1996 SCIENCE PERFORMANCE STANDARDS

Achievement Results for the Nation and States

National Assessment of Educational Progress

National Assessment Governing Board
U.S. Department of Education

Contents

Foreword 3

Highlights 5

The 1996 Student Achievement Levels 5

Major Findings for the Nation and Student Subgroups 5

Major Findings for the States/Jurisdictions and Student Subgroups 6

Introduction 8

NAEP's Mission 8

NAEP 1996 Science Framework 9

Reports on Science Performance 10

The Achievement Levels Policy 10

Development of the 1996 NAEP Science Levels 11

The 1996 Science Achievement Levels 12

Cautions on Interpretations 13

Tables – Introduction 14

Endnotes – Introduction 16

Exemplars 17

Grade 4 17

Grade 8 21

Grade 12 26

Achievement Level Results 31

National and Regional Comparisons 31

Tables – National and Regional Comparisons 37

Endnotes – National and Regional Comparisons 40

State Comparisons 41

Tables – State Comparisons 47

Endnotes – State Comparisons 52
Appendix A: Achievement Level Descriptions 53
Content Descriptions 53
Appendix B: Grade 8 Hands-on Tasks 56
Salt Solutions 56
Appendix C: Standard Error Tables 62
Achievement Level Results: National and Regional Comparisons 62
Appendix D: Figures 76
Acknowledgements 81

Foreword

As citizens across the nation grapple with the difficult problems of how to improve the country's schools, the information they want from student achievement tests has changed.

No longer is it enough just to compare who's high and who's low on an exam -- regardless of whether average performance is satisfactory or inadequate. Instead, in state after state and for many commercial tests, performance standards are now being set describing what students *should* know and be able to do at various grades. Results from these standards-based tests tell whether students have reached the standards, not simply whether they know more or less than their classmates.

Since 1988, the National Assessment Governing Board (NAGB) has been required by law to set performance standards called achievement levels, for the National Assessment of Educational Progress (NAEP). The 26-member Board includes state and local officials, teachers, testing and curriculum experts, members of the public, and business representatives. We are a bipartisan citizens group appointed by the Secretary of Education, but we carry out our responsibilities independently of the Department of Education.

In this report, the Governing Board presents results for the 1996 National Assessment in Science, reporting the outcomes primarily in terms of achievement levels. We believe this approach shows as clearly as possible what the levels are and how well our students are learning the science they need to know.

The levels were adopted by the Board after careful deliberation. We listened to a great deal of advice from panels of teachers, science experts, and members of the public from across the nation. The achievement levels represent the Board's best judgment of "how good is good enough" on the NAEP 1996 Science Assessment at grades, 4, 8, and 12, the three grades tested in NAEP's representative sample exams.

For each grade tested, the Board has adopted three achievement levels. The *Proficient* level is central, defining solid grade-level performance that demonstrates "competency over challenging subject matter." Defining achievement of the *Proficient* level as mastery of challenging knowledge and skills is in accord with the fourth National Education Goal: "American students shall be first in the world in mathematics and science by the year 2000." The definition of *Proficient* enhances NAEP's usefulness for tracking progress toward that goal.

The *Basic* level means partial mastery of fundamental knowledge and skills. The *Advanced* level signifies superior performance. Having three benchmarks per grade, rather than just one, helps NAEP monitor achievement across the range of student performance. Measuring performance

against three different achievement levels can clearly show improvements or problems that might well be hidden by focusing only on average scores.

Detailed definitions of the science achievement levels are presented in this report. They are illustrated by sample test questions and student work. For each level, we report the percentages of students that meet or exceed the standards.

The Board recognizes that setting achievement levels is an ongoing process and that the levels are used on a developmental basis. We have confidence in the value of these levels in reporting the 1996 science results.

The NAEP achievement levels are standards for judgment and encouragement, not edicts or commands. We believe they make national assessment results far more understandable to the public and serve to focus efforts and spur reform that will improve our schools.

William T. Randall, Chair
National Assessment Governing Board

Highlights

Since 1969, NAEP's mission has been to survey samples of school-age children and report on their academic performance in various school subjects. For more than 25 years, NAEP has collected and reported information about student achievement in mathematics, science, reading, U.S. history, world geography, and other subjects. NAEP is the nation's only continuing indicator of what America's students know and can do. This national treasure, as it has been called, is a valuable source of information to the American public, policymakers, business leaders, and educators alike.

The NAEP 1996 science results are important because they provide baseline information for marking progress toward the fourth National Education Goal: "American students shall be first in the world in mathematics and science by the year 2000." The national results presented in this report describe the achievement of students in grades 4, 8, and 12 in terms of the student performance standards adopted by the National Assessment Governing Board. State results also are presented for the 44 jurisdictions that participated voluntarily in the grade 8 state assessment and that met the guidelines for participation.

The 1996 Student Achievement Levels

The achievement levels adopted by the Board consist of three components:

- Content descriptions of what students know and can do at each level
- Cut points (scores) on the NAEP 0-to-300 science scale that define the levels in terms of student performance on the NAEP survey
- Exemplar questions and student answers that are typical of student performances at the *Basic*, *Proficient*, and *Advanced* levels

Chapter 1 describes each component in detail and provides many examples of student work at each achievement level.

Major Findings for the Nation and Student Subgroups

The NAEP 1996 Assessment gathered detailed information about the science knowledge of the nation's fourth-, eighth-, and twelfth-grade students. Specifically, 3 percent of the nation's students reached the *Advanced* level at all three grade levels. Twenty-six percent of fourth- and eighth-grade students and 18 percent of the twelfth-grade students performed within the *Proficient* level, while 38 percent, 32 percent, and 36 percent performed within the *Basic* level for grades 4, 8, and 12, respectively (see Figure 1).

Nationally, percentages of males and females reaching the three achievement levels were the same at grade 8. However, at grade 4, greater percentages of males than females were at or above the *Proficient* level, while at grade 12 males performed better than females at all three levels -- *Basic*, *Proficient*, and *Advanced*.

There were differences in attainment of the achievement levels by various racial/ethnic groups at all three grade levels. The gap between Whites and Blacks and Whites and Hispanics was evident at grades 4 and 8 at the *Basic* and *Proficient* levels. At grade 12, differences were observed between Whites and Hispanics at the *Advanced* level and between Whites and Blacks, and between Whites and Hispanics at the *Basic* and *Proficient* levels.

At all three grades, higher levels of parental education were associated with higher achievement level attainment.

Finally, on average, students in Title I programs and those eligible for the free or reduced-price lunch program attained lower achievement levels than those not participating in those programs.

Major Findings for the States/Jurisdictions and Student Subgroups

This report presents findings for 44 of the 47 participating jurisdictions in the 1996 state assessment program in grade 8 (3 states did not meet the participation guidelines for reporting their data).

Figure 2 shows the states in which grade 8 students participated in the 1996 Science Assessment according to the states' results in reaching the *Proficient* level. Sixteen jurisdictions, including the Department of Defense Dependents Schools (Overseas) and 15 states, had higher percentages of public school students at or above the *Proficient* level than the nation. Seventeen jurisdictions, including Guam, the District of Columbia and 15 states, had lower percentages of students at or above the *Proficient* level than the nation. The remaining 11 jurisdictions, including the Department of Defense Domestic Dependent Elementary and Secondary Schools and 10 states, had percentages of students at or above the *Proficient* level which were not significantly different from that of the nation.

On average, differences between males and females were observed in about 20 percent of the jurisdictions. This pattern was particularly evident at the *Proficient* level, with 28 percent of the jurisdictions showing more males than females at or above the *Proficient* level.

As in the national data, the data for many states showed gaps in percentages attaining the levels between Whites and Blacks and between Whites and Hispanics. Similarly, higher levels of parental education were generally associated with higher performance. The highest percentages

of students achieving at or above the *Proficient* level were observed among those reporting that their parents had graduated from college.

Of the 19 states reporting nonpublic school achievement, about 60 percent showed higher percentages of students reaching the *Basic* level than grade 8 public schools, while 21 percent showed similar differences at the *Proficient* level.

At the *Basic* and *Proficient* levels, lower percentages of students were observed for those students participating in Title I programs or eligible for the free or reduced-price lunch programs than those not in, or eligible for, such programs.

Introduction

NAEP's Mission

Authorized and funded by Congress, the National Assessment of Educational Progress (NAEP) is the only nationally representative and continuing assessment of what American students know and can do. The National Assessment Governing Board (NAGB), an independent bipartisan body, sets policy for NAEP, and the National Center for Education Statistics (NCES) of the U.S. Department of Education administers the program.

For more than 25 years, NAEP has collected and reported information about student achievement in mathematics, science, reading, writing, U.S. history, world geography, and other subjects. From 1969 through 1981, NAEP assessments were conducted annually. After 1981, they became biennial. Originally, NAEP assessed students at ages 9, 13, and 17, but beginning in 1983, the program was expanded to include students at grades 4, 8, and 12.

Since 1969, NAEP's mission has been to survey national samples of school-age children and report on their academic performance in various school subjects. In 1990, Congress expanded NAEP's mission to include reporting on student achievement in individual states and U.S. territories. Although participation in the program is voluntary, it has grown from 40 jurisdictions in 1990 to 47 in 1996.

NAEP has successfully measured performance in various subjects during the past several decades. In the 1990s, it has the added value of tracking progress toward meeting the National Education Goals. Although NAEP has measured science achievement on eight occasions since 1969, the 1996 Science Assessment is the first to use a new framework developed by NAGB. Thus, the results provide baseline information for marking progress toward the fourth National Goal: "American students shall be first in the world in mathematics and science by the year 2000."[1]

The NAEP 1996 science results are important not only because they provide baseline information for the American public, policymakers, and educators, but also because their release coincides with release of the performance results for the United States on the Third International Mathematics and Science Study (TIMSS).[2] It is hoped that the results from these two major surveys will spark a national conversation about how science is taught and learned in the nation's schools.

NAEP 1996 Science Framework

The science framework[3] for the 1996 NAEP assessment was developed in 1991 through a national consensus process that involved educators, policymakers, science teachers, representatives of the business community, assessment and curriculum experts, and members of the general public. NAGB managed this project through a contract with the Council of Chief State School Officers (CCSSO).

Two principles guide the science framework. First, the framework recognizes that scientific knowledge should be organized to connect and create meaning for factual information and that the context in which knowledge is presented influences this organization. Second, the framework assumes that science performance depends on the ability to know and integrate facts into larger constructs and the ability to use scientific tools, procedures, and reasoning processes to develop an increased understanding of the natural world.

