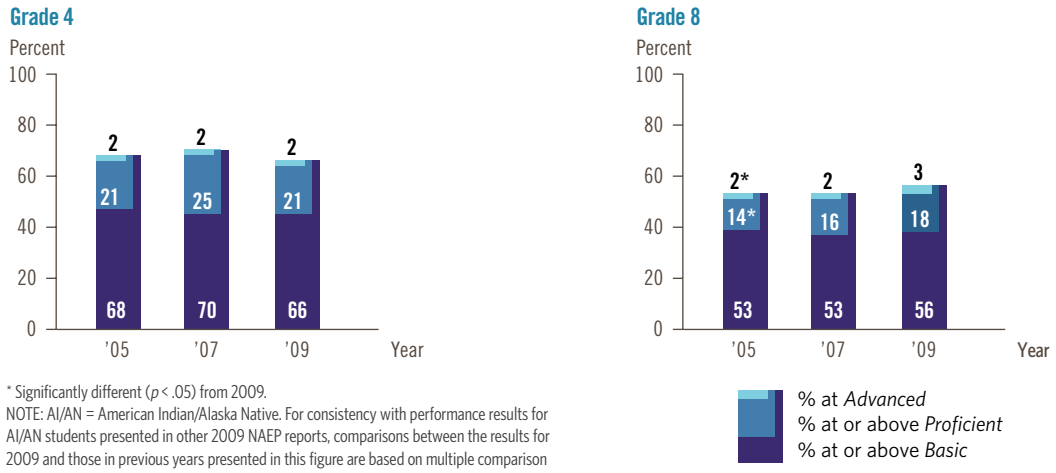
* Significantly different ($p < .05$) from 2009.
NOTE: AI/AN = American Indian/Alaska Native. For consistency with performance results for AI/AN students presented in other 2009 NAEP reports, comparisons between the results for 2009 and those in previous years presented in this figure are based on multiple comparison procedures that limit the likelihood of finding significant differences by chance by considering all six NAEP race/ethnicity categories simultaneously.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2005, 2007, and 2009 National Indian Education Studies.

In 2009, the percentages of AI/AN students performing at or above the *Basic* level were 66 percent at grade 4 and 56 percent at grade 8 (figure **M-3**). There were no significant changes in the percentages of students at or above *Basic* in comparison to earlier assessment years at either grade.

Twenty-one percent of AI/AN students at grade 4 and 18 percent at grade 8 performed at or above the *Proficient* level in 2009. While the percentage of fourth-graders at or above *Proficient* in 2009 was not significantly different from the percentages in earlier assessments, the percentage of eighth-graders was higher in 2009 than in 2005. The percentage of eighth-graders at *Advanced* also increased from 2 percent in 2005 to 3 percent in 2009.

Figure **M-3.** Trend in achievement-level results for fourth- and eighth-grade AI/AN students in NAEP mathematics



* Significantly different ($p < .05$) from 2009.
NOTE: AI/AN = American Indian/Alaska Native. For consistency with performance results for AI/AN students presented in other 2009 NAEP reports, comparisons between the results for 2009 and those in previous years presented in this figure are based on multiple comparison procedures that limit the likelihood of finding significant differences by chance by considering all six NAEP race/ethnicity categories simultaneously.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2005, 2007, and 2009 National Indian Education Studies.

AI/AN students score higher than Black students but lower than White and Asian/Pacific Islander students

AI/AN students scored lower on average than non-AI/AN students in 2009 at both grades 4 and 8 (table **M-1**). When compared to other race/ethnicity groups, the average score for fourth-grade AI/AN students was higher than the score for Black students and lower than scores for Hispanic, White, and Asian/Pacific Islander students. At grade 8, the score for AI/AN students was higher than the score for Black students, not significantly different from the score for Hispanic students, and lower than the scores for White and Asian/Pacific Islander students.

Like the results that compared overall scale scores for AI/AN students to other race/ethnicity groups, scores at each of the five percentiles were lower for AI/AN students than for White and Asian/Pacific Islander students at both grades. However, differences between AI/AN students and Black and Hispanic students varied for students performing at different percentile levels.

At grade 4, differences between AI/AN and Black students were seen for middle- and higher-performing students but not for lower-performing students. Scores for AI/AN students were higher

Table **M-1.** Percentile scores for fourth- and eighth-grade students in NAEP mathematics, by race/ethnicity: 2009

			Other race/ethnicity groups			
Percentile	AI/AN	Non-AI/AN	Black	Hispanic	White	Asian/Pacific Islander
Grade 4						
Overall	225	240*	222*	227*	248*	255*
10th	186	202*	187	192*	215*	217*
25th	206	221*	205	210	232*	237*
50th	226	241*	223*	229	249*	256*
75th	246	260*	241*	246	266*	274*
90th	262	275*	256*	261	280*	291*
Grade 8						
Overall	266	283*	261*	266	293*	301*
10th	217	236*	218	222	251*	252*
25th	241	259*	239	244	272*	277*
50th	268	284*	262*	268	294*	303*
75th	291	308*	283*	290	315*	327*
90th	313	329*	303*	310*	334*	347*

* Significantly different ($p < .05$) from AI/AN students.
NOTE: AI/AN = American Indian/Alaska Native. Black includes African American, Hispanic includes Latino, and Pacific Islander includes Native Hawaiian. Race categories exclude Hispanic origin. Results are not shown for students whose race/ethnicity was unclassified, but they are included in the results for non-AI/AN students.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2009 National Indian Education Study.

than the scores for Black students at the 50th, 75th, and 90th percentiles, while there were no significant differences between scores for the two groups at the 10th and 25th percentiles.

Differences between AI/AN and Hispanic fourth-graders were seen for the lowest-performing students but not for middle- and higher-performing students. While the score for AI/AN students at the 10th percentile was lower than the score for Hispanic students, there were no significant differences between the scores for the two groups at the 25th, 50th, 75th, and 90th percentiles.

At grade 8, scores at the 50th, 75th, and 90th percentiles were higher for AI/AN students than for Black students, while there were no significant differences between scores for the two groups at the 10th and 25th percentiles.

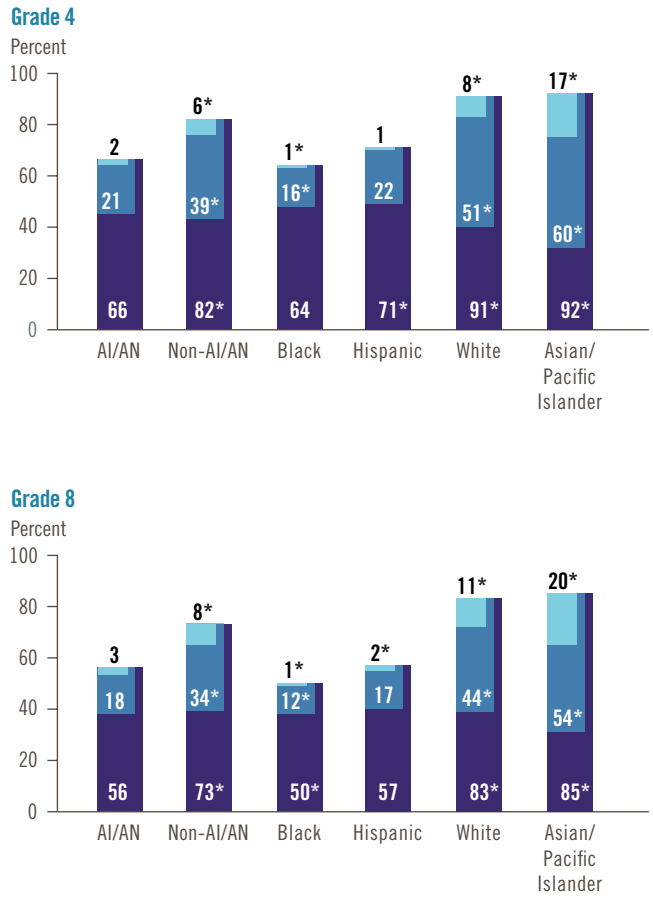
Although there was no significant difference in the overall average scores for AI/AN and Hispanic eighth-graders, the score for AI/AN students at the 90th percentile was higher than the score for Hispanic students.

DIFFERENCES BETWEEN AI/AN STUDENTS AND BLACK AND HISPANIC STUDENTS VARY BY ACHIEVEMENT LEVEL AT GRADE 4

Although the average mathematics score for AI/AN fourth-graders was higher than the score for Black students, there was no significant difference between the percentages of students in the two groups performing at or above *Basic* (figure **M-4**). The percentage of AI/AN students performing at or above *Proficient* was not significantly different from the percentage of Hispanic students even though the overall score of AI/AN fourth-graders was lower.

Like the overall average scores at grade 8, the percentages of AI/AN students performing at or above the *Basic* and *Proficient* levels were higher than the percentages of Black students, and not significantly different from the percentages of Hispanic students. The percentages of AI/AN students at or above *Basic*, at or above *Proficient*, and at *Advanced* were lower than the percentages of White or Asian/Pacific Islander students at both grades.

Figure **M-4.** Achievement-level results for fourth- and eighth-grade students in NAEP mathematics, by race/ethnicity: 2009



* Significantly different ($p < .05$) from AI/AN students.
NOTE: AI/AN = American Indian/Alaska Native. Black includes African American, Hispanic includes Latino, and Pacific Islander includes Native Hawaiian. Race categories exclude Hispanic origin. Results are not shown for students whose race/ethnicity was unclassified, but they are included in the results for non-AI/AN students.

% at *Advanced*
% at or above *Proficient*
% at or above *Basic*

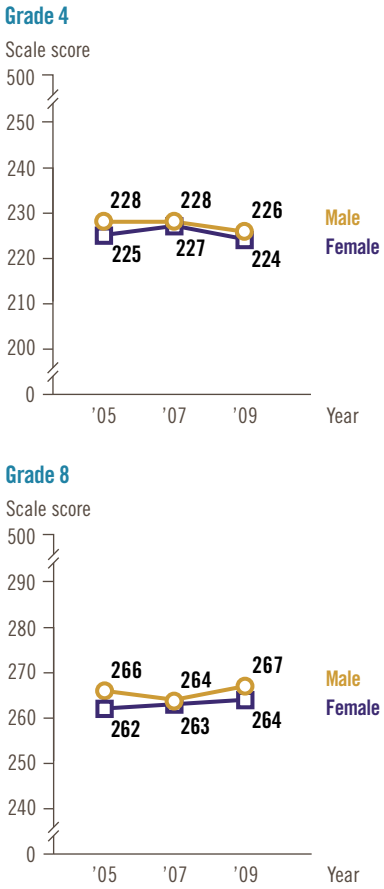
Additional results from the 2009 NAEP mathematics assessment by race/ethnicity and other student and school characteristics are provided in appendix tables **A-3** and **A-4**.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2009 National Indian Education Study.

Male and female AI/AN students perform comparably in mathematics

There was no significant difference in the average mathematics scores for male and female AI/AN students at either grade 4 or grade 8 in 2009 (figure **M-5**). Neither male nor female students had a significant change in scores in comparison to earlier assessments at either grade.

Figure **M-5.** Trend in average scores for fourth- and eighth-grade AI/AN students in NAEP mathematics, by gender



NOTE: AI/AN = American Indian/Alaska Native.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2005, 2007, and 2009 National Indian Education Studies.

AI/AN students eligible for free school lunch score lower than those eligible for reduced-price lunch at grade 8, but not at grade 4

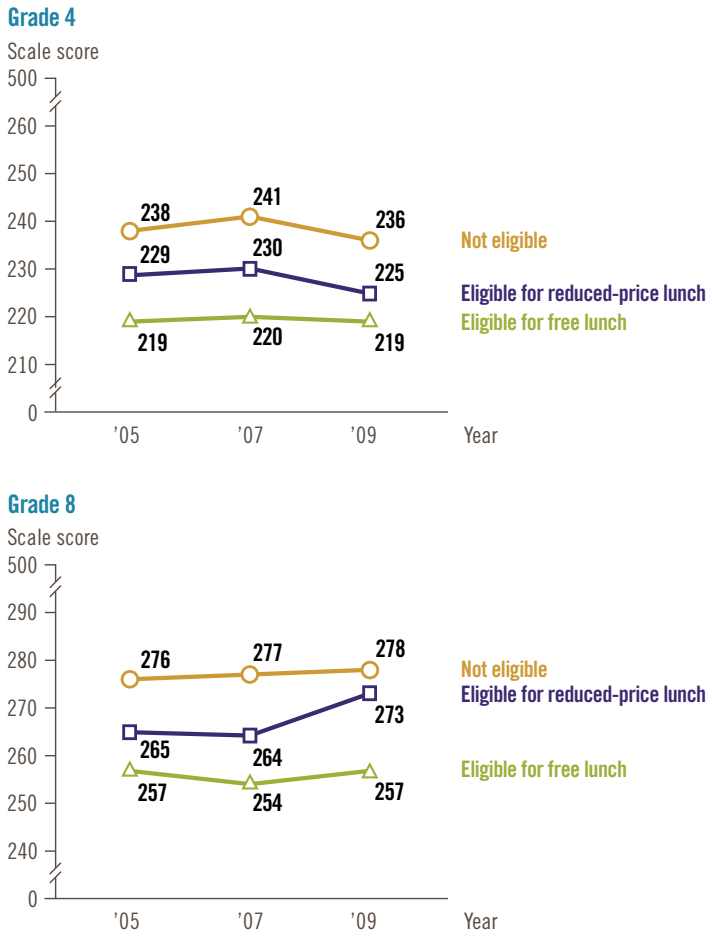
NAEP uses students' eligibility for the National School Lunch Program as an indicator of low income (see the Technical Notes for eligibility criteria). Sixty-seven percent[5] of AI/AN fourth-graders and 59 percent[5] of eighth-graders participating in the 2009 mathematics assessment were eligible for the National School Lunch Program (see appendix table **A-4**). The majority of these students were eligible for free school lunches (60 percent at grade 4 and 51 percent at grade 8).

At grade 4, there was no significant difference in the average mathematics scores for AI/AN students eligible for free lunch and those eligible for reduced-price lunch in 2009. Fourth-graders who were not eligible for the program scored higher on average than those eligible for free lunch but not significantly different from students eligible for reduced-price lunch (figure **M-6**).

At grade 8, the average score for AI/AN students who were eligible for free lunch was lower than the scores for both students eligible for reduced-price lunch and those who were not eligible for the program. There was no significant difference between the scores of students eligible for reduced-price lunch and those who were not eligible at all.

In comparison to previous assessment years, there were no significant changes in average mathematics scores for AI/AN students in any of the three eligibility groups at either grade 4 or grade 8.

Figure **M-6.** Trend in average scores for fourth- and eighth-grade AI/AN students in NAEP mathematics, by eligibility for National School Lunch Program



NOTE: AI/AN = American Indian/Alaska Native.

[5] The percentage is calculated based on the sum of the unrounded numbers rather than the rounded numbers shown in the table.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2005, 2007, and 2009 National Indian Education Studies.

AI/AN students' performance in mathematics varies by region of the country

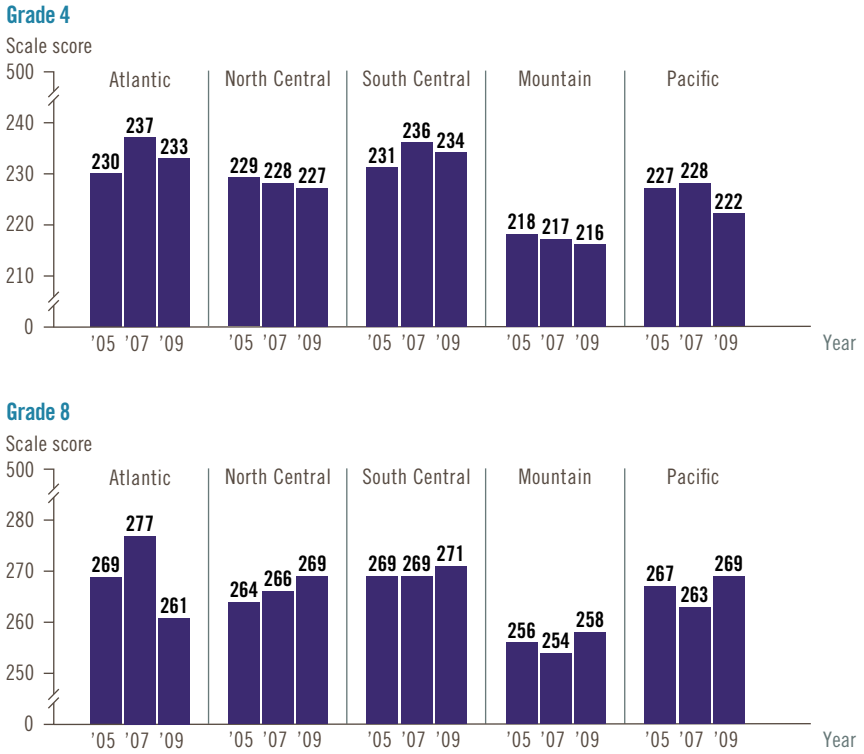
NAEP results for AI/AN students are reported for five regions of the country: Atlantic, North Central, South Central, Mountain, and Pacific. These regions, which differ from the typical regions used in other NAEP reports, are based on U.S. Census divisions and are configured to align with the overall distribution of the AI/AN student population.

In 2009, the average mathematics score for AI/AN fourth-graders attending schools in the South Central region was higher than the scores for students in the North Central, Mountain, and Pacific regions, and was not significantly different from the score for students in the Atlantic region (figure **M-7**). Fourth-graders in the Atlantic region scored higher on average than those in the Pacific and Mountain regions, but not significantly different from those in the North Central region, and those in the North Central region scored higher than those in the Mountain region.

At grade 8, AI/AN students in the North Central, South Central, and Pacific regions scored higher on average in 2009 than students in the Mountain region. Other apparent differences in regional scores were not statistically significant.

Average mathematics scores for AI/AN students in each of the regions in 2009 were not significantly different from the scores in earlier assessment years at either grade.

Figure **M-7.** Trend in average scores for fourth- and eighth-grade AI/AN students in NAEP mathematics, by region



NOTE: AI/AN = American Indian/Alaska Native.

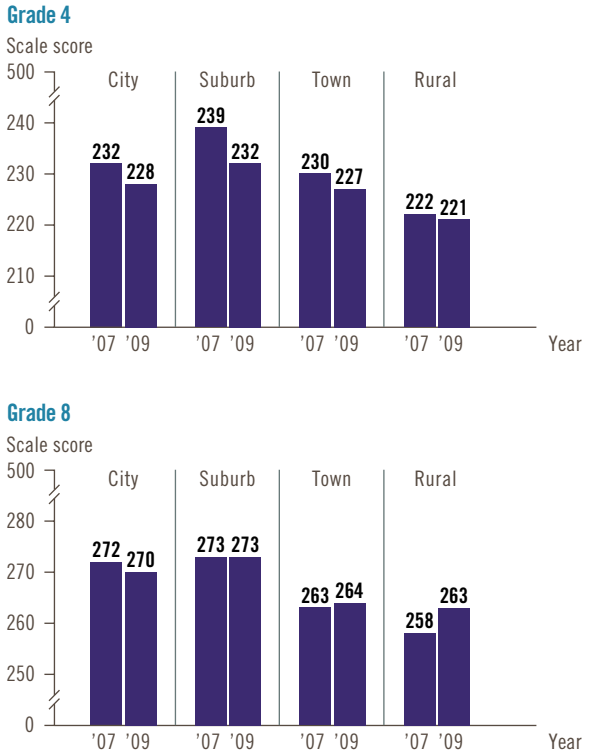
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2005, 2007, and 2009 National Indian Education Studies.

Fourth-grade AI/AN students in rural schools score lower than in other locations

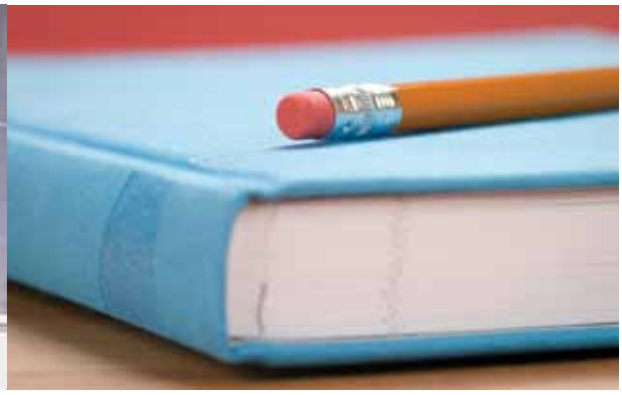
AI/AN students' performance in mathematics varied by the location of their school at grade 4 but not at grade 8. In 2009, average scores for AI/AN fourth-graders attending schools in city, suburb, and town locations were higher than the score for students attending schools in rural locations (figure **M-8**). There were no significant differences in the scores of eighth-grade AI/AN students attending schools in different types of locations.

Average scores for fourth- and eighth-grade students attending schools in each of the different locations in 2009 were not significantly different from the scores in 2007. Because of changes in location classifications in 2007, comparisons cannot be made to the results by type of location for 2005 (see the Technical Notes).

Figure **M-8.** Average scores for fourth- and eighth-grade AI/AN students in NAEP mathematics, by school location: 2007 and 2009



NOTE: AI/AN = American Indian/Alaska Native.



SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2007 and 2009 National Indian Education Studies.

AI/AN students in public schools score higher than those in BIE schools

AI/AN students' performance in mathematics varied by the proportion of AI/AN students in the schools they attended. In 2009, overall average scores for both fourth- and eighth-grade AI/AN students who attended low density public schools (where less than 25 percent of the students were AI/AN) were higher than the scores for students in high density schools (where 25 percent or more of the students were AI/AN), and scores for students in low and high density public schools were higher than the scores for students in BIE schools (table **M-2**).

Table **M-2.** Percentage of fourth- and eighth-grade AI/AN students and average scores in NAEP mathematics, by type of school and selected student and school characteristics: 2009

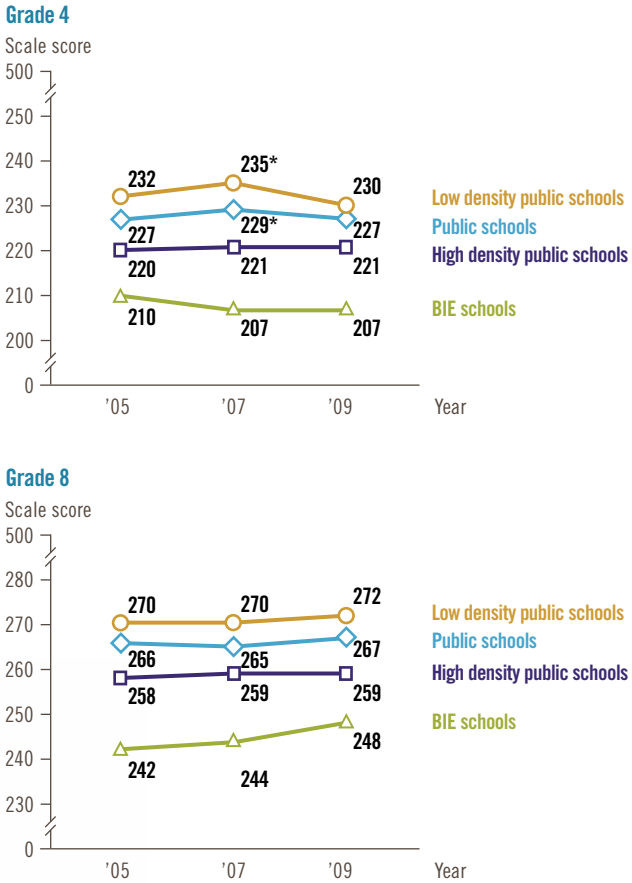
Characteristic	Public		Low density public		High density public		BIE	
	Percentage of students	Average score	Percentage of students	Average score	Percentage of students	Average score	Percentage of students	Average score
Grade 4								
Overall	100	227	100	230	100	221*	100	207*,**
Eligibility for school lunch								
Eligible for free lunch	59	221	51	225	72*	217*	85*,**	207*,**
Eligible for reduced-price lunch	8	225	10	225	6	226	2*,**	‡
Not eligible	32	237	39	238	21*	234	4*,**	‡
School location								
City	18	227	29	227	3*	221	#	‡
Suburb	16	232	25	233	1*	‡	5*,**	‡
Town	23	227	21	229	26	226	4*,**	‡
Rural	43	224	25	232	70*	220*	91*,**	206*,**
Students with disabilities	12	209	12	215	12	202*	14	191*,**
English language learners	7	201	3	‡	12*	202	34*,**	200
Grade 8								
Overall	100	267	100	272	100	259*	100	248*,**
Eligibility for school lunch								
Eligible for free lunch	52	258	42	261	67*	255*	82*,**	247*,**
Eligible for reduced-price lunch	7	272	7	279	7	262*	2*,**	‡
Not eligible	40	278	50	280	25*	269*	4*,**	‡
School location								
City	18	269	28	270	3*	‡	#	‡
Suburb	15	273	24	273	1	‡	3*	‡
Town	21	265	19	270	24	260*	8*,**	247*,**
Rural	46	265	29	274	72*	259*	89*,**	248*,**
Students with disabilities	14	232	15	235	13	226	16	225
English language learners	5	232	1	‡	11*	230	34*,**	237**

Rounds to zero.
‡ Reporting standards not met.
* Significantly different ($p < .05$) from low density public schools.
** Significantly different ($p < .05$) from high density public schools.
NOTE: AI/AN = American Indian/Alaska Native. BIE = Bureau of Indian Education. School density indicates the proportion of AI/AN students enrolled. Low density schools have less than 25 percent AI/AN students. High density schools have 25 percent or more. Results are not shown for Department of Defense and private schools. For the eligibility for school lunch category, results are not shown for students whose eligibility status was not available. For the school location category, detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2009 National Indian Education Study.

Although there was no significant change in the overall average score for fourth-grade AI/AN students in comparison to earlier assessment years, there was a decrease in the score for students in low density public schools from 235 in 2007 to 230 in 2009 (figure **M-9**). There were no significant changes in average scores for fourth- and eighth-grade AI/AN students attending high density public schools or BIE schools in 2009 compared to 2005 and 2007.

Figure **M-9.** Trend in average scores for fourth- and eighth-grade AI/AN students in NAEP mathematics, by school type/density



* Significantly different ($p < .05$) from 2009.
NOTE: AI/AN = American Indian/Alaska Native. BIE = Bureau of Indian Education. School density indicates the proportion of AI/AN students enrolled. Low density schools have less than 25 percent AI/AN students. High density schools have 25 percent or more.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2005, 2007, and 2009 National Indian Education Studies.

Mathematics Results for AI/AN Students in Selected States

Results are presented in this section for 12 states with relatively large populations of AI/AN students. The AI/AN student enrollment in these states represents more than 50 percent of the AI/AN student enrollment in the nation. NIES state-level data include results from AI/AN students who attended public and BIE schools. The national AI/AN sample referenced as a point of comparison to these state results was also made up of public and BIE school students only.

When comparing the performance of AI/AN students in different states, it is important to consider how these states differ in school and student characteristics. For example, states varied in the percentages of AI/AN students attending certain types of schools and schools in certain locations. In four of the states (Arizona, New Mexico, North Dakota, and South Dakota), the percentages of AI/AN students who attended BIE schools ranged from 17 to 28 percent at grade 4, and from 14 to 32 percent at grade 8, while 7 percent or less of AI/AN students in the remaining eight states attended BIE schools (table **M-3**).

Forty-six percent of AI/AN students nationally at grade 4 and 48 percent at grade 8 attended schools in rural locations. The percentages of students attending schools in rural areas in the 12 selected states ranged from 15 to 79 percent at grade 4, and from 7 to 73 percent at grade 8.

States also varied in the percentages of students eligible for the National School Lunch Program and in the percentages of students with disabilities and English language learners. Nationally, higher percentages of fourth- and eighth-grade AI/AN students were eligible for the National School Lunch Program than were not eligible, and higher percentages were eligible for free lunch than for reduced-price lunch. The percentages of AI/AN students eligible for free school lunch in the 12 selected states ranged from 53 percent to 86 percent at grade 4, and from 43 to 84 percent at grade 8 (table **M-4**).

Among the 12 selected states, the percentages of AI/AN students with disabilities ranged from 10 to 19 percent at grade 4 and from 11 to 21 percent at grade 8. The percentages of English language learners ranged from less than 1 percent to 34 percent at grade 4, and from less than 1 percent to 32 percent at grade 8.

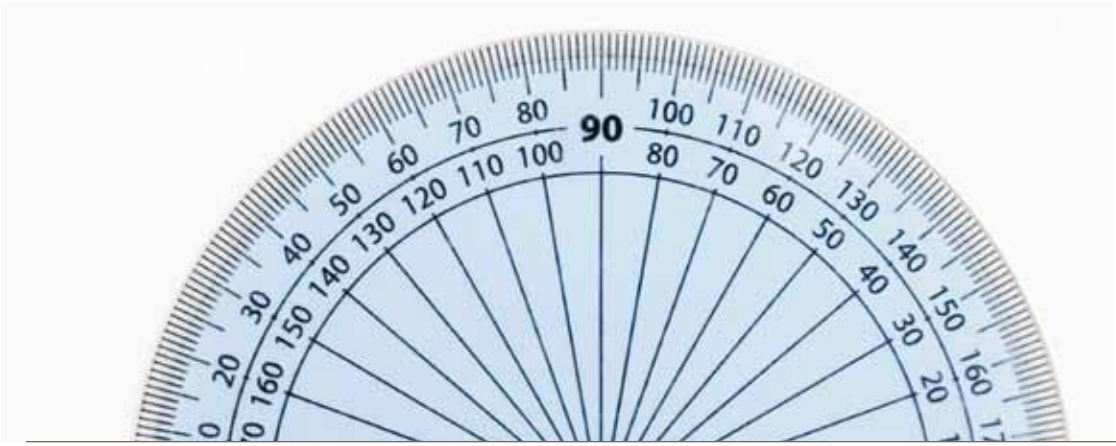


Table **M-3.** Percentage of fourth- and eighth-grade AI/AN students in NAEP mathematics, by selected school characteristics and jurisdiction: 2009

Jurisdiction	Type of school				School location			
	Public	Low density public	High density public	BIE	City	Suburb	Town	Rural
Grade 4								
Nation	93	56	37	7	17	15	22	46
Alaska	100	33*	67*	#	19	2*	14*	65*
Arizona	83*	38*	45	17*	24	7*	15	54
Minnesota	94	74*	20*	6	22	14	17	47
Montana	99*	38*	61*	1*	18	2*	27	54
New Mexico	72*	24*	48	28*	14	5*	24	57*
North Carolina	100	38*	62*	#	4	#	17	79*
North Dakota	79*	28*	51*	21*	13	7*	12*	68*
Oklahoma	100	39*	61*	#*	10*	9*	31*	50
Oregon	100	80*	20*	#	22	15	39	24*
South Dakota	75*	27*	48*	25*	17	#*	16*	67*
Utah	95*	62	32	5*	15	31*	39*	15*
Washington	95*	74*	21*	5*	21	36*	18	25*
Grade 8								
Nation	94	58	36	6	17	14	20	48
Alaska	100	32*	68*	#	13	1*	15	70*
Arizona	86*	34*	52*	14*	22	5*	14	60
Minnesota	93	78*	15*	7	10	15	28	46
Montana	98*	39*	59*	2*	17	1	25	57
New Mexico	76*	20*	56*	24*	13	9	10*	69*
North Carolina	100	43*	57*	#	5*	8	19	68
North Dakota	81*	30*	50*	19*	9*	6*	15	71*
Oklahoma	99*	44*	56*	1*	6*	12	35*	47
Oregon	100	92*	8*	#	30	6	41*	22*
South Dakota	68*	25*	43*	32*	15	#	12*	73*
Utah	100	74*	26*	#	16	29	48*	7*
Washington	95*	86*	9*	5*	23	38*	8*	31*

Rounds to zero.