Based on this framework, the NAEP 1996 Science Assessment includes the following:

- Multiple-choice questions that assess students' knowledge of important facts and concepts and that probe their analytical reasoning
- Short- and long-written response questions (sometimes referred to as constructed-response questions) that measure students' abilities to explain, integrate, apply, analyze, evaluate, and communicate scientific information
- Investigation tasks that probe students' abilities to make observations, perform investigations, and evaluate and apply results of investigations

The core of the science framework is organized into three major fields -- earth, physical, and life sciences. It also defines characteristic elements of knowing and doing science -- conceptual understanding, scientific investigation, and practical reasoning. Each question in the assessment measures knowing and doing science within one or more fields of science.

Furthermore, two overarching domains integrate the three fields of science -- the nature of science and the organizing themes of science. The nature of science encompasses the historical development of science and technology, the habits of mind that characterize scientists and engineers as well as the methods they employ in their work. It also includes the nature of design and related concepts such as optimization and trade-off. The themes of science include the notions of systems and their application in the scientific disciplines, models and their role in the development of scientific understanding, and patterns of change exemplified in natural phenomena.

Following current assessment trends, the science framework includes multiple-choice questions, but emphasizes questions that call for student-constructed responses. Under the new framework up to 80 percent of student assessment time was allocated to answering constructed-response questions. The assessment included two types of constructed-response

questions -- short response questions that required students to provide brief one- or two-sentence answers and extended-response questions that required answers one or two paragraphs in length.

In addition, students were given hands-on activities that required them to actually "do" a scientific investigation appropriate to their level of development. These structured activities guided students through scientific observation and interpretation, engaging them in an assessment experience that was more closely related to real science than a traditional paper-and-pencil test. (The full text of the Grade 8 Hands-on Tasks can be found in Appendix B.) This approach of "doing" science was similar to many statewide science assessment programs that include nontraditional types of questions such as constructed-response and performance questions.[4]

A companion NCES report[5] on science achievement provides a fuller description of the framework, and the cognitive questions that embody it, while the NAEP Technical Report and the NAGB science framework provide full details.

Reports on Science Performance

NAEP reports present descriptive information about students' average performance as well as basic and higher level performance in various subjects across the nation, by region and states, and by selected student background characteristics such as gender, race or ethnicity, and parents' education. This NAGB report presents information about achievement using the newly adopted science achievement levels. The results are expressed as percentages of students, or percentages of selected subgroups, who have reached the NAEP student performance standards in the nation and states. The companion NCES report focuses on the average achievement for the nation, the states, and various subgroups and on the relationship between achievement and various background variables such as time spent on homework and student motivation to participate in or do well on NAEP.

The Achievement Levels Policy

The 1988 NAEP legislation[6] creating NAGB directed the Board to identify "appropriate achievement goals . . . for each subject area" that NAEP measures. The 1994 NAEP reauthorization[7] reaffirmed many of the Board's statutory responsibilities, including "developing appropriate student performance standards for each age and grade in each subject area to be tested under the National Assessment." Following this directive and striving to achieve a primary mandate of the 1988 statute, "to improve the form and use of NAEP results," the Board has been developing student performance standards (called achievement levels) for NAEP since 1990. The Board has adopted achievement levels in mathematics, reading, U.S. history, world geography, and science.

The achievement levels adopted by the Board and used here to report the performance of students on the 1996 NAEP Science Assessment are developmental, and as such, are currently being evaluated by the National Academy of Sciences (NAS). The NAS findings will be available in late 1998.

The Board framed the policy for the achievement levels to help answer the question, "How good is good enough?" The goal is to report NAEP results in terms of the quality of student achievement by defining levels of learning linked to a common body of knowledge and skills that all students should attain, regardless of their backgrounds. The Board defined three levels for each grade: *Basic*, *Proficient*, and *Advanced*. These levels are cumulative in nature, that is, it is assumed that students at the *Proficient* level are likely to be successful at the *Basic* and *Proficient* content and students at the *Advanced* level are likely to be successful at the *Basic*, *Proficient*, and *Advanced* content. Table 1 presents the policy definitions of the achievement levels that apply across grades and subject areas. The specific content descriptions of science achievement levels for grades 4, 8, and 12 can be found in Appendix A. Adopting three levels of achievement for each grade signals the importance of looking at all levels of performance, from the most advanced to the very minimal. The Board believes, however, that all students should reach the *Proficient* level; the *Basic* level is not the desired goal, but rather partial mastery, a step toward *Proficient*.

Development of the 1996 NAEP Science Levels

In general, NAGB develops achievement levels for NAEP using a method for setting student performance standards that identifies what students *should know and be able to do* at each level. On behalf of NAGB, ACT assembles panels for each grade level and presents them with the policy definitions and the preliminary descriptions of the content for the achievement levels (crafted during the framework consensus process), the assessment framework, and a selection of questions from the assessment. Using these items, panelists develop and refine the final descriptions of content.

The content descriptions continue to be refined throughout the level-setting process and are validated by a supplementary group of panelists after the level-setting meetings. Panelists are also asked to select sample questions for each level. These questions, chosen from the set of released test questions, represent the full range of performance from one achievement level to the next higher level. The goal in creating content definitions and identifying and selecting exemplar questions and student responses is to represent the full range of performance from one level to the next.

When developing the science achievement levels in 1996, Board members carefully studied the information generated by the level-setting process designed and implemented by ACT.[8] The Board believed that some of the levels derived from the process did not meet its criterion of reasonableness. In several cases, the levels seemed to be set either lower or higher than would

be reasonable, resulting in too few or too many students placing at or above the *Basic*, *Proficient*, or *Advanced* levels. In reaching this conclusion, the Board examined the relevant available information, including achievement levels already adopted in other NAEP subjects, 1996 Advanced Placement (AP) results for twelfth-grade students, and information about eighth-grade students gathered from the TIMSS survey. The Board also studied the effect of adopting higher or lower cut scores on the percentages of students at or above the levels as well as the cut scores recommended by individual panelists who participated in the original process.

In the final analysis, the Board exercised its judgment about where the levels should be set on the NAEP scale to satisfy the reasonableness criterion. The levels presented in this report reflect the Board's deliberations and, as such, have been adopted by the Board for reporting the 1996 NAEP science achievement results.

Because content descriptions developed by the ACT panelists no longer matched the cut scores adopted by the Board, a broadly representative group of science educators and scientists was asked to develop new descriptions, which would describe what students know and can do at each achievement level based on students' achievement on the assessment questions.[9] Table 2 provides a summary of the NAEP science achievement level descriptions.

Since these descriptions were developed dependent on students' performance on questions in the assessment, they should not be compared either to the preliminary descriptions in the science framework or to the descriptions in other subject areas. Such descriptions are statements of what students should know and be able to do, and as such, may not be comparable to those being reported here for the 1996 Science Assessment.

In addition, new exemplar questions were selected to better represent the content of the science achievement levels adopted by the Board.

The 1996 Science Achievement Levels

The achievement levels adopted by the Board consist of the following:

- *Content descriptions* of what students know and can do at each level
- *Cut scores* on the 0-to-300 NAEP science scale that define the three achievement levels[10]
- *Exemplar questions and student responses* that represent performance at the *Basic*, *Proficient*, and *Advanced* levels for grades 4, 8, and 12

The full text of the achievement levels descriptions can be found in Appendix A, and in the Exemplars.

Cautions on Interpretations

The averages and percentages presented in this report are estimates because they are based on samples rather than on all members of each population. Consequently, the results are subject to a measure of uncertainty, reflected in the standard errors of the estimates. (The Standard Error Tables can be found in Appendix C.) The comparisons presented in this report are based on statistical tests that consider the magnitude of the difference between the group averages or percentages and the standard errors of those statistics. Throughout this report, differences among reporting groups are defined as significant when they are significant from a statistical perspective. The discussion of a difference as statistically significant means that observed differences in the sample are likely to reflect real differences in the population and are highly unlikely to have resulted from chance factors associated with sampling variability.[11] The term "significant," therefore, is not intended to imply a judgment about the educational importance of the absolute magnitude of the differences. It is, rather, intended to identify statistically dependable population differences to help focus subsequent dialogue among policymakers, educators, and the public.

The reader is cautioned against interpreting the relationships among subgroup averages or percentages as causal relationships. Average performance differences between two groups of students may result in part from socioeconomic and other factors. For example, differences among racial and ethnic subgroups are almost certainly associated with a broad range of socioeconomic and educational factors not discussed in this report. Similarly, differences in performance between public and nonpublic school students may be better understood by accounting for educational and other factors such as the composition of the student body, parents' education levels, and parental involvement. Finally, student participation rates and the motivation of students, particularly twelfth-graders, to perform on an assessment like NAEP should be considered when interpreting the results. (A further discussion of twelfth-graders' participation rates and motivation is presented in Appendix A of the NCES companion report cited earlier.)

The NAEP scales and achievement level cut points were established independently for each grade. As a result, only within-grade comparisons can be made. Comparing the achievement level attainment of males in grade 4 with that of males in grade 12, for example, or making other across-grade comparisons is not meaningful.

Finally, a word about the Tables and Figures found in Chapters 2 and 3 of this report. The data in these chapters illustrate the percentage of students *at or above* each achievement level. Since students at the *Proficient* and *Advanced* levels have also satisfied the requirements for the *Basic* level, the percentage of the students at or above the *Basic* level includes these students. Similarly, the percentages at or above the *Proficient* level includes those students who reached the *Advanced* level. These percentages are cumulative and *do not sum* to 100 percent.