* Significantly different ($p < .05$) from AI/AN students in the nation.

NOTE: AI/AN = American Indian/Alaska Native. BIE = Bureau of Indian Education. School density indicates the proportion of AI/AN students enrolled. Low density schools have less than 25 percent AI/AN students. High density schools have 25 percent or more. Results are not shown for Department of Defense and private schools. Detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2009 National Indian Education Study.

Table **M-4.** Percentage of fourth- and eighth-grade AI/AN students in NAEP mathematics, by selected student characteristics and jurisdiction: 2009

Jurisdiction	Eligibility for National School Lunch Program			Students with disabilities	English language learners
	Eligible for free lunch	Eligible for reduced-price lunch	Not eligible		
Grade 4					
Nation	61	8	30	13	9
Alaska	65	4*	31	19*	22*
Arizona	70*	11	18*	15	15
Minnesota	63	#	34	18	#
Montana	76*	7	16*	12	18*
New Mexico	86*	#	13*	10	34*
North Carolina	72	2	26	19	3*
North Dakota	82*	1*	17*	19	8
Oklahoma	53*	11*	36*	12	1
Oregon	66	#*	27	18	10
South Dakota	73*	5*	12*	17	2*
Utah	69	8	21	10	23*
Washington	60	3*	36	16	1*
Grade 8					
Nation	54	7	38	14	6
Alaska	60	5	31	14	24*
Arizona	67*	8	24*	15	12*
Minnesota	59	1	40	18	#
Montana	69*	8	24*	17	22*
New Mexico	82*	1*	15*	12	32*
North Carolina	66*	#	34	13	#
North Dakota	84*	2*	14*	21	8
Oklahoma	43*	13*	44	12	1*
Oregon	65	#	35	16	1
South Dakota	69*	2*	15*	14	4*
Utah	61	10	29	11	4
Washington	61	1*	36	17	#

Rounds to zero.
* Significantly different ($p < .05$) from AI/AN students in the nation.
NOTE: AI/AN = American Indian/Alaska Native. Results are not shown for students whose eligibility status for the National School Lunch Program was not available.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2009 National Indian Education Study.

Scores increase since 2005 for AI/AN students in Oklahoma at grade 4 and in South Dakota at grade 8

Among the 11 states with samples large enough to report results for AI/AN students in both 2009 and 2007, none had a significant change in average mathematics scores at grade 4, and South Dakota had a 6-point increase at grade 8 (table **M-5**). Of the 7 states with samples large enough to report results in both 2009 and 2005, Oklahoma had a 5-point increase at grade 4, and South Dakota had a 10-point increase at grade 8.

Table **M-5.** Average scores for fourth- and eighth-grade AI/AN students in NAEP mathematics, by jurisdiction: 2005, 2007, and 2009

Jurisdiction	2005	2007	2009
Grade 4			
Nation	226	228*	225
Alaska	220	218	216
Arizona	215	213	213
Minnesota	—	234	232
Montana	223	222	227
New Mexico	215	217	214
North Carolina	—	229	232
North Dakota	221	223	223
Oklahoma	229*	234	234
Oregon	—	220	223
South Dakota	217	215	217
Utah	—	—	218
Washington	—	226	225
Grade 8			
Nation	264	264	266
Alaska	264	260	262
Arizona	256	255	254
Minnesota	—	266	275
Montana	259	260	260
New Mexico	251	250	252
North Carolina	—	261	256
North Dakota	260	260	260
Oklahoma	267	269	269
Oregon	—	264	273
South Dakota	250*	254*	260
Utah	—	—	263
Washington	—	264	268

— Not available.
* Significantly different ($p < .05$) from 2009.
NOTE: AI/AN = American Indian/Alaska Native.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2005, 2007, and 2009 National Indian Education Studies.

AI/AN fourth-graders in one state perform higher than AI/AN students in the nation and students in four states score lower

The average mathematics scores for AI/AN fourth-graders in the 12 selected states with large proportions of AI/AN students are compared to each other and to the average scores for AI/AN students in the nation and to the other jurisdictions combined in figure **M-10**. The average mathematics score for AI/AN fourth-graders in Oklahoma was higher than the score for AI/AN students in the nation. Among the remaining 11 states with samples large enough to report results for AI/AN students, scores were not significantly different from the nation in 7 states, and scores were lower than the nation in 4 states.

Figure **M-10.** Cross-jurisdiction comparison of average scores for fourth-grade AI/AN students in NAEP mathematics: 2009

Jurisdiction (Average score)	Nation	Oklahoma	North Carolina	Minnesota	Montana	Washington	North Dakota	Oregon	Utah	South Dakota	Alaska	New Mexico	Arizona	Other jurisdictions[1]
Nation (225)		▼								▲	▲	▲	▲	▼
Oklahoma (234)	▲				▲	▲	▲	▲	▲	▲	▲	▲	▲	
North Carolina (232)										▲	▲	▲	▲	
Minnesota (232)										▲	▲	▲	▲	
Montana (227)		▼								▲	▲	▲	▲	
Washington (225)		▼								▲	▲	▲	▲	
North Dakota (223)		▼								▲	▲	▲	▲	
Oregon (223)		▼											▲	
Utah (218)		▼												
South Dakota (217)	▼	▼	▼	▼	▼	▼	▼							▼
Alaska (216)	▼	▼	▼	▼	▼	▼	▼							▼
New Mexico (214)	▼	▼	▼	▼	▼	▼	▼							▼
Arizona (213)	▼	▼	▼	▼	▼	▼	▼	▼						▼
Other jurisdictions[1] (229)	▲									▲	▲	▲	▲	

[1] The "other jurisdictions" category includes all states not shown and the District of Columbia.
NOTE: AI/AN = American Indian/Alaska Native. Read across the row corresponding to a jurisdiction listed to the left of the chart. Match the shading intensity (and arrow direction) to the chart's key to determine whether the average score for students in this jurisdiction was found to be higher than (up arrow), not significantly different from (blank cell), or lower than (down arrow) the average score for students in the jurisdiction in the column heading.

▲ The jurisdiction had a higher average score than the jurisdiction listed at the top of the column.

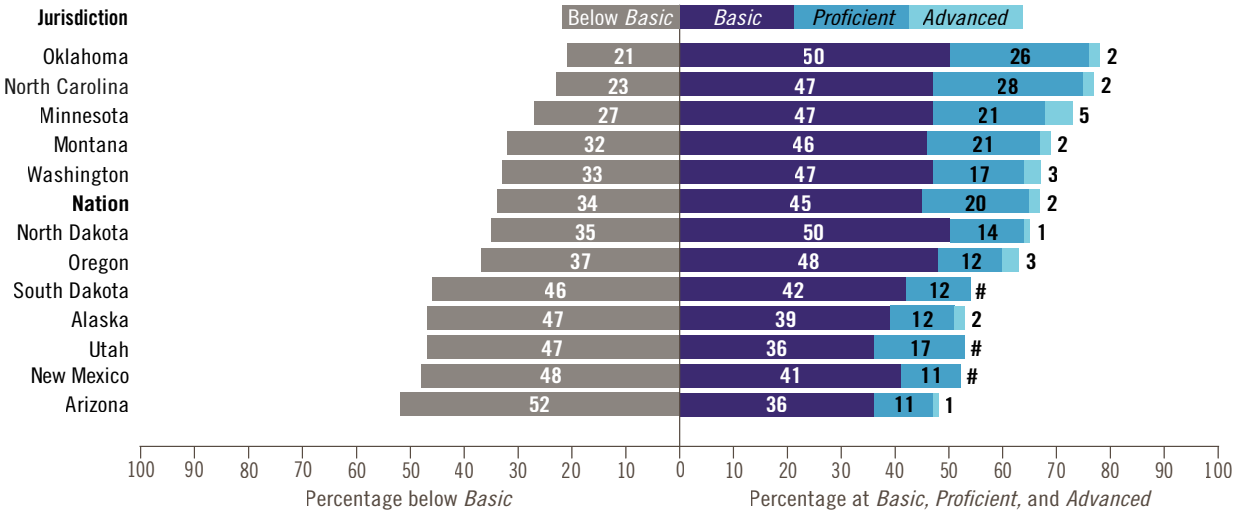
No statistically significant difference detected from the jurisdiction listed at the top of the column.

▼ The jurisdiction had a lower average score than the jurisdiction listed at the top of the column.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2009 National Indian Education Study.

The percentages of AI/AN fourth-graders performing at or above the *Basic* level in 2009 ranged from 48 percent in Arizona to 79 percent in Oklahoma (figure **M-11**). In comparison to the nation, the percentages of AI/AN students at or above *Basic* were higher in Oklahoma and lower in Alaska, Arizona, New Mexico, and South Dakota. All 12 states had some students who performed at or above the *Proficient* level in 2009.

Figure M-11. Percentage of fourth-grade AI/AN students in NAEP mathematics, by achievement level and jurisdiction: 2009



Rounds to zero.
NOTE: AI/AN = American Indian/Alaska Native. Detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2009 National Indian Education Study.

Scores for AI/AN eighth-graders in nine states comparable to AI/AN students in the nation, and scores in three states are lower

Although none of the 12 states with samples of AI/AN students large enough to report results had scores higher than the national average for AI/AN eighth-graders, most did have scores that were comparable to the nation. Average mathematics scores for AI/AN students in nine states were not significantly different from the score for the nation, and scores in three states were lower (figure **M-12**).

Figure **M-12.** Cross-jurisdiction comparison of average scores for eighth-grade AI/AN students in NAEP mathematics: 2009

Jurisdiction (Average score)	Nation	Minnesota	Oregon	Oklahoma	Washington	Utah	Alaska	North Dakota	South Dakota	Montana	North Carolina	Arizona	New Mexico	Other jurisdictions[1]
Nation (266)									▲			▲	▲	▼
Minnesota (275)							▲	▲	▲	▲	▲	▲	▲	
Oregon (273)												▲	▲	
Oklahoma (269)								▲	▲			▲	▲	
Washington (268)												▲	▲	
Utah (263)														
Alaska (262)		▼											▲	
North Dakota (260)		▼		▼									▲	▼
South Dakota (260)	▼	▼		▼									▲	▼
Montana (260)		▼												▼
North Carolina (256)		▼												▼
Arizona (254)	▼	▼	▼	▼	▼									▼
New Mexico (252)	▼	▼	▼	▼	▼		▼	▼	▼					▼
Other jurisdictions[1] (272)	▲							▲	▲	▲	▲	▲	▲	

[1] The "other jurisdictions" category includes all states not shown and the District of Columbia.
NOTE: AI/AN = American Indian/Alaska Native.
Read across the row corresponding to a jurisdiction listed to the left of the chart. Match the shading intensity (and arrow direction) to the chart's key to determine whether the average score for students in this jurisdiction was found to be higher than (up arrow), not significantly different from (blank cell), or lower than (down arrow) the average score for students in the jurisdiction in the column heading.

▲ The jurisdiction had a higher average score than the jurisdiction listed at the top of the column.

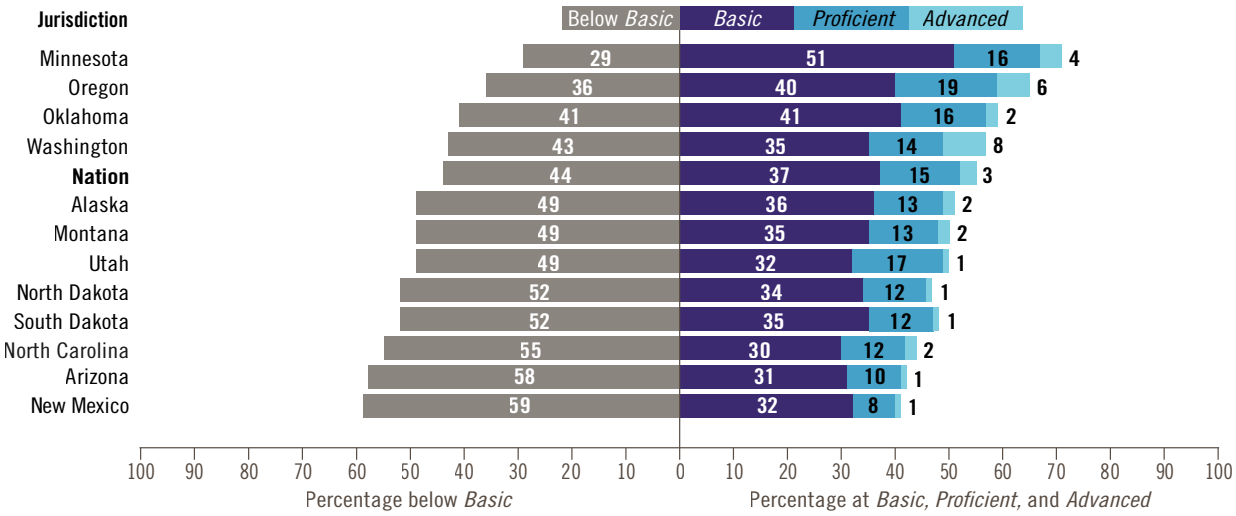
No statistically significant difference detected from the jurisdiction listed at the top of the column.

▼ The jurisdiction had a lower average score than the jurisdiction listed at the top of the column.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2009 National Indian Education Study.

The percentages of AI/AN eighth-graders performing at or above the *Basic* level in 2009 ranged from 41 percent in New Mexico to 71 percent in Minnesota (figure **M-13**). In comparison to the nation, the percentages of AI/AN students at or above *Basic* were higher in Minnesota and lower in Arizona, New Mexico, and South Dakota. All 12 states had some students who performed at or above the *Proficient* level in 2009.

Figure **M-13.** Percentage of eighth-grade AI/AN students in NAEP mathematics, by achievement level and jurisdiction: 2009



NOTE: AI/AN = American Indian/Alaska Native. Detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2009 National Indian Education Study.

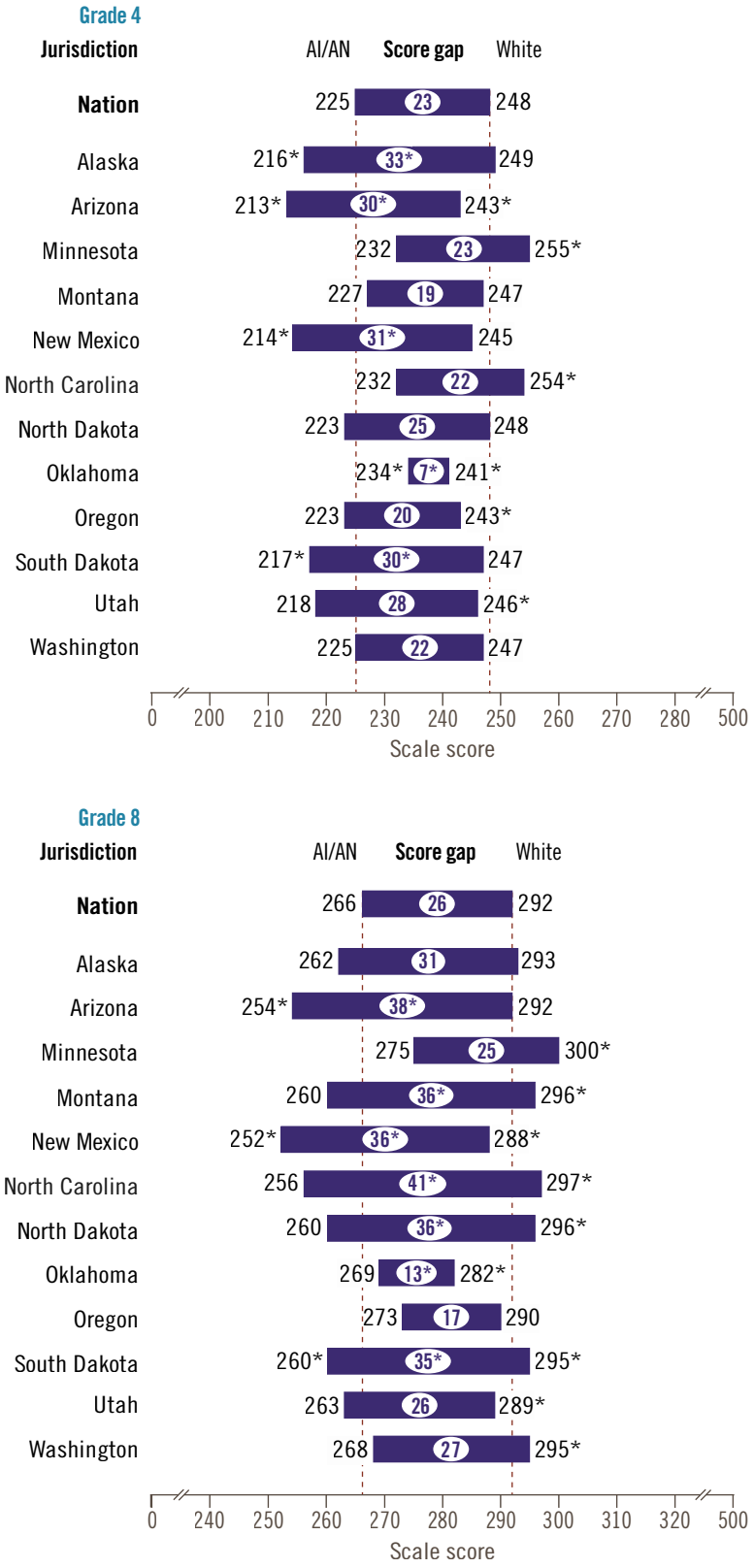
White – AI/AN score gaps in Oklahoma smaller than national gaps

In 2009, the mathematics score gap between AI/AN and White students attending public and BIE schools in the nation was 23 points at grade 4 and 26 points at grade 8 (figure **M-14**). Average mathematics score gaps between White and AI/AN students in the 12 selected states ranged from 7 to 33 points at grade 4 and from 13 to 41 points at grade 8.

At grade 4, the 7-point gap in Oklahoma was smaller than the White – AI/AN gap in the nation, while the gaps in Alaska, Arizona, New Mexico, and South Dakota were larger than the gap for the nation.

At grade 8, the 13-point gap in Oklahoma was smaller than the White – AI/AN gap in the nation, and the gaps in Arizona, Montana, New Mexico, North Carolina, North Dakota, and South Dakota were larger than the gap for the nation.

Figure **M-14.** White – AI/AN score gaps for fourth- and eighth-grade students in NAEP mathematics, by jurisdiction: 2009



* Significantly different ($p < .05$) from students in the nation.
NOTE: AI/AN = American Indian/Alaska Native. Race categories exclude Hispanic origin. Score gaps are calculated based on the difference between unrounded average scores.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2009 National Indian Education Study.

Mathematics Assessment Content at Grade 4

To reflect a different emphasis across grade levels, the proportion of the mathematics assessment devoted to each of the five content areas varies by grade.

40%

Number properties and operations

These questions focus on computation with or understanding of whole numbers and common fractions and decimals.

20%

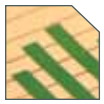
Measurement

These questions focus on customary units such as inch, quart, pound, and hour, and common metric units such as centimeter, liter, and gram, as well as the geometric attribute of length.

15%

Geometry

These questions focus on simple figures and their attributes, including plane figures such as triangles and circles and solid figures such as cubes and spheres.



10%

Data analysis, statistics, and probability

These questions focus on students' understanding of how data are collected and organized, how to read and interpret various representations of data, and basic concepts of probability.

15%

Algebra

These questions measure understanding of algebraic representation, patterns, and rules; graphing points on a line or a grid; and using symbols to represent unknown quantities.

Because the assessment covered a breadth of content and included more questions than any one student could reasonably answer, each student took just a portion of the assessment. The 159 questions that made up the entire fourth-grade assessment were divided into 10 sections, each containing between 15 and 19 questions, depending on the balance between multiple-choice and constructed-response questions. Each student responded to questions in just two 25-minute sections.

Some sections of the assessment incorporated the use of calculators, rulers, geometric shapes, or other manipulatives that were provided. Fourth-graders were provided with a four-function calculator to use on approximately 20 percent of the assessment.

NAEP Mathematics Achievement-Level Descriptions for Grade 4

The achievement-level descriptions of what fourth-graders should know and be able to do at the *Basic*, *Proficient*, and *Advanced* mathematics achievement levels are presented below. (Note: Shaded text is a short, general summary to describe performance at each achievement level.) NAEP achievement levels are cumulative; therefore, student performance at the *Proficient* level includes the competencies associated with the *Basic* level, and the *Advanced* level 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.

Basic (214)

Fourth-grade students performing at the *Basic* level should show some evidence of understanding the mathematical concepts and procedures in the five NAEP content areas.

Fourth-graders performing at the *Basic* level should be able to estimate and use basic facts to perform simple computations with whole numbers; show some understanding of fractions and decimals; and solve some simple real-world problems in all NAEP content areas. Students at this level should be able to use—although not always accurately—four-function calculators, rulers, and geometric shapes. Their written responses are often minimal and presented without supporting information.

Proficient (249)

Fourth-grade students performing at the *Proficient* level should consistently apply integrated procedural knowledge and conceptual understanding to problem solving in the five NAEP content areas.

Fourth-graders performing at the *Proficient* level should be able to use whole numbers to estimate, compute, and determine whether results are reasonable. They should have a conceptual understanding of fractions and decimals; be able to solve real-world problems in all NAEP content areas; and use four-function calculators, rulers, and geometric shapes appropriately. Students performing at the *Proficient* level should employ problem-solving strategies such as identifying and using appropriate information. Their written solutions should be organized and presented both with supporting information and explanations of how they were achieved.

Advanced (282)

Fourth-grade students performing at the *Advanced* level should apply integrated procedural knowledge and conceptual understanding to complex and nonroutine real-world problem solving in the five NAEP content areas.

Fourth-graders performing at the *Advanced* level should be able to solve complex nonroutine real-world problems in all NAEP content areas. They should display mastery in the use of four-function calculators, rulers, and geometric shapes. These students are expected to draw logical conclusions and justify answers and solution processes by explaining why, as well as how, they were achieved. They should go beyond the obvious in their interpretations and be able to communicate their thoughts clearly and concisely.

What Fourth-Graders Know and Can Do in Mathematics

The item map below is useful for understanding performance at different levels on the NAEP scale. The scale scores on the left represent the average scores for students who were likely to get the items correct. The cut score at the lower end of the range for each achievement level is boxed. The descriptions of selected assessment questions are listed on the right along with the corresponding mathematics content areas.

With an overall average score of 225, AI/AN fourth-graders were likely to successfully answer those questions described on the map at 222 and below.

GRADE 4 NAEP MATHEMATICS ITEM MAP

	Scale score	Content area	Question description
	500		
	//		
Advanced	300	**Data analysis, statistics, and probability**	*Find the median price from a table*
Advanced	299	**Algebra**	*Identify the expression that models a scenario*
Advanced	295	**Geometry**	*Identify parallel and perpendicular lines*
Advanced	291	**Number properties and operations**	*Solve a story problem involving remainders*
Advanced	288	**Measurement**	Indicate measurements on a ruler
Advanced	288	**Number properties and operations**	*Identify the fraction closest to the given value*
Advanced	285	**Algebra**	Reason using equivalences to make and explain a conclusion (calculator available)
	282		
Proficient	281	**Number properties and operations**	*Identify a pictorial representation of equivalent fractions*
Proficient	277	**Geometry**	Plot points on a grid to satisfy the given conditions (**shown on page 73**)
Proficient	273	**Number properties and operations**	Reason about odd and even numbers
Proficient	270	**Data analysis, statistics, and probability**	*Read and interpret a line graph*
Proficient	265	**Number properties and operations**	*Divide a three-digit number by a one-digit number*
Proficient	257	**Measurement**	*Identify the figure with the greatest area on a grid* (**shown on page 72**)
Proficient	252	**Geometry**	*Identify the shape of a shaded region*
Proficient	250	**Data analysis, statistics, and probability**	*Determine the probability of a particular event* (**shown on page 74**)
	249		
Basic	246	**Measurement**	*Solve a story problem involving quarts and cups*
Basic	243	**Number properties and operations**	*Subtract a two-digit number from a three-digit number* (**shown on page 71**)
Basic	241	**Algebra**	*Determine the missing shapes in a pattern*
Basic	237	**Number properties and operations**	*Determine a ratio from a diagram*
Basic	233	**Algebra**	Determine the value of an unknown in a number sentence (**shown on page 75**)
Basic	230	**Number properties and operations**	Use place value to write a number
Basic	228	**Geometry**	*Determine how many given pieces cover a shape*
	225		***Overall average score for American Indian/Alaska Native fourth-graders***
Basic	222	**Number properties and operations**	Represent the same whole number in different ways
Basic	222	**Data analysis, statistics, and probability**	Make a pictograph of the given information
	214		
	207	**Number properties and operations**	*Recognize the result of multiplying by 10*
	205	**Number properties and operations**	*Compute the product of a two-digit number and a one-digit number*
	202	**Measurement**	*Identify an appropriate unit for measuring length* (calculator available)
	199	**Algebra**	*Find the unknown in a whole number sentence*
	188	**Number properties and operations**	*Compute a value using multiplication and division* (calculator available)
	183	**Geometry**	*Identify the figure that is not symmetric* (calculator available)
	176	**Measurement**	*Identify the appropriate measuring device*
	//		
	0		

NOTE: Regular type denotes a constructed-response question. *Italic* type denotes a multiple-choice question. The position of a question on the scale represents the average score attained by students who had a 65 percent probability of successfully answering a constructed-response question, or a 74 percent probability of correctly answering a four-option multiple-choice question. For constructed-response questions, the question description represents students' performance rated as completely correct. Scale score ranges for mathematics achievement levels are referenced on the map.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2009 Mathematics Assessment.

SAMPLE QUESTION: NUMBER PROPERTIES AND OPERATIONS

This sample question from the 2009 fourth-grade assessment measures students' performance in the number properties and operations content area. The question asks students to subtract a two-digit number from a three-digit number, which requires regrouping to obtain the correct answer of 226 (Choice A). Students were not permitted to use a calculator to answer this question.

Approximately two-thirds (67 percent) of fourth-grade students in the nation and 61 percent of AI/AN students answered correctly.

SAMPLE QUESTION:

$$\begin{array}{r} 301 \\ -75 \\ \hline \end{array}$$

(A) 226
(B) 235
(C) 236
(D) 374

Percentage of fourth-grade students in each response category, by race/ethnicity: 2009

Race/ethnicity	Choice A	Choice B	Choice C	Choice D	Omitted
All students	67	5	14	11	2
AI/AN	61	6	11	21	2
Black	53	7	20	17	3
Hispanic	63	6	15	15	1
White	72	5	13	9	2
Asian/Pacific Islander	81	4	9	5	1

NOTE: AI/AN = American Indian/Alaska Native. Black includes African American, Hispanic includes Latino, and Pacific Islander includes Native Hawaiian. Race categories exclude Hispanic origin. Results are not shown for students whose race/ethnicity was unclassified. Detail may not sum to totals because of rounding.

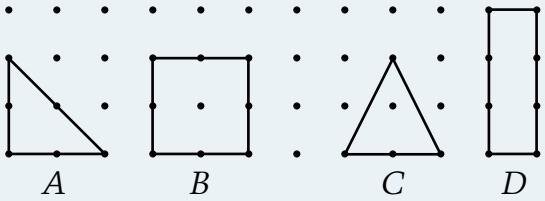
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2009 Mathematics Assessment.

SAMPLE QUESTION: MEASUREMENT

This fourth-grade sample multiple-choice question measures students' performance in the measurement content area. The question requires students to compare the areas of four shapes drawn on a grid, and to identify the figure with the greatest area. The correct answer (Choice B) has an area of 4 square units. Each triangle (Choice A and Choice C) has an area of 2 square units. The rectangle (Choice D) has an area of 3 square units. Students were not permitted to use a calculator on this question.

This question was answered correctly by 65 percent of fourth-grade students in the nation and 58 percent of AI/AN students. The most common incorrect answer was the rectangle (Choice D), which is the tallest of the four shapes.

SAMPLE QUESTION:



Which figure has the greatest area?

- (A) *A*
- (B) *B*
- (C) *C*
- (D) *D*

Percentage of fourth-grade students in each response category, by race/ethnicity: 2009

Race/ethnicity	Choice A	Choice B	Choice C	Choice D	Omitted
All students	2	65	3	29	1
AI/AN	2	58	4	35	1
Black	3	55	4	35	2
Hispanic	2	57	3	37	1
White	2	70	2	24	1
Asian/Pacific Islander	2	73	1	22	1

NOTE: AI/AN = American Indian/Alaska Native. Black includes African American, Hispanic includes Latino, and Pacific Islander includes Native Hawaiian. Race categories exclude Hispanic origin. Results are not shown for students whose race/ethnicity was unclassified. Detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2009 Mathematics Assessment.

SAMPLE QUESTION: GEOMETRY

This sample constructed-response question measures fourth-graders' performance in the geometry content area. It is a multistep problem that requires students to plot and identify points in the plane, and to use visualization skills to determine additional points that could be connected to form a rectangle. Students were not permitted to use a calculator to answer this question. Student responses to this question were rated using five scoring levels.

Extended responses
- correctly plotted the three given points, (B,1), (B,3), and (D,5),
- correctly plotted three other points that formed a rectangle and gave their coordinates, and
- connected the dots to form a rectangle.

Satisfactory responses met all of the criteria for an extended rating, but contained a minor error or omission.

Partial responses correctly plotted the three given points and partially plotted three other points that formed a rectangle and gave their coordinates.

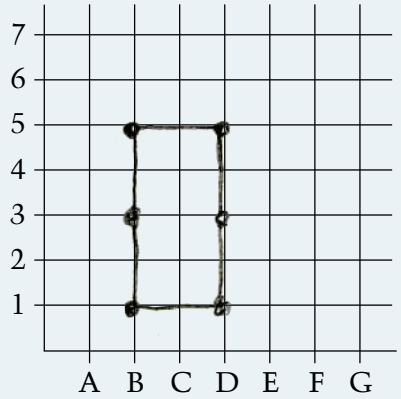
Minimal responses plotted three points clearly (either the given points, the new points, or some combination), or partially met one of the criteria specified for an extended rating.

All other responses were rated as **incorrect**.