Tables – Introduction

Table 1	Policy Definitions of NAEP Achievement Levels
	Achievement Level
Advanced	Superior performance
Proficient	Solid academic performance for each grade assessed. Students reaching this level have demonstrated competency over challenging subject matter, including subject-matter knowledge, application of such knowledge to real-world situations, and analytical skills appropriate to the subject matter.
Basic	Partial mastery of prerequisite knowledge and skills that are fundamental for proficient work at each grade

Table 2	Summary of the 1996 NAEP Science Achievement Level Descriptions
Cut Score	**Content Descriptions**
	Grade 4
Basic 138	Students performing at the *Basic* level demonstrate some of the knowledge and reasoning required for understanding of the earth, physical, and life sciences at a level appropriate to Grade 4. For example, they can carry out simple investigations and read uncomplicated graphs and diagrams. Students at this level also show a beginning understanding of classification, simple relationships, and energy.
Proficient 170	Students performing at the *Proficient* level demonstrate the knowledge and reasoning required for understanding of the earth, physical, and life sciences at a level appropriate to Grade 4. For example, they understand concepts relating to the Earth's features, physical properties, and structure and function. In addition, students can formulate solutions to familiar problems as well as show a beginning awareness of issues associated with technology.
Advanced 204	Students performing at the *Advanced* level demonstrate a solid understanding of the earth, physical, and life sciences as well as the ability to apply their understanding to practical situations at a level appropriate to Grade 4. For example, they can perform and critique simple investigations, make connections from one or more of the sciences to predict or conclude, and apply fundamental concepts to practical applications.
	Grade 8
Basic 143	Students performing at the *Basic* level demonstrate some of the knowledge and reasoning required for understanding of the earth, physical, and life sciences at a level appropriate to Grade 8. For example, they can carry out investigations and obtain information from graphs, diagrams, and tables. In addition, they demonstrate some understanding of concepts relating to the solar system and relative motion. Students at this level also have a beginning understanding of cause-and-effect relationships.
Proficient 170	Students performing at the *Proficient* level demonstrate much of the knowledge and many of the reasoning abilities essential for understanding of the earth, physical, and life sciences at a level appropriate to Grade 8. For example, students can interpret graphic information, design simple investigations, and explain such scientific concepts as energy transfer. Students at this level also show an awareness of environmental issues, especially those addressing energy and pollution.
Advanced 207	Students performing at the *Advanced* level demonstrate a solid understanding of the earth, physical, and life sciences as well as the abilities required to apply their understanding in practical situations at a level appropriate to Grade 8. For example, students can perform and critique the design of investigations, relate scientific concepts to each other, explain their reasoning, and discuss the impact of human activities on the environment.
	Grade 12
Basic 145	Students performing at the *Basic* level demonstrate some knowledge and certain reasoning abilities required for understanding of the earth, physical, and life sciences at a level appropriate to Grade 12. In addition, they demonstrate knowledge of the themes of science (models, systems, patterns of change) required for understanding the most basic relationships among the earth, physical, and life sciences. They are able to conduct investigations, critique the design of investigations, and demonstrate a rudimentary understanding of scientific principles.
Proficient 178	Students performing at the *Proficient* level demonstrate the knowledge and reasoning abilities required for understanding of the earth, physical, and life sciences at a level appropriate to Grade 12. In addition, they demonstrate knowledge of the themes of science (models, systems, patterns of change) required for understanding how these themes illustrate essential relationships among the earth, physical, and life sciences. They are able to analyze data and apply scientific principles to everyday situations.
Advanced 210	Students performing at the *Advanced* level demonstrate the knowledge and reasoning abilities required for a solid understanding of the earth, physical, and life sciences at a level appropriate to Grade 12. In addition, they demonstrate knowledge of the themes of science (models, systems, patterns of change) required for integrating knowledge and understanding of scientific principles from the earth, physical, and life sciences. Students can design investigations that answer questions about real-world situations and use their reasoning abilities to make predictions.

Endnotes – Introduction

1 Executive Office of the President, *National goals for education* (Washington, DC: Government Printing Office, 1990).

2 Grade 8 TIMSS results were released on November 20, 1996, grade 4 results were released on June 10, 1997, and grade 12 results will be released in early 1998.

3 *Science framework for the 1996 National Assessment of Educational Progress* (Washington, DC: National Assessment Governing Board, 1995).

4 Council of Chief State School Officers, State Education Assessment Center, *State student assessment program database, 1994-95 school year* (Washington, DC: Council of Chief State School Officers, 1996).

5 O'Sullivan, C.Y., Reese, C.M., Mazzeo, J., *NAEP 1996 science report card for the nation and the states* (Washington, DC: National Center for Education Statistics, 1997).

6 Public Law 100-297. (1988). National Assessment of Educational Progress improvement act (Article No. USC 1221). Washington, DC.

7 Public Law 103-382. (1994). Improving America's schools act. Washington, DC.

8 The technical details of the original process conducted by ACT can be found in *The 1996 science achievement levels: Final report* (Iowa City, IA: ACT, 1997).

9 Bourque, M.L. *Report on developing achievement levels descriptions for the 1996 NAEP science assessment* (unpublished manuscript, 1997).

10 The 1996 NAEP Science Assessment is scaled separately for each grade, 4, 8, and 12, and is reported here using a 0-300 metric. Comparisons of performance across grades are not appropriate. Further details on the development of the 1996 NAEP science scale can be found in the companion NCES report.

11 All differences reported are statistically significant at the 0.05 level with appropriate adjustments for multiple comparisons. Appendix A of the *NAEP 1996 science report card for the nation and the states* provides further details on the technical procedures used to analyze the data.

Exemplars

Grade 4

Basic Exemplar 1

Grade 4

basic exemplar 1

Students at the Basic level are likely to have a knowledge of the stages of the life cycles of familiar organisms.

Insects also change as they grow. Look at the pictures below. One part of the picture is missing. Draw and label the missing part of the picture.

Egg Caterpillar Draw and label the missing part of the picture Butterfly

Scoring guide:

2 = Draws and labels the pupal stage
1 = Draws or labels the pupal stage
0 = Does not draw the pupal stage

Percent reaching a score of 2 at each achievement level:			
Below Basic 24	**Basic 54**	Proficient 75	Advanced 89

Basic Exemplar 2

Grade 4

basic exemplar 2

Students at the Basic level are likely to identify one useful property of common materials, such as metals used to make objects found in and around the home.

Many things are made of metal, such as pots, pans, tools, and wire. Give two reasons why metals are used to make many different things.

I think one reason might be because metal last pretty long

Scoring guide:

2 = Lists 2 properties of metal
1 = Lists 1 property of metal
0 = Lists no properties of metal

Percent reaching a score of 1 at each achievement level:			
Below Basic 28	**Basic 53**	Proficient 76	Advanced 92

Proficient Exemplar 3

Grade 4

proficient exemplar 3

Students at the *Proficient* level are likely to recognize major features of the Earth's surface.

Look at the world maps below. Which map has the Atlantic and Pacific Oceans correctly labeled?

Ⓐ

Ⓒ

Ⓑ

● (selected)

Percent correct at each achievement level:			
Below Basic	Basic	Proficient	Advanced
36	52	68	84

Proficient Exemplar 4

Grade 4

proficient exemplar 4

This question measures the students' understanding of how natural forces change features of the Earth's surface and the ability to describe those changes. At the *Proficient* level, students are likely to provide one or two forces and may or may not be able to describe the changes.

Scoring guide:

3 = Lists 2 forces and 2 descriptions
2 = Lists 2 forces and 1 description
1 = Lists 1 force and 1 description or lists 1 or 2 forces with no descriptions
0 = Lists no correct forces

Percent reaching a score of 1 at each achievement level:			
Below Basic	Basic	Proficient	Advanced
19	40	64	87

Natural forces are always changing features of the Earth's surface. Some changes happen quickly and some changes happen slowly.

(a) Name one natural force that can change a part of the Earth's surface over a period of days.

tornado

How is the Earth's surface changed?

it changed when big things happened

(b) Name one natural force that can change a part of the

water

How is the Earth's surface changed?

water it flude thing

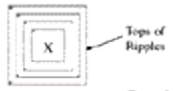
Proficient Exemplar 5

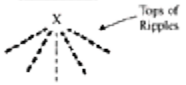
Grade 4

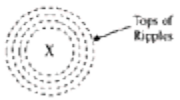
proficient exemplar 5

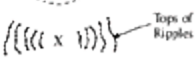
This question measures the students' understanding of patterns of motion in the water, such as vibrations caused by a disturbance. Students at the *Proficient* level are likely to select the correct pattern.

You stand on the end of a boat dock and toss a small stone out into a pond of still water. Ripples form on the surface of the water. Which drawing shows what you will see when you look down at the water? (X marks where the stone enters the water.)

Ⓐ 

Ⓑ 

● 

Ⓓ 

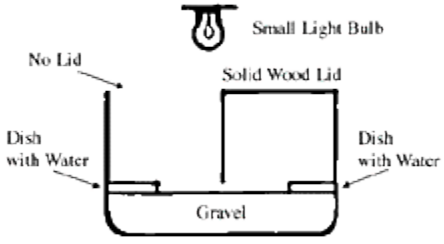
Percent correct at each achievement level:			
Below Basic	Basic	Proficient	Advanced
38	58	76	90

Advanced Exemplar 6

Grade 4

advanced exemplar 6

Students at the *Advanced* level are likely to correctly analyze the appropriateness of an experimental design.



Is this a good way to set up this experiment? Tell why or why not.

Yes, because it has a chance to go on the side it wants and there is water on both side

Scoring guide:

2 = Lists 1 reason why design is appropriate with correct explanation

1 = Lists 1 reason why design is appropriate but offers no explanation or an incorrect explanation

0 = States the design is inappropriate

Percent reaching a score of 2 at each achievement level:			
Below Basic	Basic	Proficient	Advanced
5	15	31	55

Advanced Exemplar 7

Grade 4

advanced exemplar 7

Students at the *Advanced* level are likely to have a full understanding of the life cycle of familiar organisms.

The picture below shows the life cycle of a grasshopper.

Tell one way that the grasshopper's life cycle is <u>different</u> from the butterfly's life cycle.

Because all of its
r look the same but
it just gets bigger Other
than the butterfly it changes
the way it looks.

Tell one way that the grasshopper's life cycle is <u>the same</u> as the butterfly's life cycle.

Both of them are
eggs first They also
go through many
stages

Tell some other ways that the grasshopper's and the butterfly's life cycles are similar and different from each other.

The way that they
are similar is that they
both turn to bigger things
they are a egg first and
both have stages. They
are different by the grasshopper
has more stages to go through
the butterfly is first a catapiller
then it turns into a cocoon.

Scoring guide:

- 4 = Lists 2 similarities and 2 differences
- 3 = Lists 2 differences and 1 similarity or 2 similarities and 1 difference
- 2 = Lists 1 similarity and 1 difference or 2 similarities or 2 differences
- 1 = Lists 1 similarity or 1 difference
- 0 = Lists no correct similarities or differences

Percent reaching a score of 3 at each achievement level:

Below Basic	Basic	Proficient	Advanced
2	13	34	64

Grade 8

Basic Exemplar 1

Grade 8

basic exemplar 1

This question measures the students' understanding of the effect of parasites on familiar organisms and their environment. Students at the *Basic* level are likely to identify one advantage or one disadvantage.