The sample student response shown on the right was rated as "Extended" because it correctly answered all parts of the question. Twenty-seven percent of fourth-graders' responses in the nation and 18 percent of AI/AN students' responses to this question received an "Extended" rating.

SAMPLE QUESTION:

On the grid below, plot the points that have coordinates (B, 1), (B, 3), and (D, 5).



Plot 3 more points on the grid so that when you connect all 6 points you will make a rectangle.

List the coordinates for the 3 new points.

(B,5) (D,3) (D,1)

Connect the 6 points to show your rectangle.

Percentage of fourth-grade students in each response category, by race/ethnicity: 2009

Race/ethnicity	Extended	Satisfactory	Partial	Minimal	Incorrect	Omitted
All students	27	10	3	32	24	3
AI/AN	18	9	3	34	32	4
Black	16	6	3	33	37	5
Hispanic	16	8	3	34	34	5
White	33	12	3	31	18	2
Asian/Pacific Islander	43	11	3	25	16	2

NOTE: AI/AN = American Indian/Alaska Native. Black includes African American, Hispanic includes Latino, and Pacific Islander includes Native Hawaiian. Race categories exclude Hispanic origin. Results are not shown for students whose race/ethnicity was unclassified. Detail may not sum to totals because the percentage of responses rated as "Off-task" is not shown. Off-task responses are those that do not provide any information related to the assessment task.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2009 Mathematics Assessment.

SAMPLE QUESTION: DATA ANALYSIS, STATISTICS, AND PROBABILITY

This sample multiple-choice question measures fourth-graders' performance in the data analysis, statistics, and probability content area. The question presents students with a list of 10 names and asks for the probability that a student selected at random will have a name that begins with the letter P. Since 3 of the names in the list begin with P, the correct answer is 3 out of 10 (Choice D). Students were not permitted to use a calculator to answer this question.

This question was answered correctly by 66 percent of the fourth-grade students in the nation and 53 percent of AI/AN students.

SAMPLE QUESTION:

Kara	Paula	Caitlyn
Pablo	Peter	Janet
Tanisha	Clara	Bill
	Matt	

One student will be chosen at random from the list above. What is the probability that the student's name begins with the letter P ?

- (A) 1 out of 3
- (B) 1 out of 10
- (C) 3 out of 7
- (D) 3 out of 10

Percentage of fourth-grade students in each response category, by race/ethnicity: 2009

Race/ethnicity	Choice A	Choice B	Choice C	Choice D	Omitted
All students	18	6	10	66	1
AI/AN	23	8	15	53	1
Black	20	7	13	59	1
Hispanic	20	7	13	60	#
White	16	5	8	70	1
Asian/Pacific Islander	16	4	8	72	1

Rounds to zero.
NOTE: AI/AN = American Indian/Alaska Native. Black includes African American, Hispanic includes Latino, and Pacific Islander includes Native Hawaiian. Race categories exclude Hispanic origin. Results are not shown for students whose race/ethnicity was unclassified. Detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2009 Mathematics Assessment.

SAMPLE QUESTION: ALGEBRA

This fourth-grade sample constructed-response question measures students' performance in the algebra content area. Students are asked to solve an equation involving subtraction, with the unknown quantity represented by a box. The correct answer is 29, since 29 – 8 = 21. Students were not permitted to use a calculator to answer this question. Student responses to this question were rated as either correct or incorrect.

Sixty-nine percent of fourth-grade students' responses in the nation and 66 percent of AI/AN students' responses were rated correct.

SAMPLE QUESTION:

$$\square - 8 = 21$$

What number should be put in the box to make the number sentence above true?

Answer: 29

Percentage of fourth-grade students in each response category, by race/ethnicity: 2009

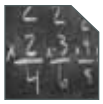
Race/ethnicity	Correct	Incorrect	Omitted
All students	69	30	1
AI/AN	66	31	2
Black	56	40	3
Hispanic	61	37	1
White	74	25	1
Asian/Pacific Islander	78	21	1

NOTE: AI/AN = American Indian/Alaska Native. Black includes African American, Hispanic includes Latino, and Pacific Islander includes Native Hawaiian. Race categories exclude Hispanic origin. Results are not shown for students whose race/ethnicity was unclassified. Detail may not sum to totals because the percentage of responses rated as "Off-task" is not shown. Off-task responses are those that do not provide any information related to the assessment task.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2009 Mathematics Assessment.

Mathematics Assessment Content at Grade 8

The distribution of items among the five content areas reflects the relative emphasis in each area specified in the mathematics framework for each grade.



20%

Number properties and operations

These questions measure computation with rational and common irrational numbers, and ratios and proportions.

15%

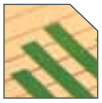
Measurement

These questions focus on the use of square units for measuring area and surface area, cubic units for measuring volume, degrees for measuring angles, and rates.

20%

Geometry

These questions focus on properties of plane figures, especially parallel and perpendicular lines, angle relations in polygons, cross sections of solids, and the Pythagorean theorem.



15%

Data analysis, statistics, and probability

These questions focus on organizing and summarizing data (including tables, charts, and graphs), analyzing statistical claims, and probability.

30%

Algebra

These questions measure understanding of patterns and functions; algebraic expressions, equations, and inequalities; and algebraic representations, including graphs.

The 159 questions that made up the entire eighth-grade mathematics assessment were divided into 10 sections, each containing between 14 and 18 questions, depending on the balance between multiple-choice and constructed-response questions. Each student responded to questions in just two 25-minute sections.

Some sections incorporated the use of a calculator, ruler/protractor, geometric shapes, or other manipulatives that were provided. Eighth-graders were permitted to use their own scientific or graphing calculator or were provided with a scientific calculator to use on approximately 30 percent of the assessment.

NAEP Mathematics Achievement-Level Descriptions for Grade 8

The achievement-level descriptions of what eighth-graders should know and be able to do at the *Basic*, *Proficient*, and *Advanced* mathematics achievement levels are presented below. (Note: Shaded text is a short, general summary to describe performance at each achievement level.) NAEP achievement levels are cumulative; therefore, student performance at the *Proficient* level includes the competencies associated with the *Basic* level, and the *Advanced* level 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.

Basic (262)

Eighth-grade students performing at the *Basic* level should exhibit evidence of conceptual and procedural understanding in the five NAEP content areas. This level of performance signifies an understanding of arithmetic operations—including estimation—on whole numbers, decimals, fractions, and percents.

Eighth-graders performing at the *Basic* level should complete problems correctly with the help of structural prompts such as diagrams, charts, and graphs. They should be able to solve problems in all NAEP content areas through the appropriate selection and use of strategies and technological tools—including calculators, computers, and geometric shapes. Students at this level also should be able to use fundamental algebraic and informal geometric concepts in problem solving.

As they approach the *Proficient* level, students at the *Basic* level should be able to determine which of the available data are necessary and sufficient for correct solutions and use them in problem solving. However, these eighth-graders show limited skill in communicating mathematically.

Proficient (299)

Eighth-grade students performing at the *Proficient* level should apply mathematical concepts and procedures consistently to complex problems in the five NAEP content areas.

Eighth-graders performing at the *Proficient* level should be able to conjecture, defend their ideas, and give supporting examples. They should understand the connections among fractions, percents, decimals, and other mathematical topics such as algebra and functions. Students at this level are expected to have a thorough understanding of *Basic* level arithmetic operations—an understanding sufficient for problem solving in practical situations.

Quantity and spatial relationships in problem solving and reasoning should be familiar to them, and they should be able to convey underlying reasoning skills beyond the level of arithmetic. They should be able to compare and contrast mathematical ideas and generate their own examples. These students should make inferences from data and graphs; apply properties of informal geometry; and accurately use the tools of technology. Students at this level should understand the process of gathering and organizing data and be able to calculate, evaluate, and communicate results within the domain of statistics and probability.

Advanced (333)

Eighth-grade students performing at the *Advanced* level should be able to reach beyond the recognition, identification, and application of mathematical rules in order to generalize and synthesize concepts and principles in the five NAEP content areas.

Eighth-graders performing at the *Advanced* level should be able to probe examples and counterexamples in order to shape generalizations from which they can develop models. Eighth-graders performing at the *Advanced* level should use number sense and geometric awareness to consider the reasonableness of an answer. They are expected to use abstract thinking to create unique problem-solving techniques and explain the reasoning processes underlying their conclusions.

What Eighth-Graders Know and Can Do in Mathematics

The item map below illustrates the range of mathematical knowledge and skills demonstrated by eighth-graders. The scale scores on the left represent the average scores for students who were likely to get the items correct. The cut score at the lower end of the range for each achievement level is boxed. The descriptions of selected assessment questions are listed on the right along with the corresponding mathematics content areas.

With an overall average score of 266, AI/AN eighth-graders were likely to successfully answer those questions described on the map at 264 and below.

GRADE 8 NAEP MATHEMATICS ITEM MAP

	Scale score	Content area	Question description
	500		
	//		
Advanced	361	**Data analysis, statistics, and probability**	Determine the complete sample space
	350	**Algebra**	Find the coordinates of collinear points
	347	**Measurement**	*Identify the figures with equivalent areas*
	342	**Geometry**	Use the given pieces to make a shape with certain properties
	339	**Data analysis, statistics, and probability**	*Read and interpret the information in a graph*
	337	**Algebra**	Use an algebraic model to make a prediction (calculator available)
	336	**Algebra**	Find the next term in a geometric sequence
	333		
Proficient	332	**Algebra**	Set up and solve an algebraic equation
	331	**Algebra**	*Find the change in y given the change in x for a linear equation*
	330	**Geometry**	*Find the length of a hypotenuse* (**shown on page 81**)
	324	**Measurement**	Solve a problem involving unit conversions (calculator available)
	319	**Geometry**	*Identify the piece used to form a figure*
	312	**Number properties and operations**	Solve a problem using division
	306	**Algebra**	*Represent the length of a rectangle in terms of the width* (**shown on page 83**)
	300	**Number properties and operations**	Determine a number that satisfies the given conditions (**shown on page 79**)
	299		
Basic	292	**Geometry**	*Identify the steps in a transformation*
	288	**Number properties and operations**	*Identify the number with the given digit in the hundredths place*
	285	**Measurement**	*Determine the possible dimensions of a rectangle, given the area* (**shown on page 80**)
	283	**Geometry**	*Identify the side with the same length in congruent figures*
	281	**Algebra**	*Identify the solution from a graph of linear equations*
	278	**Number properties and operations**	*Determine a quantity based on a given percent*
	267	**Data analysis, statistics, and probability**	*Determine the probability of a particular outcome* (**shown on page 82**)
	266	***Overall average score for American Indian/Alaska Native eighth-graders***	
	264	**Algebra**	Read information from a graph
	262		
	260	**Data analysis, statistics, and probability**	*Recognize misrepresented data*
	259	**Measurement**	*Solve a problem involving rates* (calculator available)
	257	**Geometry**	*Identify the result of combining two shapes*
	253	**Number properties and operations**	*Use estimation to find a difference*
	236	**Number properties and operations**	*Find the greatest number that can be bought* (calculator available)
	233	**Measurement**	*Measure the length of a line segment*
	224	**Algebra**	Determine the value of the unknown in a number sentence
	//		
	0		

NOTE: Regular type denotes a constructed-response question. *Italic* type denotes a multiple-choice question. The position of a question on the scale represents the average score attained by students who had a 65 percent probability of successfully answering a constructed-response question, a 74 percent probability of correctly answering a four-option multiple-choice question, or a 72 percent probability of correctly answering a five-option multiple-choice question. For constructed-response questions, the question description represents students' performance rated as completely correct. Scale score ranges for mathematics achievement levels are referenced on the map.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2009 Mathematics Assessment.

SAMPLE QUESTION: NUMBER PROPERTIES AND OPERATIONS

This sample constructed-response question from the 2009 eighth-grade assessment measures students' performance in the number properties and operations content area. Students are asked to find an even number between 100 and 120 that is divisible by 9. Both 108 and 117 are divisible by 9, but only 108 is an even number. Students were not permitted to use a calculator to answer this question.

Fifty percent of eighth-grade students' responses in the nation and 41 percent of AI/AN students' responses were rated correct.

SAMPLE QUESTION:

A certain even number is divisible by 9. This number is between 100 and 120. What is the number?

Answer: 108

Percentage of eighth-grade students in each response category, by race/ethnicity: 2009

Race/ethnicity	Correct	Incorrect	Omitted
All students	50	43	5
AI/AN	41	54	5
Black	40	51	8
Hispanic	37	53	8
White	56	39	4
Asian/Pacific Islander	65	30	5

NOTE: AI/AN = American Indian/Alaska Native. Black includes African American, Hispanic includes Latino, and Pacific Islander includes Native Hawaiian. Race categories exclude Hispanic origin. Results are not shown for students whose race/ethnicity was unclassified. Detail may not sum to totals because the percentage of responses rated as "Off-task" is not shown. Off-task responses are those that do not provide any information related to the assessment task.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2009 Mathematics Assessment.

SAMPLE QUESTION: MEASUREMENT

This sample multiple-choice question measures eighth-graders' performance in the measurement content area. Students are asked to find possible dimensions for a rectangle with an area of 24 square centimeters. Although there are many such rectangles, the only answer choice with an area of 24 square centimeters is the rectangle with dimensions 2 centimeters by 12 centimeters (Choice A), since *area = length × width* = 2 × 12 = 24. Students were not permitted to use a calculator to answer this question.

The correct answer was selected by 70 percent of eighth-grade students in the nation and 59 percent of AI/AN students. The most common incorrect answer (Choice E) is obtained by adding the dimensions of the rectangle instead of multiplying the dimensions.

SAMPLE QUESTION:

Megan drew a rectangle that has an area of 24 square centimeters. Which of the following could be the dimensions of her rectangle?

- (A) 2 centimeters by 12 centimeters
- (B) 3 centimeters by 9 centimeters
- (C) 4 centimeters by 20 centimeters
- (D) 6 centimeters by 6 centimeters
- (E) 12 centimeters by 12 centimeters

Percentage of eighth-grade students in each response category, by race/ethnicity: 2009

Race/ethnicity	Choice A	Choice B	Choice C	Choice D	Choice E	Omitted
All students	70	7	7	5	10	1
AI/AN	59	10	11	7	13	#
Black	64	7	10	5	13	1
Hispanic	62	8	11	5	12	1
White	74	7	6	4	8	1
Asian/Pacific Islander	80	6	4	3	6	1

Rounds to zero.
NOTE: AI/AN = American Indian/Alaska Native. Black includes African American, Hispanic includes Latino, and Pacific Islander includes Native Hawaiian. Race categories exclude Hispanic origin. Results are not shown for students whose race/ethnicity was unclassified. Detail may not sum to totals because of rounding.

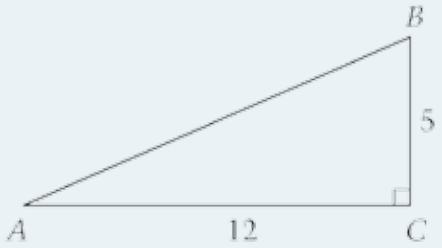
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2009 Mathematics Assessment.

SAMPLE QUESTION: GEOMETRY

This eighth-grade sample multiple-choice question measures students' performance in the geometry content area. The question asks for the length of the hypotenuse (segment *AB*) of a right triangle with legs of length 5 and 12. The answer to this question requires the use of the Pythagorean Theorem, which states that for a right triangle with legs of length *a* and *b* and hypotenuse of length *c*, the relationship between the lengths of the sides of the triangle is $a^2 + b^2 = c^2$. The correct answer is 13 (Choice C) since $5^2 + 12^2 = 25 + 144 = 169 = 13^2$. Students were not permitted to use a calculator to answer this question.

The correct answer was selected by 40 percent of eighth-grade students in the nation and 35 percent of AI/AN students. The most common incorrect answer (Choice D) is obtained by adding the lengths of the legs of the triangle.

SAMPLE QUESTION:



In the right triangle above, what is the length of AB?

(A) 8.5
(B) 12
(C) 13
(D) 17
(E) 30

Percentage of eighth-grade students in each response category, by race/ethnicity: 2009

Race/ethnicity	Choice A	Choice B	Choice C	Choice D	Choice E	Omitted
All students	7	18	40	29	5	1
AI/AN	8	22	35	29	5	1
Black	9	21	29	33	7	2
Hispanic	9	20	37	28	5	2
White	6	16	43	29	5	1
Asian/Pacific Islander	3	11	55	25	5	1

NOTE: AI/AN = American Indian/Alaska Native. Black includes African American, Hispanic includes Latino, and Pacific Islander includes Native Hawaiian. Race categories exclude Hispanic origin. Results are not shown for students whose race/ethnicity was unclassified. Detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2009 Mathematics Assessment.

SAMPLE QUESTION: DATA ANALYSIS, STATISTICS, AND PROBABILITY

This sample question from the 2009 eighth-grade assessment measures students' performance in the data analysis, statistics, and probability content area. It asks students to determine the probability of a simple event. Obtaining the correct answer requires first determining that there is a total of 15 pencils to choose from (6 red plus 4 green plus 5 blue). Students were not permitted to use a calculator to answer this question.

Since 4 of these pencils are green, the correct answer is 4 out of 15 (Choice D), which was selected by 77 percent of the eighth-grade students in the nation and 60 percent of AI/AN students. The most common incorrect answer (Choice C) represents the probability of picking any one pencil from the total of 15 pencils.

SAMPLE QUESTION:

Marty has 6 red pencils, 4 green pencils, and 5 blue pencils. If he picks out one pencil without looking, what is the probability that the pencil he picks will be green?

(A) 1 out of 3
(B) 1 out of 4
(C) 1 out of 15
(D) 4 out of 15

Percentage of eighth-grade students in each response category, by race/ethnicity: 2009

Race/ethnicity	Choice A	Choice B	Choice C	Choice D	Omitted
All students	4	6	12	77	1
AI/AN	9	9	21	60	2
Black	5	8	20	65	2
Hispanic	6	9	17	67	1
White	4	4	8	83	1
Asian/Pacific Islander	4	4	9	82	1

NOTE: AI/AN = American Indian/Alaska Native. Black includes African American, Hispanic includes Latino, and Pacific Islander includes Native Hawaiian. Race categories exclude Hispanic origin. Results are not shown for students whose race/ethnicity was unclassified. Detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2009 Mathematics Assessment.

SAMPLE QUESTION: ALGEBRA

This sample question measures eighth-graders' performance in the algebra content area. The question asks students to identify an algebraic expression that models a relationship that is given in a geometric context. Students were not permitted to use a calculator to answer this question.

About one-half (51 percent) of the eighth-grade students in the nation and 38 percent of AI/AN students selected the correct answer (Choice E). The most common incorrect answer (Choice A) represents a common error when translating "less" into an algebraic expression.

SAMPLE QUESTION:

The length of a rectangle is 3 feet less than twice the width, w (in feet). What is the length of the rectangle in terms of w?

(A) $3 - 2w$
(B) $2(w + 3)$
(C) $2(w - 3)$
(D) $2w + 3$
(E) $2w - 3$

Percentage of eighth-grade students in each response category, by race/ethnicity: 2009

Race/ethnicity	Choice A	Choice B	Choice C	Choice D	Choice E	Omitted
All students	21	8	13	7	51	1
AI/AN	24	11	15	12	38	#
Black	28	9	15	9	37	1
Hispanic	26	12	15	9	36	1
White	17	6	12	6	58	1
Asian/Pacific Islander	18	4	8	4	66	1

Rounds to zero.
NOTE: AI/AN = American Indian/Alaska Native. Black includes African American, Hispanic includes Latino, and Pacific Islander includes Native Hawaiian. Race categories exclude Hispanic origin. Results are not shown for students whose race/ethnicity was unclassified. Detail may not sum to totals because of rounding.

NAEP Questions Tool

Explore other sample questions from the mathematics assessment at http://nces.ed.gov/nationsreportcard/itmrlsx/.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2009 Mathematics Assessment.

Technical Notes

Sampling and Weighting

The schools and students participating in NAEP assessments are selected to be representative of the target populations for which results are reported. The samples of American Indian/Alaska Native (AI/AN) students participating in the 2009 NAEP reading and mathematics assessments represent augmentations of the sample of AI/AN students who would usually be selected to participate in NAEP. This allows more detailed reporting of performance for this group.

Prior to 2005, BIE schools were identified as part of the national sample, and the resulting number of participating schools was usually small, fewer than five per grade. In 2005, BIE schools were sampled as a part of each state sample, at the same rate as public schools in a given state. That means, roughly speaking, that a BIE student had the same probability of selection as a public school student in the same state. As a result, about 30 BIE schools were included per grade, thereby increasing the number of AI/AN students in the sample. In 2007 and 2009, there were even larger samples of BIE schools than in 2005; all BIE schools and students were included in the 2007 and 2009 samples. The BIE population represents approximately 130 schools at grade 4 and 110 schools at grade 8. In terms of the number of students, the BIE population represents approximately 2,900 students at grade 4 and 2,500 students at grade 8.

In 2005, seven states had sufficient samples of AI/AN students to report state-level data. In 2007, a total of 11 states had sufficiently large samples, with Minnesota, North Carolina, Oregon, and Washington being added to the original 7 selected states from 2005. In 2009, results are also reported for Utah, resulting in state-level reporting for a total of 12 states. While 6 of the 12 states had sufficient AI/AN students without oversampling, schools in 6 states were oversampled in 2009: Arizona, Minnesota, North Carolina, Oregon, Utah, and Washington. Schools with relatively large percentages (at least 5 percent) of AI/AN students were oversampled by factors ranging from 2 to 6 based on state and grade. When AI/AN students are widely dispersed among schools, school oversampling is not effective. The basic approach taken was to create a new stratum in each state that contains schools with a *high* percentage of AI/AN students, and then to increase the *measure of size* of these schools by an oversampling factor, thereby increasing their probability of selection. The increase in the expected sample size of AI/AN students was then calculated.

Using different sampling rates for different subgroups of the population, and consequently applying different weights, is generally not as efficient as a sampling scheme that gives each unit in the population an equal chance of selection. The precision achieved by a sample selected in this way could be achieved by a smaller sample size (typically called the "effective" sample size) if sampling rates were the same for each subgroup. However, sampling different subgroups at different rates provides more accurate estimates of target population characteristics and reduces the costs associated with collecting data in the field.

Each school that participated in the assessment, and each student assessed, represents a portion of the population of interest. Results are weighted to make appropriate inferences between the student samples and the respective populations from which they are drawn. Sampling weights account for the disproportionate representation of the selected sample. This includes the oversampling of schools with high proportions of students from certain race/ethnicity groups and lower sampling rates of students who attend very small nonpublic schools. All population and subpopulation characteristics based on the assessment data were estimated using sampling weights. These weights included adjustments for school and student nonresponse.

School and Student Participation Rates

In both reading and mathematics, the national school participation rates based on initial weights were 97 percent for grades 4 and 8; the student participation rates were 95 percent for grade 4 and 93 percent for grade 8. Student participation rates for AI/AN students were 93 percent for grade 4 in reading and mathematics, 90 percent in grade 8 reading, and 92 percent in grade 8 mathematics.

Based on initial weights, the school participation rates for BIE schools were 88 percent in grade 4 and 80 percent in grade 8 in both reading and mathematics. Student participation rates for BIE schools were 92 percent for both subjects at grade 4, and 89 percent for reading and 90 percent for mathematics at grade 8.

When participation rates fall below 85 percent, a nonresponse bias analysis is conducted to determine if the responding sample is not representative of the population, thereby introducing the potential for nonresponse bias. The participation rate for BIE schools at grade 8 was 80 percent, and therefore a nonresponse bias analysis was conducted. The grade 8 BIE school sample was a census sample, meaning that all schools were sampled. The responding schools' weights were adjusted to mitigate nonresponse, but results of the nonresponse bias analysis showed that the adjustments did not fully account for potential nonresponse bias in the grade 8 BIE school sample. For instance, compared to the original school sample, BIE schools at grade 8 in the Midwest were somewhat overrepresented in the responding sample, whereas schools in the Northeast, South, and West were slightly underrepresented. The responding sample also contained an overrepresentation of BIE schools in non-rural and remote rural locations relative to the original sample, with schools in fringe rural and distant rural locations being underrepresented.

Data Analysis and Scaling

The goal of the analysis of NAEP data is to summarize the performance of groups of students. Item response theory (IRT) models are used to describe the relationship between the item responses provided by students and the underlying scale (e.g., reading ability or mathematics ability). The primary purpose of IRT scaling is to provide a common scale on which performance can be compared even when students receive different blocks of items. Item parameters that are used in the models are estimated from student response data for each item. Different IRT models with different types of item parameters are used to describe multiple-choice items, constructed-response items that are scored simply as correct or incorrect, and complex constructed-response items that have three or more categories. More information about IRT scaling in NAEP can be found at http://nces.ed.gov/nationsreportcard/tdw/analysis/scaling.asp.

Because the NAEP design gives each student a small proportion of the pool of assessment items, the assessment cannot provide reliable information about individual student performance. Traditional test scores for individual students, even those based on IRT, would result in misleading estimates of population characteristics, such as student group means and percentages of students at or above a certain scale-score level. The goal of NAEP to estimate these population characteristics can be achieved with methodologies that produce estimates of the population-level parameters. This is accomplished using marginal estimation techniques for latent variables, described in more detail at http://nces.ed.gov/nationsreportcard/tdw/analysis/est.asp. Under the assumptions of the analysis models, these population estimates will be consistent in the sense that the estimates approach the population values as the sample size increases.

NAEP Demographic Variables

RACE/ETHNICITY

Student race/ethnicity data are based on official school records, as reported by participating schools at the time of data collection. Schools were asked to report each student's race/ethnicity as "White, not Hispanic," "Black, not Hispanic," "Hispanic," "Asian/Pacific Islander," "American Indian/Alaska Native," or "other." Schools were instructed to categorize students of more than one race as "other," and these students were not included in reporting results for AI/AN students or in any comparisons to students in the other individual race/ethnicity groups. In 2009, the percentage of students whose race/ethnicity was unclassified (including those with more than one race and those with no available information regarding their race/ethnicity) was 2 percent at grade 4 and 1 percent at grade 8. Unclassified students are those whose school-reported race/ethnicity was "other" or "unavailable," or was missing.

NATIONAL SCHOOL LUNCH PROGRAM

NAEP collects data on student eligibility for the National School Lunch Program (NSLP) as an indicator of low family income. Under the guidelines of NSLP, children from families with incomes below 130 percent of the poverty level are eligible for free meals. Those from families with incomes between 130 and 185 percent of the poverty level are eligible for reduced-price meals. (For the period July 1, 2008, through June 30, 2009, for a family of four, 130 percent of the poverty level was $27,560, and 185 percent was $39,220.) For more information on NSLP, visit http://www.fns.usda.gov/cnd/lunch/.

SCHOOL TYPE/DENSITY

Results are reported separately for students attending low density public schools, high density public schools, and Bureau of Indian Education (BIE) schools. This variable represents a cross between school type and school density. NAEP school type categories include public, BIE, Department of Defense, and private schools. For NIES, the public school category was further divided based on the proportion of AI/AN students attending those schools. As defined by the Office of Indian Education (OIE), low density schools are those in which less than 25 percent of the students are AI/AN, and high density schools are those in which 25 percent or more of the students are AI/AN. The number of students sampled from Department of Defense and private schools was too small to allow reporting their results as a separate category. Therefore, results by school type/density do not include these other students.

There are 180 BIE schools and dormitories located on or near 63 reservations that serve approximately

49,000 students in 23 states. Schools funded by the BIE are either operated by the BIE or by tribes under contracts or grants. BIE-operated schools are under the direct auspices of the BIE, and tribally operated schools are managed by individual federally recognized tribes with grants or contracts from the BIE. The BIE, formerly the Office of Indian Education Programs, in the Department of the Interior, oversees the BIE elementary and secondary school programs.

SCHOOL LOCATION

NAEP results are reported for four mutually exclusive categories of school locations: city, suburb, town, and rural. The categories are based on standard definitions established by the Federal Office of Management and Budget using population and geographic information from the U.S. Census Bureau. Schools are assigned to these categories in the NCES Common Core of Data (CCD) based on their physical address.

The classification system was revised for 2007; therefore, trend comparisons to previous years are not available. The new categories ("locale codes") are based on a school's proximity to an urbanized area (a densely settled core with densely settled surrounding areas). This is a change from the original system based on metropolitan statistical areas. To distinguish the two systems, the new system is referred to as "urban-centric locale codes."

The urban-centric locale code system classifies territory into four major types: city, suburban, town, and rural (table **TN-1**). Each type has three subcategories. For city and suburb, these are gradations of size—large, midsize, and small. Towns and rural areas are further distinguished by their distance from an urbanized area. They can be characterized as fringe, distant, or remote.

One of the primary advantages of the locale framework is the use of explicit distance measures to identify town and rural subtypes. Unlike the previous CCD framework that differentiated towns on the basis of population size, the new typology classifies towns according to their proximity to larger urban cores. This approach considers potential spatial relationships and acknowledges the likely interaction between urban cores based on their relative locations. Rural subtypes are similar in that they identify rural territory relative to urban cores. This distinction avoids the often misleading distance proxy based on county metro status. More importantly, the explicit distance indicators offer the opportunity to identify and differentiate rural schools and school systems in relatively remote areas from those that may be located just outside an urban core. More detail on the locale codes is available at http://nces.ed.gov/ccd/rural_locales.asp.

Table **TN-1.** Definitions of the 12 urban-centric locale code categories

City	
City, Large:	Territory inside an urbanized area and inside a principal city with population of 250,000 or more.
City, Midsize:	Territory inside an urbanized area and inside a principal city with population less than 250,000 and greater than or equal to 100,000.
City, Small:	Territory inside an urbanized area and inside a principal city with population less than 100,000.
Suburb	
Suburb, Large:	Territory outside a principal city and inside an urbanized area with population of 250,000 or more.
Suburb, Midsize:	Territory outside a principal city and inside an urbanized area with population less than 250,000 and greater than or equal to 100,000.
Suburb, Small:	Territory outside a principal city and inside an urbanized area with population less than 100,000.
Town	
Town, Fringe:	Territory inside an urban cluster that is less than or equal to 10 miles from an urbanized area.
Town, Distant:	Territory inside an urban cluster that is more than 10 miles and less than or equal to 35 miles from an urbanized area.
Town, Remote:	Territory inside an urban cluster that is more than 35 miles from an urbanized area.
Rural	
Rural, Fringe:	Census-defined rural territory that is less than or equal to 5 miles from an urbanized area, as well as rural territory that is less than or equal to 2.5 miles from an urban cluster.
Rural, Distant:	Census-defined rural territory that is more than 5 miles but less than or equal to 25 miles from an urbanized area, as well as rural territory that is more than 2.5 miles but less than or equal to 10 miles from an urban cluster.
Rural, Remote:	Census-defined rural territory that is more than 25 miles from an urbanized area and is also more than 10 miles from an urban cluster.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Common Core of Data (CCD), "Documentation to the NCES Common Core of Data Public Elementary/Secondary School Locale Code File: School Year 2003–04," (NCES 2006-332).