When a population of mice is infected with parasites, many of the mice die from the parasitic infection, but some mice appear as healthy as they were before being infected. Some people are considering using these parasites to control the mouse population in people's homes.

Give one advantage and one disadvantage of using these parasites instead of mouse traps or poisons to limit the population of mice.

Advantage:

the mice will probably die and you wouldn't have any problem

Disadvantage:

you might get sick from the parasites they might also get on your food and they can get sick.

Scoring guide:

2 = Lists 1 advantage and 1 disadvantage
1 = Lists 1 advantage or 1 disadvantage
0 = Demonstrates no understanding

Percent reaching a score of 1 at each achievement level:			
Below Basic	Basic	Proficient	Advanced
36	57	33	88

Basic Exemplar 2

Grade 8

basic exemplar 2

Students at the *Basic* level are likely to display an understanding of the different classifications of organisms.

A certain organism has many cells, each containing a nucleus. If the organism makes its own food, it would be classified as

Ⓐ a bacterium
Ⓑ a fungus
● a plant
Ⓓ an animal

Percent correct at each achievement level:			
Below Basic	Basic	Proficient	Advanced
58	75	85	93

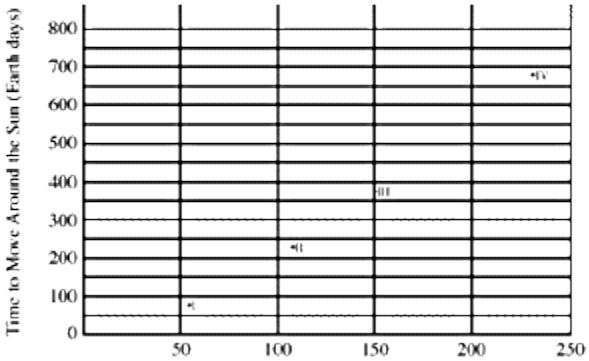
Basic Exemplar 3

Grade 8

basic exemplar 3

Students at the *Proficient* level are likely to be able to read a graph and make an observation about the data displayed in the graph and to give an explanation for the observation. At the *Basic* level, students would probably only be able to respond correctly to one part of the question.

The planets move at different speeds and require different amounts of time to circle the Sun. The following graph shows the number of Earth days it takes for each of the four planets to move around the Sun once.



Average Distance from Sun (million kilometers)

I Mercury III Earth
II Venus IV Mars

Using information from the graph, name each planet that has a year that is shorter than a year on Earth. Explain how you arrived at your answer.

Mercury and Venus

Scoring guide:

2 = Identifies Mercury and Venus and explains the procedure
1 = Identifies 1 or both planets and may or may not give the correct explanation
0 = Identifies Mars

Percent reaching a score of 1 at each achievement level:

Below Basic	Basic	Proficient	Advanced
38	73	91	99

Proficient Exemplar 4

Grade 8

proficient exemplar 4

(see question from basic exemplar 3)

Using information from the graph, name each planet that has a year that is shorter than a year on Earth. Explain how you arrived at your answer.

The planets of Venus and Mercury have a shorter year than an earth year because it takes them less than five days to orbit the sun

Percent reaching a score of 2 at each achievement level:

Below Basic	Basic	Proficient	Advanced
15	44	70	89

Proficient Exemplar 5

Grade 8

proficient exemplar 5

This question measures the students' ability to make a prediction about an experiment with an explanation and to explain why the prediction may be incorrect. Students at the *Advanced* level are probably able to provide explanations, while students at the *Proficient* level are not likely to do so.

Suppose that the experiments yielded the results shown in the table below.

Time (min)	0	1	2	3	4	5	6	7	8
Soil Temp (°C)	20	21	22.5	24	26	27.5	29.5	30.5	32
Water Temp (°C)	20	21.5	23	23.5	24	25.5	26	27.5	28.5

At a beach that has white sand, you measure the temperature of the sand and the temperature of the seawater at 9:00 a.m. You find that both have a temperature of 16 C. If it is clear and sunny all morning, what do the data from the experiment predict about the temperature of the white sand compared to the temperature of the seawater at noon?

The white sand would be hoter

Explain your answer:

the sun will heat the white sand faster then the seawater

Explain why the prediction based on the data might be wrong.

Scoring guide:

3 = Lists and explains a prediction and explains why it may be wrong.
2 = Lists a prediction and explains it or explains why it is wrong.
1 = Lists a reasonable prediction.
0 = Provides no reasonable prediction or explanation.

Percent reaching a score of 1 at each achievement level:

Below Basic	Basic	Proficient	Advanced
23	43	64	87

Advanced Exemplar 6

Grade 8

advanced exemplar 6

(see question from proficient exemplar 5)

The sand will become more warmer than the water by noon

Explain your answer:

Well the sun is exposed to both the water and the sand. but the water will evaporate when it becomes heated and the sand will absorb the heat from the sun

Explain why the prediction based on the data might be wrong.

It might be wrong because the time data is incorrect

Percent reaching a score of 2 at each achievement level:

Below Basic	Basic	Proficient	Advanced
2	8	24	59

Proficient Exemplar 7

Grade 8

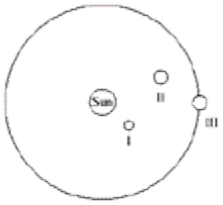
proficient exemplar 7

Proficient level responses demonstrate an awareness of planetary movement and position, while Advanced level responses also demonstrate an understanding of configuration and orbits.

Scoring guide:

2 = Identifies planets in correct configuration with an explanation
1 = Aware of configuration with an explanation
0 = Responds "Yes" with an incorrect or no explanation

Percent reaching a score of 1 at each achievement level:			
Below Basic	Basic	Proficient	Advanced
15	34	58	83



At the moment of time shown in the picture above, Venus is the planet closest to the Earth. Could Mercury ever be the planet closest to the Earth?

● Yes
Ⓑ No

Explain why or why not. You can draw on the picture to help explain your answer.

Because of the rotation Mercury moves faster. Venus goes 2nd fastest then Earth moves real slow

Advanced Exemplar 8

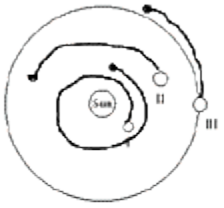
Grade 8

advanced exemplar 8

Scoring guide:

2 = Identifies planets in correct configuration with an explanation
1 = Aware of configuration with an explanation
0 = Responds "Yes" with an incorrect or no explanation

Percent reaching a score of 2 at each achievement level:			
Below Basic	Basic	Proficient	Advanced
6	18	39	68



At the moment of time shown in the picture above, Venus is the planet closest to the Earth. Could Mercury ever be the planet closest to the Earth?

● Yes
Ⓑ No

Explain why or why not. You can draw on the picture to help explain your answer.

As Mercury passes Venus and Earth it goes around the Sun faster and Earth is further away from the Sun so it takes longer to go around the Sun and Mercury catches up with Earth.

Advanced Exemplar 9

Grade 8

advanced exemplar 9

This question measures the students' understanding of input/output energy forms. At the Advanced level, students are likely to choose the correct response.

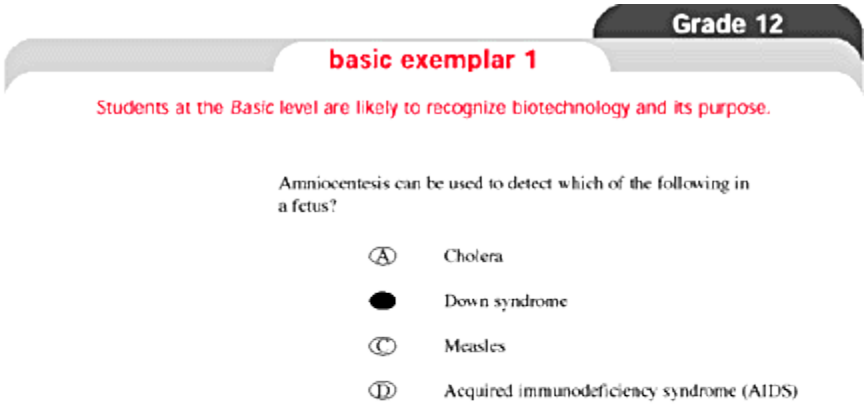
Which of the following represents the input/output energy forms for a stereo system?

	Input	Output
Ⓐ	Motion	Sound only
Ⓑ	Motion	Sound and heat only
Ⓒ	Electricity	Motion and sound only
●	Electricity	Motion, sound, and heat

Percent correct at each achievement level:			
Below Basic	Basic	Proficient	Advanced
40	47	53	62

Grade 12

Basic Exemplar 1



Grade 12

basic exemplar 1

Students at the *Basic* level are likely to recognize biotechnology and its purpose.

Amniocentesis can be used to detect which of the following in a fetus?

Ⓐ Cholera

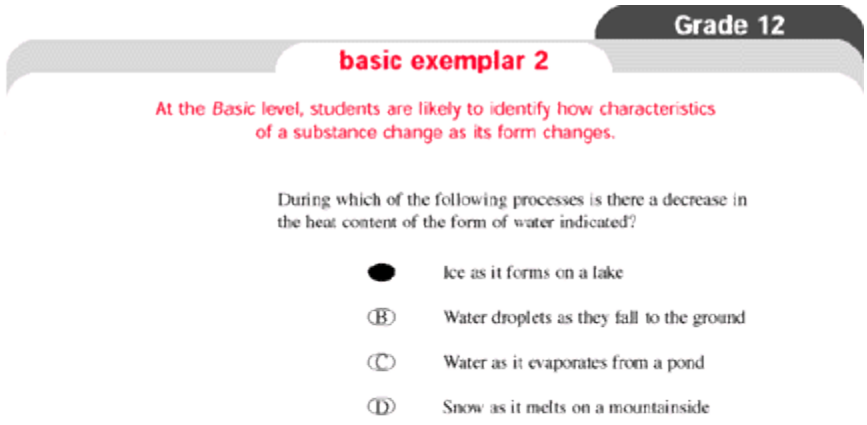
● Down syndrome

Ⓒ Measles

Ⓓ Acquired immunodeficiency syndrome (AIDS)

Percent correct at each achievement level:			
Below Basic	Basic	Proficient	Advanced
46	70	85	94

Basic Exemplar 2



Grade 12

basic exemplar 2

At the *Basic* level, students are likely to identify how characteristics of a substance change as its form changes.

During which of the following processes is there a decrease in the heat content of the form of water indicated?

● Ice as it forms on a lake

Ⓑ Water droplets as they fall to the ground

Ⓒ Water as it evaporates from a pond

Ⓓ Snow as it melts on a mountainside

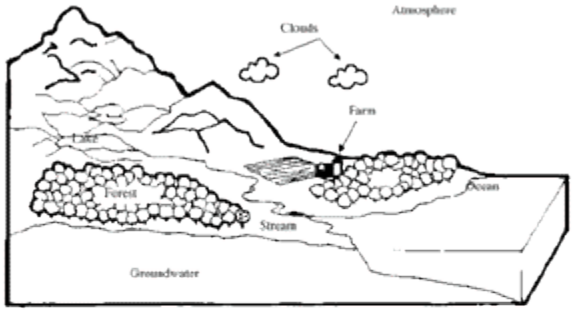
Percent correct at each achievement level:			
Below Basic	Basic	Proficient	Advanced
47	70	84	94

Basic Exemplar 3

Grade 12

basic exemplar 3

Students at the Basic level demonstrate an understanding of most, but not all, of the elements that occur during water cycles



The diagram above shows a region near the coast of a large continent. A range of high, snowcapped mountains lies near the ocean. There is a farm between the mountains and a forest.

The following question ask you to think about water and the water cycle in the system shown in the diagram. In the system, water exists as a gas, a liquid, and a solid.

Describe how water in the lake can become snow on the mountains in the system shown in the diagram.

The lake water can be evaporated in as gaseous form, And precipitate into clouds the clouds will been cold So much condensation, that it would bring forth snowflakes.

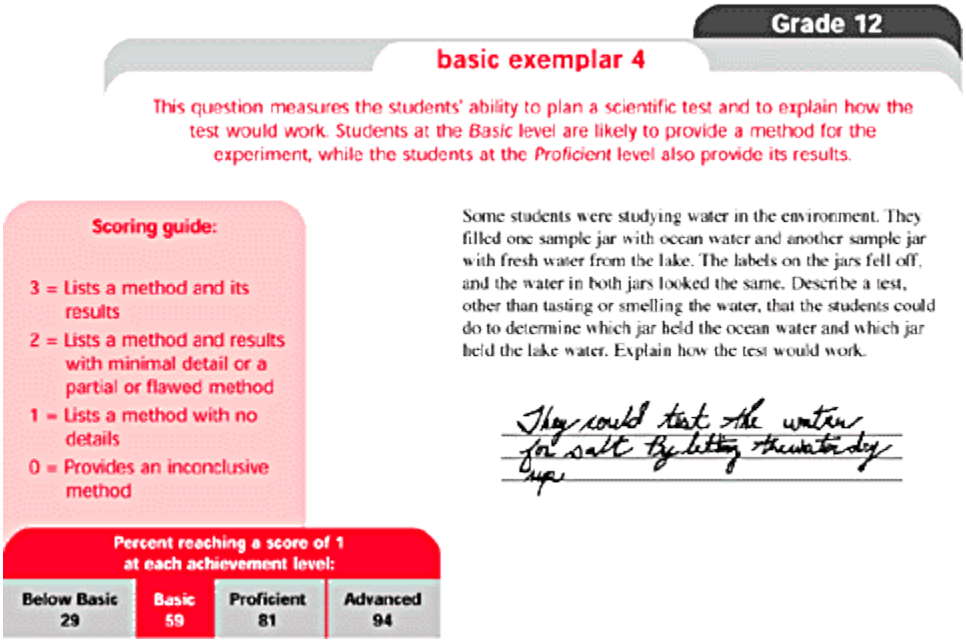
Scoring guide:

3 = Lists 3 elements of the process in this water cycle
2 = Lists 2 elements
1 = Lists 1 element
0 = Shows no understanding

Percent reaching a score of 2 at each achievement level:

Below Basic	Basic	Proficient	Advanced
34	77	92	98

Basic Exemplar 4



Grade 12

basic exemplar 4

This question measures the students' ability to plan a scientific test and to explain how the test would work. Students at the *Basic* level are likely to provide a method for the experiment, while the students at the *Proficient* level also provide its results.

Scoring guide:

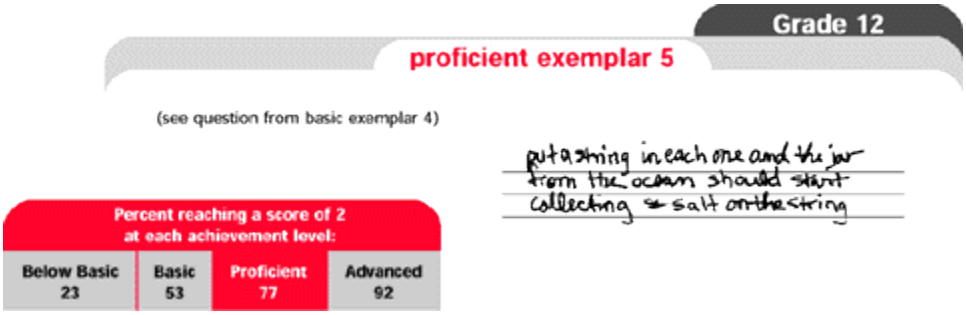
3 = Lists a method and its results
2 = Lists a method and results with minimal detail or a partial or flawed method
1 = Lists a method with no details
0 = Provides an inconclusive method

Some students were studying water in the environment. They filled one sample jar with ocean water and another sample jar with fresh water from the lake. The labels on the jars fell off, and the water in both jars looked the same. Describe a test, other than tasting or smelling the water, that the students could do to determine which jar held the ocean water and which jar held the lake water. Explain how the test would work.

They could test the water for salt By letting the water dry up

Percent reaching a score of 1 at each achievement level:			
Below Basic	Basic	Proficient	Advanced
29	59	81	94

Proficient Exemplar 5



Grade 12

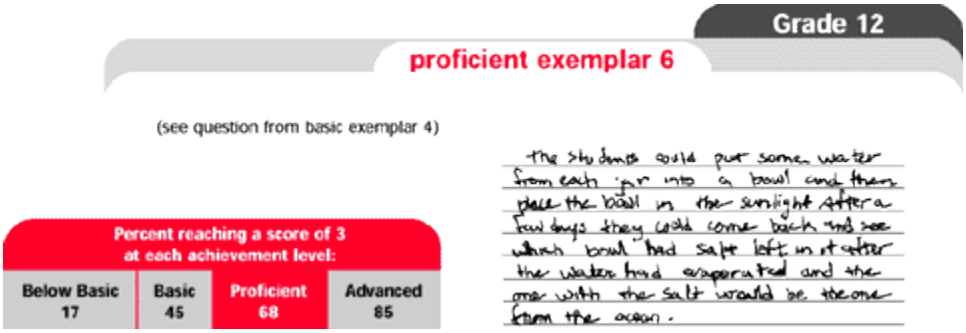
proficient exemplar 5

(see question from basic exemplar 4)

put a string in each one and the jar from the ocean should start collecting salt on the string

Percent reaching a score of 2 at each achievement level:			
Below Basic	Basic	Proficient	Advanced
23	53	77	92

Proficient Exemplar 6



Grade 12

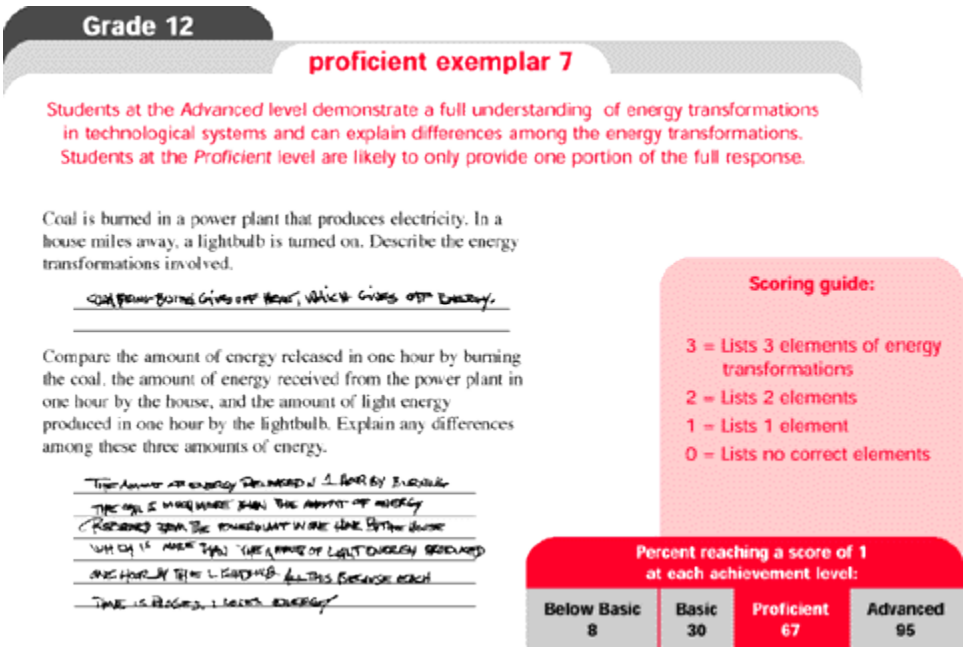
proficient exemplar 6

(see question from basic exemplar 4)

the students could put some water from each jar into a bowl and then place the bowl in the sunlight after a few days they could come back and see which bowl had salt left in it after the water had evaporated and the one with the salt would be the one from the ocean.

Percent reaching a score of 3 at each achievement level:			
Below Basic	Basic	Proficient	Advanced
17	45	68	85

Proficient Exemplar 7



Grade 12

proficient exemplar 7

Students at the *Advanced* level demonstrate a full understanding of energy transformations in technological systems and can explain differences among the energy transformations. Students at the *Proficient* level are likely to only provide one portion of the full response.

Coal is burned in a power plant that produces electricity. In a house miles away, a lightbulb is turned on. Describe the energy transformations involved.