Drawing Inferences From the Results

The reported statistics are estimates and are therefore subject to a measure of uncertainty. There are two sources of such uncertainty. First, NAEP uses a sample of students rather than testing all students. Second, all assessments have some amount of uncertainty related to the fact that they cannot ask all questions that might be asked in a content area. The magnitude of this uncertainty is reflected in the standard error of each of the estimates. When the percentages or average scale scores of certain groups are compared, the estimated standard error should be taken into account.

The comparisons in this report are based on statistical tests that consider both the magnitude of the differences between the average scores or percentages and the estimated standard errors of the statistics being compared. Estimates based on smaller groups are likely to have relatively large standard errors. As a consequence, a numerical difference that seems large may not be statistically significant. Furthermore, differences of the same magnitude may or may not be statistically significant, depending on the size of the standard errors. The results presented in table **TN-2**, for example, show that a 2-point difference between the average mathematics scores for AI/AN students in 2007 and 2009 was not statistically significant, while a 2-point difference for non-AI/AN students was significant. Standard errors for all estimates in this report are available at http://nces.ed.gov/nationsreportcard/naepdata/. Additional information about variance estimation in NAEP, including the computation of standard errors, is available at http://nces.ed.gov/nationsreportcard/tdw/analysis/summary.asp.

Table **TN-2.** Average scores for eighth-grade AI/AN and non-AI/AN students in NAEP mathematics: 2007 and 2009

Student group	2007	2009
AI/AN	263.56 (1.219)	265.58 (1.144)
Non-AI/AN	281.57 (0.270)*	283.10 (0.300)

* Significantly different ($p < .05$) from 2009.
NOTE: AI/AN = American Indian/Alaska Native. Standard errors of the estimates appear in parentheses.

Any difference between scores or percentages that is identified as higher, lower, larger, or smaller in this report, including within-group differences not marked in tables and figures, meets the requirements for statistical significance at the .05 level.

While the standard error reflects the precision of the sample mean, the standard deviation reflects the variability of scores within a group in the original scale of measurement. Thus, standard deviations for two groups can be used to understand both the variability of NAEP reading and mathematics scores among AI/AN students, and among all other students at each grade level. Table **TN-3** shows the standard deviations of the scores of AI/AN students and of all other students for each subject and grade.

The standard deviation measures how widespread the values in a data set are. If many data points are close to the mean, then the standard deviation is small; if many data points are far from the mean, then the standard deviation is large.

Table **TN-3.** Standard deviations of NAEP average scores, by student group, grade, and subject: 2009

Grade and subject	Standard deviation	
	AI/AN students	Non-AI/AN students
Grade 4		
Reading	41.0	35.4
Mathematics	29.3	28.7
Grade 8		
Reading	36.7	34.3
Mathematics	37.8	36.3

NOTE: AI/AN = American Indian/Alaska Native.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2007 and 2009 National Indian Education Studies.

Analyzing Group Differences in Averages and Percentages

Statistical tests determine whether, based on the data from the groups in the sample, there is strong enough evidence to conclude that the averages or percentages are actually different for those groups in the population. If the evidence is strong (i.e., the difference is statistically significant), the report describes the group averages or percentages as being different (e.g., one group performed higher or lower than another group), regardless of whether the sample averages or percentages appear to be approximately the same. The reader is cautioned to rely on the results of the statistical tests rather than on the apparent magnitude of the difference between sample averages or percentages when determining whether the sample differences are likely to represent actual differences among the groups in the population.

To determine whether a real difference exists between the average scale scores (or percentages of a certain attribute) for two groups in the population, one needs to obtain an estimate of the degree of uncertainty associated with the difference between the averages (or percentages) of these groups for the sample. This estimate of the degree of uncertainty, called the "standard error of the difference" between the groups, is obtained by taking the square of each group's standard error, summing the squared standard errors, and taking the square root of that sum.

$$SE_{A\text{-}B} = \sqrt{(SE_A^{\ 2} + SE_B^{\ 2})}$$

The standard error of the difference can be used, just like the standard error for an individual group average or percentage, to help determine whether differences among groups in the population are real. The difference between the averages or percentages of the two groups plus or minus 1.96 standard errors of the difference represents an approximately 95 percent confidence interval. If the resulting interval includes zero, there is insufficient evidence to claim a real difference between the groups in the population. If the interval does not contain zero, the difference between the groups is statistically significant at the .05 level.

The following example of comparing groups addresses the problem of determining whether the average mathematics scale score of group A is higher than that of group B. The sample estimates of the average scale scores and estimated standard errors are as follows:

Group	Average scale score	Standard error
A	218	0.9
B	216	1.1

The difference between the estimates of the average scale scores of groups A and B is 2 points (218 – 216). The standard error of this difference is

$$\sqrt{(0.9^2 + 1.1^2)} = 1.4$$

Thus, an approximately 95 percent confidence interval for this difference is plus or minus 1.96 standard errors of the difference:

$$2 \pm 1.96 \times 1.4$$
$$2 \pm 2.7$$
$$(-0.7, 4.7)$$

The value zero is within the confidence interval; therefore, there is insufficient evidence to conclude that group A's performance is statistically different from group B.

The procedure above is appropriate to use when it is reasonable to assume that the groups being compared have been independently sampled for the assessment. Such an assumption is clearly warranted when comparing results for one state with another. This is the approach used for NAEP reports when comparisons involving independent groups are made. The assumption of independence is violated to some degree when comparing group results for the nation or a particular state (e.g., comparing national 2009 results for male and female students), since these samples of students have been drawn from the same schools.

When the groups being compared do not share students (as is the case, for example, of comparing male and female students), the impact of this violation of the independence assumption on the outcome of the statistical tests is assumed to be small, and NAEP, by convention, has, for computational convenience, routinely applied the procedures described above to those cases as well.

When making comparisons of results for groups that share a considerable proportion of students in common, it is not appropriate to ignore such dependencies. In such cases, NAEP has used procedures appropriate to comparing dependent groups. When the dependence in group results is due to the overlap in samples (e.g., when a subgroup is being compared to a total group), a simple modification of the usual standard error of the difference formula can be used. The formula for such cases is

$$\mathrm{SE}_{\text{Total-Subgroup}} = \sqrt{(\mathrm{SE}^2_{\text{Total}} + \mathrm{SE}^2_{\text{Subgroup}} - 2p\mathrm{SE}^2_{\text{Subgroup}})}$$

where p is the proportion of the total group contained in the subgroup. This formula was used for this report when a state was compared to the aggregate nation.

CONDUCTING MULTIPLE TESTS

To ensure that significant differences in NAEP data reflect actual differences and not mere chance, error rates need to be controlled when making multiple simultaneous comparisons. The more comparisons that are made (e.g., comparing the performance of AI/AN students attending schools in city, suburb, town, and rural locations), the higher the probability of finding significant differences by chance. In NAEP, the Benjamini-Hochberg False Discovery Rate (FDR) procedure is used to control the expected proportion of falsely rejected hypotheses relative to the number of comparisons that are conducted. A detailed explanation of this procedure can be found at http://nces.ed.gov/nationsreportcard/tdw/analysis/infer.asp.

NAEP employs a number of rules to determine the number of comparisons conducted, which in most cases is simply the number of possible statistical tests. In general, there are two exceptions where the FDR is not applied: when comparing multiple years and when comparing multiple jurisdictions to the nation, neither the number of years nor the number of jurisdictions counts toward the number of comparisons. In this report, the FDR was applied for comparisons of performance results for AI/AN students nationwide in 2009 to results for AI/AN students in previous years; these comparisons consider all six NAEP race/ethnicity categories simultaneously in order to ensure consistency with performance results for AI/AN students presented in other 2009 NAEP reports. In all other comparisons of AI/AN student performance in this report, other race/ethnicity categories did not contribute to the total number of comparisons unless they were specifically identified as the comparison group.

ACCOMMODATIONS AND EXCLUSIONS IN NAEP

Testing accommodations, such as extra testing time or individual rather than group administration, are provided for students with disabilities or English language learners who could not fairly and accurately demonstrate their abilities without modified test administration procedures.

Even with the availability of accommodations, there still remains a portion of students excluded from the NAEP assessment. Variations in exclusion and accommodation rates, due to differences in policies and practices regarding the identification and inclusion of students with disabilities and English language learners, should be taken into consideration when comparing students' performance over time and across states. While the effect of exclusion is not precisely known, comparisons of performance results could be affected if exclusion rates are comparatively high or vary widely over time. More information about NAEP's policy on inclusion of special-needs students is available at http://nces.ed.gov/nationsreportcard/about/inclusion.asp.

Tables **TN-4** through **TN-7** show the percentages of AI/AN students identified as students with disabilities or English language learners, excluded, and assessed with and without accommodations for the nation overall and by type of school, and for public and BIE schools in the nation and selected states in 2009.

Table **TN-4.** Percentage of fourth- and eighth-grade AI/AN students with disabilities and English language learners identified, excluded, and assessed in NAEP reading, as a percentage of all AI/AN students, by type of school: 2009

	Students with disabilities				English language learners			
Type of school	Identified	Excluded	Assessed with accom-modations	Assessed without accom-modations	Identified	Excluded	Assessed with accom-modations	Assessed without accom-modations
Grade 4								
Overall	17	6	7	4	8	1	2	5
Public	18	6	7	5	6	1	2	3
BIE	16	4	8	3	35	2	6	27
Grade 8								
Overall	18	6	10	3	7	1	2	4
Public	19	6	10	3	5	1	2	3
BIE	18	4	9	6	34	1	5	28

NOTE: AI/AN = American Indian/Alaska Native. BIE = Bureau of Indian Education. Results are not shown separately for Department of Defense and private schools. Detail may not sum to totals because of rounding.

Table **TN-5.** Percentage of fourth- and eighth-grade AI/AN students with disabilities and English language learners identified, excluded, and assessed in NAEP mathematics, as a percentage of all AI/AN students, by type of school: 2009

	Students with disabilities				English language learners			
Type of school	Identified	Excluded	Assessed with accom-modations	Assessed without accom-modations	Identified	Excluded	Assessed with accom-modations	Assessed without accom-modations
Grade 4								
Overall	15	3	8	4	8	#	3	5
Public	15	3	8	4	7	#	3	3
BIE	15	2	9	5	35	1	7	26
Grade 8								
Overall	17	3	11	3	6	#	3	3
Public	17	4	11	3	5	#	2	2
BIE	18	3	12	4	34	1	7	25

Rounds to zero.
NOTE: AI/AN = American Indian/Alaska Native. BIE = Bureau of Indian Education. Results are not shown separately for Department of Defense and private schools. Detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2009 National Indian Education Study.

Table **TN-6.** Percentage of fourth- and eighth-grade AI/AN students with disabilities and English language learners identified, excluded, and assessed in NAEP reading, as a percentage of all AI/AN students, by jurisdiction: 2009

	Students with disabilities				English language learners			
Jurisdiction	Identified	Excluded	Assessed with accom-modations	Assessed without accom-modations	Identified	Excluded	Assessed with accom-modations	Assessed without accom-modations
Grade 4								
Nation	17	6	7	4	8	1	3	5
Alaska	19	3	13	4	21	1	12	8
Arizona	17	7	5	5	15	3	3	9
Minnesota	31	3	19	9	#	#	#	#
Montana	14	6	6	1	18	2	6	10
New Mexico	17	4	8	4	34	2	12	20
North Carolina	16	3	6	7	#	#	#	#
North Dakota	18	8	5	5	9	1	#	7
Oklahoma	15	7	5	3	#	#	#	#
Oregon	19	8	7	4	6	#	#	5
South Dakota	19	8	5	6	2	#	#	2
Utah	16	11	3	2	22	5	5	12
Washington	24	6	9	9	1	#	#	1
Grade 8								
Nation	19	6	10	3	7	1	2	4
Alaska	19	4	13	2	24	3	11	10
Arizona	17	6	9	2	13	1	3	9
Minnesota	21	4	15	3	#	#	#	#
Montana	16	5	9	3	20	2	6	12
New Mexico	20	6	11	4	31	2	11	18
North Carolina	24	5	17	3	#	#	#	#
North Dakota	27	11	8	7	7	2	1	4
Oklahoma	16	5	8	4	1	#	#	1
Oregon	19	4	9	7	3	#	#	3
South Dakota	17	6	7	4	3	#	#	3
Utah	16	7	8	1	15	3	7	6
Washington	17	7	9	1	#	#	#	#

Rounds to zero.

NOTE: AI/AN = American Indian/Alaska Native. The national and state results reported here include only public and Bureau of Indian Education (BIE) schools. Detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2009 National Indian Education Study.

Table **TN-7.** Percentage of fourth- and eighth-grade AI/AN students with disabilities and English language learners identified, excluded, and assessed in NAEP mathematics, as a percentage of all AI/AN students, by jurisdiction: 2009

Jurisdiction	Students with disabilities				English language learners			
	Identified	Excluded	Assessed with accom-modations	Assessed without accom-modations	Identified	Excluded	Assessed with accom-modations	Assessed without accom-modations
Grade 4								
Nation	15	3	8	4	9	#	3	5
Alaska	19	1	14	5	22	#	14	7
Arizona	17	3	9	6	15	1	7	8
Minnesota	21	3	14	4	#	#	#	#
Montana	15	4	11	1	18	1	9	8
New Mexico	11	2	8	2	35	1	14	20
North Carolina	20	2	14	5	3	#	#	3
North Dakota	22	4	10	7	8	#	2	5
Oklahoma	16	5	8	4	1	#	#	#
Oregon	20	2	13	5	10	#	1	8
South Dakota	19	3	12	4	2	#	1	1
Utah	13	3	9	#	23	#	13	9
Washington	18	3	9	6	1	#	#	1
Grade 8								
Nation	17	3	11	3	7	#	3	4
Alaska	17	4	12	1	25	2	12	11
Arizona	16	1	10	5	12	#	4	7
Minnesota	24	7	13	4	#	#	#	#
Montana	18	2	13	3	21	#	10	11
New Mexico	16	5	9	2	32	1	14	17
North Carolina	13	1	11	2	#	#	#	#
North Dakota	26	6	15	5	9	1	4	4
Oklahoma	17	6	9	2	1	#	#	#
Oregon	18	2	10	6	1	#	#	1
South Dakota	17	3	9	5	4	#	#	4
Utah	12	1	11	#	4	#	2	3
Washington	20	4	14	2	#	#	#	#

Rounds to zero.

NOTE: AI/AN = American Indian/Alaska Native. The national and state results reported here include only public and Bureau of Indian Education (BIE) schools. Detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2009 National Indian Education Study.

Appendix Tables

Table **A-1.** Average scores for fourth- and eighth-grade students in NAEP reading, by race/ethnicity and selected student and school characteristics: 2009

Characteristic	AI/AN	Non-AI/AN	Other race/ethnicity groups			
			Black	Hispanic	White	Asian/Pacific Islander
Grade 4						
Overall	204	221*	205	205	230*	235*
Eligibility for school lunch						
Eligible for free lunch	195	205*	199*	199*	214*	216*
Eligible for reduced-price lunch	211	216	210	209	221	225*
Not eligible	219	232*	216	217	235*	242*
Region						
Atlantic	213	225*	208	214	233*	241*
North Central	201	223*	200	206	230*	236*
South Central	214	218	203*	210	228*	239*
Mountain	191	218*	206*	200*	228*	228*
Pacific	209	214	202	197*	228*	230*
School location						
City	213	216	202*	203*	234*	233*
Suburb	217	225	208	208	234*	238*
Town	204	218*	201	201	224*	226*
Rural	196	223*	205*	208*	226*	231*
Grade 8						
Overall	251	264*	246*	249	273*	274*
Eligibility for school lunch						
Eligible for free lunch	243	247*	240*	243	257*	258*
Eligible for reduced-price lunch	257	256	248*	250	262	266
Not eligible	263	273*	256*	260	276*	282*
Region						
Atlantic	251	267*	249	255	275*	283*
North Central	253	268*	244*	253	273*	278*
South Central	261	261	244*	252*	271*	280*
Mountain	244	263*	248	248	271*	271*
Pacific	248	257*	244	243	271*	266*
School location						
City	251	259*	244*	247	275*	271*
Suburb	261	268*	251*	251*	277*	279*
Town	251	261*	242*	247	268*	261
Rural	249	265*	246	253	269*	277*

* Significantly different ($p < .05$) from AI/AN students.
NOTE: AI/AN = American Indian/Alaska Native. Black includes African American, Hispanic includes Latino, and Pacific Islander includes Native Hawaiian. Race categories exclude Hispanic origin. Results are not shown for students whose race/ethnicity was unclassified, but they are included in the results for non-AI/AN students.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2009 National Indian Education Study.