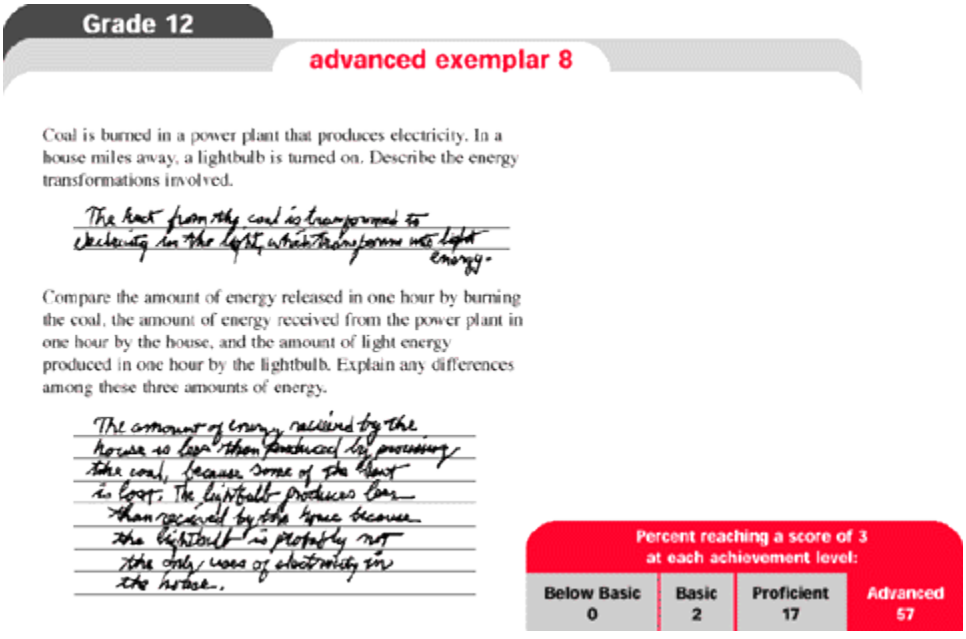
Compare the amount of energy released in one hour by burning the coal, the amount of energy received from the power plant in one hour by the house, and the amount of light energy produced in one hour by the lightbulb. Explain any differences among these three amounts of energy.

Scoring guide:

3 = Lists 3 elements of energy transformations
2 = Lists 2 elements
1 = Lists 1 element
0 = Lists no correct elements

Percent reaching a score of 1 at each achievement level:			
Below Basic	Basic	Proficient	Advanced
8	30	67	95

Advanced Exemplar 8



Grade 12

advanced exemplar 8

Coal is burned in a power plant that produces electricity. In a house miles away, a lightbulb is turned on. Describe the energy transformations involved.

Compare the amount of energy released in one hour by burning the coal, the amount of energy received from the power plant in one hour by the house, and the amount of light energy produced in one hour by the lightbulb. Explain any differences among these three amounts of energy.

Percent reaching a score of 3 at each achievement level:			
Below Basic	Basic	Proficient	Advanced
0	2	17	57

Advanced Exemplar 9

Grade 12

advanced exemplar 9

At the *Advanced* level, students probably understand most of the information in a table and are likely to draw reasonable conclusions from the table and some are able to explain those conclusions.

The biologist collected information about the physical appearance, mating behavior, and reproduction compatibility of the three frog populations. Some of this information is shown in the table below.

Frog Population	Body Color Pattern	Mating Behavior	Reproduction Compatibility
Pond 1	Green with few large brown spots	Looks for mates in shallow water at pond's edge	Can also reproduce with frogs from Pond 2 and Pond 3
Pond 2	Green with many dark brown spots	Looks for mates in shallow water at pond's edge	Can also reproduce with frogs from Pond 1 and Pond 3
Pond 3	Light brown with many dark brown spots	Looks for mates in grasses and other plants on land near the pond	Can also reproduce with frogs from Pond 1 and Pond 2

Based on the information in the table, do you think that the three populations of frogs all belong to the same species or are members of two or three different frog species? Justify your answer, and explain what information in the table was most important in helping determine your answer.

Yes they all have the same abilities and have same habits, they all breed the same same style and colors and all produce with each other.

Scoring guide:

2 = Identifies as 1 species

1 = Identifies as 1 species but includes insignificant information

0 = Responds that they are of different species based on different appearances

Percent reaching a score of 1 at each achievement level:

Below Basic	Basic	Proficient	Advanced
20	35	51	69

Advanced Exemplar 10

Grade 12

advanced exemplar 10

(see question from advanced exemplar 9)

Based on the information in the table, do you think that the three populations of frogs all belong to the same species or are members of two or three different frog species? Justify your answer, and explain what information in the table was most important in helping determine your answer.

Some species because they can all mate with each other. Different species usually don't mate -

Percent reaching a score of 2 at each achievement level:

Below Basic	Basic	Proficient	Advanced
12	25	40	58

Achievement Level Results

National and Regional Comparisons

The NAEP 1996 Assessment gathered detailed information about the science knowledge and skills of the nation's fourth-, eighth-, and twelfth-grade students.

This chapter offers detailed descriptions of the science achievement levels for the nation, for major regions within the nation, and for major subpopulations (e.g., males and females). The 1996 science findings showed a number of consistent patterns. At all three grades, racial and ethnic groups showed large differences in achievement level attainment. Also at all three grades, higher levels of parental education were generally associated with students' attainment of higher achievement levels. Finally, at all three grades, groups of students who may be low in socioeconomic status or otherwise "at risk" -- specifically, those receiving Title I services and those eligible for free or reduced-price lunches -- attained lower achievement levels than other students. Other patterns such as gender differences in achievement level attainment were less consistent.

National Results

Nationally, as Figure 1 shows, 3 percent of students at grades 4, 8, and 12 performed at the *Advanced* level. The percentage of students performing at or above the *Proficient* level was 29 percent at grades 4 and 8 and 21 percent at grade 12. Those at or above the *Basic* level represented 67 percent of students in grade 4, 61 percent of students in grade 8, and 57 percent of students in grade 12.

Regional Results

For reporting purposes, the nation was divided into four regions: Northeast, Southeast, Central, and West. Each state was assigned to a region, as was the District of Columbia. (The NCES companion report provides a description of each region.) Regional differences in performance have typically been found across the various subjects NAEP has assessed (science, mathematics, reading, writing, history, geography, and others).

As Table 3 indicates, the 1996 Science Assessment results also revealed regional differences in performance. In general, compared with students in the Southeast and West, a higher percentage of students in the Northeast and Central regions attained higher achievement levels. In particular, proportionally more students attending schools in the Central region were at or above the *Proficient* level than was true of students in the Southeast. At grades 4 and 12, a

greater percentage of students attending schools in the Northeast were also at or above the *Proficient* level when compared with students in the Southeast. At all three grades, compared with students in the Southeast, greater percentages of students in the Central region reached the *Basic* level. At grades 4 and 12, a similar pattern appeared when students in the Northeast were compared with those in the Southeast. At grade 12, students in the Central region significantly outperformed those in the West at the *Basic* and *Proficient* levels.

Performance of Selected Subgroups

The following sections of this chapter report results for selected demographic subgroups of fourth-, eighth-, and twelfth-grade students. The subgroups are classified by gender, race and ethnicity, level of parental education, type of school, Title I participation, and eligibility for the free or reduced-price lunch program. The results from the 1996 Science Assessment are consistent with NAEP results in other subjects, in that members of a subgroup vary considerably in achievement level attainment.

Gender

Are there differences in achievement levels attained by males and females? Table 4 and Figure 2 show the percentage of males and females performing at or above the three achievement levels, as well as those performing below the *Basic* level. Gender differences in achievement level attainment are evident in grades 4 and 12. At grade 4, a greater percentage of males than females was at or above the *Proficient* level. At grade 12, a greater percentage of males than females was at or above each of the three levels -- *Advanced*, *Proficient*, and *Basic*. No significant differences between males and females were found at grade 8.

Race/Ethnicity

How do the achievement level attainments of students from different racial and ethnic groups compare? Table 5 presents the 1996 science achievement levels attained by students in the following racial and ethnic categories: White, Black, Hispanic, Asian/Pacific Islander, and American Indian. (Students' classification into these categories was based on their own identification of the racial or ethnic group to which they belong.) Figure 3 displays the performance of these groups with respect to the *Proficient* level only.

Differences in achievement level attainment among the racial and ethnic groups were evident at all grade levels.[1] Differences in students' achievement level attainment must be interpreted with caution, however. Socioeconomic status, home environment, and available educational opportunities influence attainment and argue against oversimplified explanations.[2]

As shown in Table 5, at grade 4, the percentages of White, Asian/Pacific Islander, and American Indian students at or above the *Basic* and *Proficient* levels were greater than the percentages of Black and Hispanic students at or above these levels.

At grade 8, several differences appeared. The percentages of White and Asian/Pacific Islander students at or above the *Basic* and *Proficient* levels were greater than the percentages of Black and Hispanic students at these levels. The percentage of American Indian students at or above the *Basic* level was greater than the percentages of Black and Hispanic students at this level. Finally, the percentage of Hispanic students at or above the *Basic* and *Proficient* levels was greater than the percentage of Black students.

At grade 12, the percentage of White students at the *Advanced* level was greater than the percentage of Hispanic students, and the percentages of White and Asian/Pacific Islander students at or above *Basic* or *Proficient* levels were greater than the percentages of Black and Hispanic students at these levels.

Parents' Highest Education Level

Students who participated in the NAEP Science Assessment were asked to indicate the highest level of education attained by each parent by selecting one of the following categories: Did Not Finish High School, Graduated from High School, Some Education after High School, Graduated from College, and "I Don't Know." Students were classified by the highest educational level they reported either of their parents attaining. If a student reported that one parent graduated from college and the other from high school, for example, that student's achievement level attainment is shown in the Graduated from College subgroup. Thirty-three percent of fourth-grade students, 9 percent of eighth-grade students, and 3 percent of twelfth-grade students reported not knowing the educational level of either parent. At all three grades, as Table 6 and Figure 4 show, higher levels of parental education were associated with attainment of higher achievement levels.

At grade 4, three significant results were evident. First, a greater percentage of students who reported that a parent had graduated from college was at the *Advanced* level than was true of students who reported that a parent had graduated from high school. Second, greater percentages of students who reported that a parent had some education after high school were at or above the *Basic* and *Proficient* levels compared with those students who reported that neither parent finished high school or that at least one parent graduated from high school. Third, greater percentages of students who reported that a parent had graduated from college were at or above the *Basic* and *Proficient* levels than was true for students who reported that neither parent finished high school or that one parent had graduated from high school. Essentially, the same pattern of relationships between parents' education and students' achievement levels existed at grade 8.