Table **A-2.** Percentage of fourth- and eighth-grade students in NAEP reading, by race/ethnicity and selected student and school characteristics: 2009

Characteristic	AI/AN	Non-AI/AN	Other race/ethnicity groups			
			Black	Hispanic	White	Asian/Pacific Islander
Grade 4						
Eligibility for school lunch						
Eligible for free lunch	59	37*	65*	65*	21*	24*
Eligible for reduced-price lunch	6	6	7	9*	5	6
Not eligible	32	50*	25*	23*	66*	61*
Region						
Atlantic	8	36*	47*	24*	37*	31*
North Central	18	22*	20	10*	28*	13*
South Central	25	18*	24	22*	16*	9*
Mountain	30	7*	2*	11*	7*	5*
Pacific	19	17	7*	34*	11*	41*
School location						
City	18	31*	48*	46*	19	43*
Suburb	15	37*	32*	36*	38*	45*
Town	20	11*	8*	8*	14*	4*
Rural	46	21*	12*	10*	29*	9*
Grade 8						
Eligibility for school lunch						
Eligible for free lunch	55	33*	60*	60*	17*	28*
Eligible for reduced-price lunch	6	6	7	9*	5	7
Not eligible	36	54*	29*	27*	70*	57*
Region						
Atlantic	9	35*	48*	22*	36*	30*
North Central	17	22*	19	9*	28*	11*
South Central	26	19*	24	22*	17*	10*
Mountain	27	7*	2*	11*	7*	5*
Pacific	20	17	7*	37*	11*	44*
School location						
City	15	29*	44*	43*	19*	41*
Suburb	14	37*	33*	36*	37*	43*
Town	20	13*	9*	11*	15*	7*
Rural	51	21*	14*	10*	28*	9*

* Significantly different ($p < .05$) from AI/AN students.

NOTE: AI/AN = American Indian/Alaska Native. Black includes African American, Hispanic includes Latino, and Pacific Islander includes Native Hawaiian. Race categories exclude Hispanic origin. Results are not shown for students whose race/ethnicity was unclassified, but they are included in the results for non-AI/AN students. For the eligibility for school lunch category, results are not shown for students whose eligibility status was not available. For the region and school location categories, detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2009 National Indian Education Study.

Table **A-3.** Average scores for fourth- and eighth-grade students in NAEP mathematics, by race/ethnicity and selected student and school characteristics: 2009

Characteristic	AI/AN	Non-AI/AN	Other race/ethnicity groups			
			Black	Hispanic	White	Asian/Pacific Islander
Grade 4						
Overall	225	240*	222*	227*	248*	255*
Eligibility for school lunch						
Eligible for free lunch	219	226*	218	224*	235*	242*
Eligible for reduced-price lunch	225	235*	228	229	241*	244*
Not eligible	236	250*	232	237	253*	262*
Region						
Atlantic	233	243*	226*	233	250*	258*
North Central	227	242*	219*	229	248*	256*
South Central	234	237*	220*	233	245*	256*
Mountain	216	238*	222*	223*	246*	247*
Pacific	222	235*	220	220	247*	253*
School location						
City	228	236*	220*	226	250*	255*
Suburb	232	243*	226	229	251*	256*
Town	227	238*	220*	224	243*	245*
Rural	221	241*	223	229*	245*	250*
Grade 8						
Overall	266	283*	261*	266	293*	301*
Eligibility for school lunch						
Eligible for free lunch	257	265*	255	261*	275*	282*
Eligible for reduced-price lunch	273	276	265	273	281*	297*
Not eligible	278	294*	271*	275	298*	309*
Region						
Atlantic	261	286*	264	270	295*	310*
North Central	269	287*	257*	269	293*	300*
South Central	271	281*	259*	277*	290*	309*
Mountain	258	283*	264	265*	293*	294*
Pacific	269	275	254*	258*	291*	294*
School location						
City	270	279*	259*	266	295*	302*
Suburb	273	287*	265	266	297*	304*
Town	264	280*	259*	262	288*	276*
Rural	263	285*	260	273*	289*	302*

* Significantly different ($p < .05$) from AI/AN students.
NOTE: AI/AN = American Indian/Alaska Native. Black includes African American, Hispanic includes Latino, and Pacific Islander includes Native Hawaiian. Race categories exclude Hispanic origin. Results are not shown for students whose race/ethnicity was unclassified, but they are included in the results for non-AI/AN students.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2009 National Indian Education Study.

Table **A-4.** Percentage of fourth- and eighth-grade students in NAEP mathematics, by race/ethnicity and selected student and school characteristics: 2009

Characteristic	AI/AN	Non-AI/AN	Other race/ethnicity groups			
			Black	Hispanic	White	Asian/Pacific Islander
Grade 4						
Eligibility for school lunch						
Eligible for free lunch	60	38*	65*	66*	21*	26*
Eligible for reduced-price lunch	8	6	7	9	5*	6
Not eligible	31	49*	24*	22*	66*	61*
Region						
Atlantic	9	36*	47*	24*	37*	31*
North Central	17	22*	20*	9*	28*	13*
South Central	24	18*	24	23	16*	9*
Mountain	29	7*	2*	11*	7*	6*
Pacific	21	17*	7*	32*	11*	40*
School location						
City	18	31*	48*	46*	19	44*
Suburb	15	37*	32*	35*	38*	43*
Town	21	11*	8*	8*	14*	4*
Rural	46	21*	12*	11*	29*	8*
Grade 8						
Eligibility for school lunch						
Eligible for free lunch	51	33*	60*	61*	17*	29*
Eligible for reduced-price lunch	7	6	7	9	5*	6
Not eligible	38	54*	30*	27*	70*	56*
Region						
Atlantic	10	35*	49*	23*	36*	30*
North Central	18	22*	19	8*	28*	11*
South Central	25	18*	24	22	17*	10*
Mountain	28	7*	2*	11*	7*	5*
Pacific	19	17	6*	36*	11*	44*
School location						
City	17	29*	44*	43*	19	42*
Suburb	14	37*	33*	36*	38*	43*
Town	20	13*	10*	11*	15*	8*
Rural	49	21*	14*	10*	28*	8*

* Significantly different ($p < .05$) from AI/AN students.

NOTE: AI/AN = American Indian/Alaska Native. Black includes African American, Hispanic includes Latino, and Pacific Islander includes Native Hawaiian. Race categories exclude Hispanic origin. Results are not shown for students whose race/ethnicity was unclassified, but they are included in the results for non-AI/AN students. For the eligibility for school lunch category, results are not shown for students whose eligibility status was not available. For the region and school location categories, detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2009 National Indian Education Study.

Acknowledgments

The National Center for Education Statistics (NCES) conducted the National Indian Education Study (NIES) for the U.S. Department of Education, Office of Indian Education (OIE). The study was designed in consultation with a Technical Review Panel composed of American Indian and Alaska Native educators and researchers from across the country.

NIES Part I is directed by NCES and carried out by Educational Testing Service (ETS), Pearson Educational Measurement, American Institutes for Research, NAEP Education Statistics Services Institute, Westat, and Fulcrum IT. Additional support in the development of this report was provided by Hager Sharp and Levine & Associates.

Many thanks are due to the numerous people who reviewed this report at various stages including those from the OIE and the NIES Technical Review Panel.

The report would not have been possible without the participation of thousands of students, teachers, and principals across the country, and the support of various education agencies, communities, and parents. Special thanks go to the student artists whose works are included in this report.

National Indian Education Study Technical Review Panel 2009

Henry Braun
Boston College

Bryan Brayboy
Arizona State University and
University of Alaska Fairbanks

Robert Cook
Pine Ridge High School
Pine Ridge, South Dakota

Steven Culpepper
University of Colorado
Denver

Susan Faircloth
The Pennsylvania State University

Valeria Littlecreek
Oklahoma State Department of Education

Christopher Lohse
Council of Chief State School Officers

Larry Ludlow
Boston College

Debora Norris
Arizona Department of Education

Ted Wright
Lummi Indian Business Council
Bellingham, Washington

Tarajean Yazzie-Mintz
Indiana University

IMAGE CREDITS: © Feng Yu/iStockphoto #6791248; © Jeffrey Van Daele/iStockphoto #2969536; © Kauffman & Associates, Inc., 2004, Kauffman & Associates, Inc. Used by Permission; © American Images Inc./Jupiterimages #72724224; © Ryan Balderas/iStockphoto #1106539; © ERproductions Ltd/Blend Images/Jupiterimages #56957270; © Blend Images Photography/Veer #BLP0092792; © Robert Adrian Hillman/Dreamstime #1221728; © Soren Pilman/iStockphoto #2214693; © Nicole Hill/Rubberball/Jupiterimages #83605595; © Charles Brutlag/iStockphoto #7033824; © Kauffman & Associates, Inc., 2004, Kauffman & Associates, Inc. Used by Permission; © Palo Alto Photography/Veer #PHP3074601; © Brand X Photography/Veer #BXP0028343; © Palto/iStockphoto #7973403; © Purestock/Getty Images #71196043; © Edyta Pawlowska/Dreamstime #468552; From *New and Selected Poems: Volume One* by Mary Oliver, copyright © 1992 by Mary Oliver. Reprinted by permission of Beacon Press, Boston. Courtesy of Patricia Wynne; © Somos/Veer/Getty Images #74953581; Alligator Poem from *New and Selected Poems* by Mary Oliver, copyright © 1992 by Mary Oliver. Used by permission of Beacon Press, Boston; © Rafa Irusta/Dreamstime #5783645; © amygdala_imagery/iStockphoto #1213697; 2010 Chris Arend/AlaskaStock.com; © Norberto Mario/iStockphoto #7318144; © SuperStock #1598R-178825-R-X999; © Andrew Johnson/iStockphoto #11533775; © Michael Flippo/iStockphoto #7123929; © Matthew Rambo/iStockphoto #5870358; © Peter Chigmaroff/Dreamstime #6593089; © Christopher Hudson/iStockphoto #2956290; © Kauffman & Associates, Inc., 2004, Kauffman & Associates, Inc. Used by Permission; © Pixhook/iStockphoto #7824404; © Nicole Hill/Rubberball/Jupiterimages #83605967; © Peter Chigmaroff/Dreamstime #7563799; © Corbis/Jupiterimages; © Duane Osborn/Somos Images/Corbis #21856589; © Image Werks/Corbis #21932934; © Julia Nichols//iStockphoto #7644847; © Stefan Klein/iStockphoto #507534; © Ekaterina Monakhova/iStockphoto #8859642; © Araminta/Dreamstime #1266749; 2010 Jeff Schultz/AlaskaStock.com; © Molka/Dreamstime #1795303; © Peter Chigmaroff/Dreamstime #6479633; 2010 Jeff Schultz/AlaskaStock.com

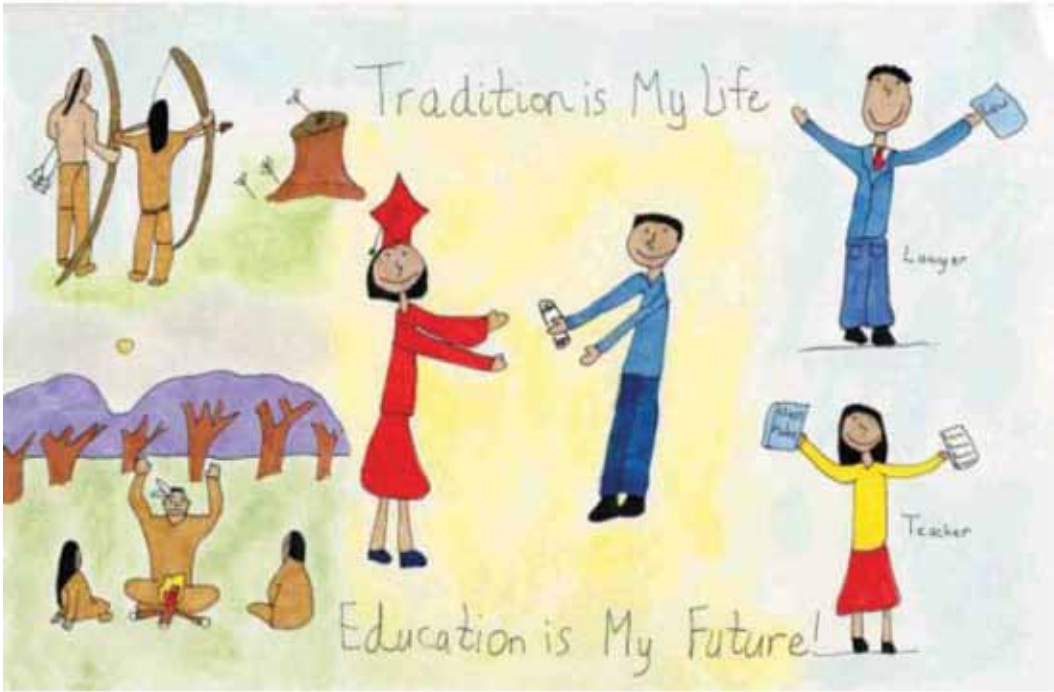
U.S. Department of Education

The National Assessment of Educational Progress (NAEP) is a congressionally authorized project sponsored by the U.S. Department of Education. The National Center for Education Statistics, a department within the Institute of Education Sciences, administers NAEP. The Commissioner of Education Statistics is responsible by law for carrying out the NAEP project.

Arne Duncan
Secretary
U.S. Department of Education

John Q. Easton
Director
Institute of Education Sciences

Stuart Kerachsky
Deputy Commissioner
National Center for Education Statistics



National Indian Education Study: Part I

June 2010

MORE INFORMATION

The report release site is http://nces.ed.gov/nationsreportcard/nies. The NCES web electronic catalog is http://nces.ed.gov/pubsearch.

For ordering information, write to
ED Pubs
U.S. Department of Education
P.O. Box 22207
Alexandria, VA 22304

or call toll free 1-877-4ED-Pubs

or order online at http://www.EDPubs.gov.

SUGGESTED CITATION

Grigg, W., Moran, R., and Kuang, M. (2010). *National Indian Education Study - Part I: Performance of American Indian and Alaska Native Students at Grades 4 and 8 on NAEP 2009 Reading and Mathematics Assessments* (NCES 2010-462). National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education, Washington, D.C.

CONTENT CONTACT

Taslima Rahman
202-502-7316
Taslima.Rahman@ed.gov

"THE DEPARTMENT OF EDUCATION'S MISSION IS TO PROMOTE STUDENT ACHIEVEMENT AND PREPARATION FOR GLOBAL COMPETITIVENESS BY FOSTERING EDUCATIONAL EXCELLENCE AND ENSURING EQUAL ACCESS."

www.ed.gov