The pattern was more pronounced at grade 12 where the significant relationships are even more numerous at the *Basic* and *Proficient* levels. For instance, greater percentages of students reporting a parent who graduated from college were at or above the *Basic* or the *Proficient* levels than was true of students whose parents had some education after high school, graduated from high school, or did not finish high school.

Type of School

Approximately 90 percent of the nation's fourth-, eighth-, and twelfth-grade students attend public schools. The remainder attend Catholic and other private schools (i.e., nonpublic schools). Figure 5 displays science achievement level attainment by type of school students attend.

At all grade levels in 1996, students attending nonpublic schools attained higher achievement levels than those attending public schools. However, the relationship between school type and achievement level attainment was less pronounced at grades 8 and 12 than at grade 4.

At grade 4, the percentages of students at or above all three achievement levels -- *Advanced*, *Proficient*, and *Basic* -- were greater for students attending nonpublic schools than for students attending public schools. Also at grade 4, students attending both Catholic and other nonpublic schools outperformed students attending public schools at the *Basic* and *Proficient* levels. At grade 8, there were significant differences between the percentages of student at or above the *Basic* and *Proficient* levels for student attending nonpublic schools than for students attending public schools. In addition, grade 8 Catholic school students performed significantly better than public school students at the *Basic* and *Proficient* levels. Similarly, grade 12 nonpublic school students outperformed public school students at the *Basic* level.

Caution should be taken not to use these comparisons to make simplistic inferences about the relative effectiveness of public and nonpublic schools. Differences in achievement level attainment by students in public and nonpublic schools may be related in part to socioeconomic or sociological factors, such as parental education or parents' involvement in their children's education.

Participation in Title I

The Improving America's Schools Act of 1994[3] reauthorized the Elementary and Secondary Education Act of 1965 (ESEA). Title I, Part A, of ESEA provides local education agencies with financial assistance to meet the educational needs of children performing below grade level and who are economically disadvantaged.[4]

Title I programs are designed to help disadvantaged students meet challenging academic performance standards. They assist schools in improving teaching and learning and in providing students with opportunities to acquire the knowledge and skills outlined in their state's curriculum content and performance standards. Typically, Title I funds are used for reading and mathematics. All children in schools located in high-poverty areas may benefit from participation in schoolwide Title I programs. Title I funding supports state and local education reform efforts and promotes the coordination of resources to improve education for all students. Nationally, 22 percent of fourth-grade students and 12 percent of eighth-grade students received Title I services during the 1995-96 academic year. As Table 7 indicates, smaller percentages of these students attained higher achievement levels compared with other students. Because the program targets students performing below grade level, these results are not surprising.

At grades 4 and 8, greater percentages of students who were not currently receiving Title I services were at or above the *Basic*, *Proficient*, and *Advanced* levels than was true of students who were receiving Title I services. At grade 12, a greater percentage of students who were not currently receiving Title I services was at or above the *Basic* level than was true of students who were receiving Title I services.

Title I information collected by NAEP refers to current participation in Title I programs. Thus, students who participated in such services in the past but who do not currently receive services are not identified as Title I participants. Differences in achievement levels between students who receive Title I services and those who do not should not be used as an evaluation of Title I programs. Typically, Title I services are intended for low-achieving students. To properly evaluate Title I programs, the performance of students participating in them must be monitored and assessed over time.

Eligibility for Free or Reduced-Price Lunch Program

The free or reduced-price lunch component of the National School Lunch Program offered through the U.S. Department of Agriculture is designed to ensure that children near or below the poverty level receive nourishing meals.[5] This program is available to students attending public schools, nonprofit private schools, and residential child care institutions. Eligibility for free or reduced-price meals is determined through the USDA's Income Eligibility Guidelines. NAEP includes eligibility for the free or reduced-price lunch program as an indicator of poverty.

As Table 8 shows, the nation's poorest fourth-, eighth-, and twelfth-grade students (i.e., those who were eligible for the free or reduced-price lunch program) attained lower achievement levels than students who were not eligible.

Specifically, in grades 4 and 8, lower percentages of students who were eligible to receive free or reduced-price lunch attained the *Basic*, *Proficient*, or *Advanced* levels of performance. At grade 12, this same pattern prevailed for the *Basic* and *Proficient* levels.

Summary

The preceding sections provide a detailed picture of achievement levels attained by students in various subgroups, defined by region, gender, race and ethnicity, level of parental education, type of school, Title I participation, and eligibility for the free or reduced-price lunch program. Although results differed slightly by grade and achievement level, the following major findings emerged:

- Nationally, 29 percent of students in grades 4 and 8 were at or above the *Proficient* level.
- Twenty-one percent of students in grade 12 were at or above the *Proficient* level.
- Nationally, approximately 70 percent of students in grade 4 were at the *Basic* level, while nearly 60 percent of students in grades 8 and 12 reached this level.
- No significant differences in percentages of males and females achievement level attainment occurred in grade 8. However, at grade 12, greater percentages of males than females performed at or above the *Advanced*, *Proficient*, and *Basic* levels.
- Significant differences in attainment of achievement levels by racial and ethnic groups were evident at all grade levels, especially in comparisons of Whites with Hispanics and Whites with Blacks.
- At all three grades, higher levels of parental education were associated with significantly higher achievement level attainments.
- On average, students in Title I programs and those eligible for the free or reduced-price lunch program attained significantly lower achievement levels than students not participating in these programs.

Tables – National and Regional Comparisons

Table 3 Average Score and Percentage Attaining Science Achievement Levels by Region

	Average Scores	Advanced	At or Above Proficient	At or Above Basic	Below Basic
Grade 4					
Nation	150	3	29	67	33
Northeast	156	4	36	74	26
Southeast	143	2	23	57	43
Central	156	4	34	74	26
West	146	2	24	63	37
Grade 8					
Nation	150	3	29	61	39
Northeast	151	3	30	62	38
Southeast	143	2	22	53	47
Central	156	5	35	68	32
West	149	3	28	61	39
Grade 12					
Nation	150	3	21	57	43
Northeast	154	4	26	60	40
Southeast	142	1	14	47	53
Central	158	4	28	67	33
West	147	2	17	54	46

SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Science Assessment

Table 4 Average Score and Percentage Attaining Science Achievement Levels by Gender

	Average Scores	Advanced	At or Above Proficient	At or Above Basic	Below Basic
Grade 4					
All Students	150	3	29	67	33
Male	151	3	31	68	32
Female	149	3	27	67	33
Grade 8					
All Students	150	3	29	61	39
Male	151	4	31	62	38
Female	149	3	27	61	39
Grade 12					
All Students	150	3	21	57	43
Male	152	4	25	60	40
Female	148	1	17	55	45

SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Science Assessment

Table 5 Percentage Attaining Science Achievement Levels by Race/Ethnicity

	Advanced	At or Above Proficient	At or Above Basic	Below Basic
Grade 4				
All Students	3	29	67	33
White	4	37	79	21
Black	0	7	34	66
Hispanic	0	9	42	58
Asian/Pacific Islander	4	29	66	34
American Indian	2	26	59	41
Grade 8				
All Students	3	29	61	39
White	4	37	73	27
Black	0	5	24	76
Hispanic	0	11	36	64
Asian/Pacific Islander	3	30	62	38
American Indian	2	24	60	40
Grade 12				
All Students	3	21	57	43
White	3	27	68	32
Black	0	4	23	77
Hispanic	1	7	33	67
Asian/Pacific Islander	3	22	56	44
American Indian	0	10	52	48

SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Science Assessment

Table 6 Average Score and Percentage Attaining Science Achievement Levels by Parents' Highest Education Level

	Average Scores	Advanced	At or Above Proficient	Below Basic	Basic
Grade 4					
All Students	150	3	29	67	33
Did Not Finish High School	136	0	12	52	48
Graduated from High School	146	2	23	64	36
Some Education after High School	155	3	35	75	25
Graduated from College	158	5	39	74	26
I Don't Know	144	2	20	60	40
Grade 8					
All Students	150	3	29	61	39
Did Not Finish High School	131	0	10	39	61
Graduated from High School	140	1	18	49	51
Some Education after High School	155	3	33	69	31
Graduated from College	159	5	39	72	28
I Don't Know	134	0	13	41	59
Grade 12					
All Students	150	3	21	57	43
Did Not Finish High School	123	0	3	25	75
Graduated from High School	140	1	12	43	57
Some Education after High School	151	2	19	59	41
Graduated from College	160	4	30	69	31
I Don't Know	116	0	4	17	83

SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Science Assessment

Table 7 Average Score and Percentage Attaining Science Achievement Levels by Title I Participation

	Average Scores	Advanced	At or Above Proficient	At or Above Basic	Below Basic
Grade 4					
All Students	150	3	29	67	33
Participated	126	0	7	36	64
Did Not Participate	157	4	35	76	24
Grade 8					
All Students	150	3	29	61	39
Participated	126	1	9	33	67
Did Not Participate	153	3	32	65	35
Grade 12					
All Students	150	3	21	57	43
Participated	118	0	3	19	81
Did Not Participate	151	3	22	58	42

SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Science Assessment

Table 8 Average Score and Percentage Attaining Science Achievement Levels by Eligibility for Free or Reduced-Lunch Program

	Average Scores	Advanced	At or Above Proficient	At or Above Basic	Below Basic
Grade 4					
All Students	150	3	29	67	33
Not Eligible	159	4	36	78	22
Eligible	133	1	13	46	54
Information Not Available	161	6	42	78	22
Grade 8					
All Students	150	3	29	61	39
Not Eligible	156	3	34	69	31
Eligible	133	1	14	39	61
Information Not Available	156	5	36	69	31
Grade 12					
All Students	150	3	21	57	43
Not Eligible	154	3	23	62	38
Eligible	125	0	7	28	72
Information Not Available	150	3	22	56	44

SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Science Assessment

Endnotes – National and Regional Comparisons

1 It was not possible to accurately estimate the standard error associated with the percentage of Blacks and American Indians at or above the *Advanced* level for all three grades, and for Hispanics at or above *Advanced* in grade 4. Therefore, differences between these groups and other racial/ethnic groups for these grades and achievement levels are not discussed.

2 McKenzie, F. D., "Educational Strategies for the 1990's," in *The state of Black America* (New York: National Urban League, Inc., 1991); Swinton, D. H., "The Economic Status of African Americans: Permanent Poverty and Inequity," in *The state of Black America* (New York: National Urban League, Inc., 1991).

3 Public Law 103-382. (1994). Improving America's schools act. Washington, DC.

4 U.S. Department of Education, Office of Elementary and Secondary Compensatory Education Programs, *Improving basic programs operated by local education agencies* (Washington, DC: U.S. Department of Education, 1996).

5 U.S. General Services Administration, *Catalog of federal domestic assistance* (Washington, DC: Executive Office of the President, Office of Management and Budget, 1995).

6 It was not possible to accurately estimate the standard error associated with the percentage of eligible students at or above the *Advanced* level for grade 12. Therefore, differences between eligible and non-eligible groups at the *Advanced* level for grade 12 are not discussed.

State Comparisons

The NAEP 1996 Science Assessment gathered detailed information about the science knowledge and skills of the nation's fourth-, eighth-, and twelfth-grade students. In addition, state-level data were collected at grade 8 in 43 states, the District of Columbia, Guam, the Department of Defense Domestic Dependent Elementary and Secondary Schools (DDESS), and the overseas Department of Defense Dependents Schools (DoDDS). Throughout this report the terms states and jurisdictions are used interchangeably to refer to participants in the state NAEP program, even though some participants are political units, such as a territory (Guam) or a district (District of Columbia).

As Table 9 indicates, three states did not obtain participation from at least 70 percent of the public schools in their initial samples and thus failed to meet the minimum participation requirement. Therefore, data for these states are not reported here. Ten additional states met the 70-percent requirement, but did not satisfy one or more of the guidelines for public school participation rates; their data are reported with appropriate annotation. See Appendix A of the NAEP 1996 Science Report for a full discussion of the participation guidelines.

This chapter presents detailed descriptions of 1996 grade-8 science achievement levels for the states and for major subpopulations (gender, race and ethnicity, etc). The findings show a number of consistent patterns. At grade 8, large differences in achievement level attainment exist among racial and ethnic groups. Also, at grade 8, higher levels of parental education are generally associated with attainment of higher achievement levels. Finally, at grade 8, groups of students who may be low in socioeconomic status or otherwise at risk -- specifically, those receiving Title I services and those eligible for free or reduced-price lunches -- attain lower achievement levels than other students.

State Results

Table 10 contains achievement level data for 40 states, the District of Columbia, Guam, DoDDS, and DDESS. In addition to the average score for each jurisdiction, Table 10 shows the percentage of eighth-grade students at the *Advanced* level, at or above the *Proficient* level, at or above the *Basic* level, and below the *Basic* level. As a basis for comparison, achievement for only public school students in the nation has been included in each Table and Figure. These values differ slightly from the national results in Chapter 2 which includes both public and nonpublic school students in the national estimates.

Figure 6 displays the national and state results according to the percentages of eighth-grade public school students who were at the *Advanced* level and at or above the *Proficient* level. The rank order is by the percentages of students at or above *Proficient*.

Comparisons can be made between the state-by-state and national results. Figure 7 shows the states where the percentages of students at or above the *Proficient* level were at, above, or below the percentage in the nation.

In 16 of the 44 jurisdictions, as Figure 7 shows, the percentages of eighth-grade public school students at or above the *Proficient* level were significantly higher than the percentage at or above this level for the nation. In 17 jurisdictions, smaller percentages of students achieved this level, while the percentages of students achieving this level in the remaining 11 jurisdictions were not significantly different from the percentage of students achieving at this level nationwide. There is considerable variability in achievement level results among the states, from the states with the highest percentages at or above *Proficient* (Maine, Montana, and North Dakota) to the lowest performing jurisdictions (Guam and the District of Columbia).

Performance of Selected Subgroups within States

The following sections of this chapter report state-level results for eighth-grade students in selected demographic subgroups. The subgroups are classified by gender, race and ethnicity, highest level of parental education, type of school, Title I participation, and eligibility for the free or reduced-price lunch program. The results from the 1996 Science Assessment are consistent with NAEP results in other subjects, in that achievement level attainment across subgroups varies considerably.

Gender

Table 11 shows percentages of students at each achievement level for all students and for males and females. At the national level, no significant gender differences in achievement level attainment are found at grade 8. However, in 13 jurisdictions -- Arkansas, Georgia, Louisiana, Massachusetts, Michigan, Minnesota, Nebraska, New Mexico, New York, Texas, Utah, Washington, and DDESS -- significant gender differences in achievement level attainment of eighth-grade students occur. The most pronounced differences appear at the *Proficient* level, at which the percentages of males at or above this level are significantly greater than the percentages of females in 12 of 43 jurisdictions. In two jurisdictions (Michigan and Utah), the percentages of males at all three achievement levels exceed the percentages of females. In five jurisdictions (Michigan, Nebraska, New York, Utah, and Washington), the percentages of males at the *Advanced* level exceed the percentages of females.

Race/Ethnicity

How does the achievement level attainment of students from different racial and ethnic groups compare? Achievement level attainment of eighth-grade students by state is presented in Table

12. Results for the following racial and ethnic categories are reported: White, Black, Hispanic, Asian/Pacific Islander, and American Indian. Students' racial and ethnic classification was based on information gathered from their answers to student background questionnaires.

Significant differences in achievement level attainment of students in the racial and ethnic groups occur in all jurisdictions. The largest differences occur between White and Black students and between White and Hispanic students.

In three-quarters of the reporting jurisdictions, the percentages of Whites at or above the *Proficient* level are significantly greater than the percentages of Blacks. In more than 90 percent of the jurisdictions, the percentages of Whites at or above the *Proficient* level are significantly greater than the percentages of Hispanics. The results are similar at the *Basic* level. In about three-quarters of the jurisdictions, the percentages of White students at or above the *Basic* level are greater than those for Black students. In almost all jurisdictions, larger percentages of White students than Hispanic students are at or above the *Basic* level.

In some cases, comparisons among groups could not be made because data did not meet statistical criteria. Often, the reporting sample was not large enough to draw inferences. For instance, the White population in the District of Columbia is too small to make valid White-Black and White-Hispanic comparisons.

Differences in students' achievement level attainment must be interpreted with caution. Factors such as socioeconomic status, home environment, and available educational opportunities can influence achievement level attainment and must be considered when any comparison is made.[1]

Parents' Highest Education Level

Students who participated in the NAEP Science Assessment indicated the highest level of education attained by each parent, using the following categories: Did Not Finish High School, Graduated from High School, Some Education after High School, Graduated from College, and "I Don't Know." The highest educational level reported for either parent determined students' classifications in this subgroup. For example, if a student reported that one parent graduated from college and the other from high school, that student's achievement level attainment appears in the Graduated from College subgroup. Nationally, 34 percent of fourth-grade students, 9 percent of eighth-grade students, and 3 percent of twelfth-grade students reported not knowing the educational level of either parent.

The patterns observed in the state data reflect those observed in the national data. As Table 13 indicates, in the majority of the jurisdictions, greater percentages of students whose parents graduated from college achieved at or above the *Basic* and *Proficient* levels than the percentages of students whose parents did not finish high school. Furthermore, in a majority of jurisdictions, higher percentages of students whose parents have some education following high

school graduation achieved at or above the *Basic* and *Proficient* levels than the percentages of students whose parents did not have postsecondary education.

Type of School

Approximately 90 percent of the nation's eighth-grade students attend public schools. The remainder attend Catholic and other private schools (i.e., nonpublic schools). Table 14 displays science achievement level attainment by type of school. Nineteen jurisdictions met the minimum participation criteria for reporting their nonpublic sample data separately; the remaining 25 are not included in Table 14.

At grade 8, in 11 of the 19 reporting states, students attending nonpublic schools attained higher achievement levels than those attending public schools.

There were no significant differences between grade 8 public and non-public percentages of students attaining the achievement levels in Georgia, Iowa, Massachusetts, Michigan, New York, North Dakota, and Washington. However, five jurisdictions (Arkansas, Louisiana, Missouri, Montana, and Guam) attained higher percentages at both the *Basic* and *Proficient* levels. California, Kentucky, Minnesota, Nebraska, New Mexico, Texas, and Vermont showed higher performance for nonpublic over public schools at the *Basic* level only.

The reader is cautioned against using these data to make simplistic inferences about the relative effectiveness of public and nonpublic schools. Differences in achievement level attainment by students in these two types of schools may be partly related to socioeconomic or sociological factors such as parental education or parental involvement in their children's education.

Participation in Title I

The Improving America's Schools Act of 1994 (P.L. 103-382) reauthorized the Elementary and Secondary Education Act of 1965. Title I, Part A of the act provides local education agencies with financial assistance to meet the educational needs of children performing below grade level and are economically disadvantaged.[2]

Title I programs are designed to help disadvantaged students meet challenging academic performance standards. They assist schools in improving teaching and learning and in providing students with opportunities to acquire the knowledge and skills outlined in their state's curriculum content and performance standards. Typically, Title I funds are used for reading and mathematics. All children in schools located in high-poverty areas may benefit from participation in schoolwide Title I programs. Title I funding supports state and local education reform efforts and promotes the coordination of resources to improve education for all students. Nationally, 12 percent of eighth-grade students received Title I services during the

1995-96 academic year. As Table 15 shows, smaller percentages of these students than other students attained higher achievement levels. Because the program targets students performing below grade level, these results are not surprising.

At grade 8, 33 jurisdictions contained sufficient samples of students who participated in Title I to allow comparisons between those who received Title I services and those who did not. In all states reporting data, the percentages of students who did not receive Title I services and who were at or above the *Basic* level were greater than those of students who received Title I services. The results were similar at the *Proficient* level.

Title I information collected by NAEP refers to current participation in the programs. Thus, students who received these services in the past but who did not receive services at the time of the assessment are not identified as Title I participants. Differences in achievement level attainment between students who receive Title I services and those who do not should not be used to evaluate Title I programs. Typically, Title I services are intended for low-achieving students. To properly evaluate Title I programs, the performance of students participating in the programs must be monitored and assessed over time.

Eligibility for Free or Reduced-Price Lunch Program

The free or reduced-price lunch component of the NSLP offered through the USDA is designed to ensure that children near or below the poverty level receive nourishing meals.[3] The program is available to students attending public schools, nonprofit private schools, and residential child care institutions. Eligibility for free or reduced-price meals is determined by the USDA's Income Eligibility Guidelines. NAEP includes eligibility for the free or reduced-price lunch program as an indicator of poverty.

Table 16 shows that in the jurisdictions as in the nation, lower percentages of eighth-grade students who are eligible for the free or reduced-price lunch program attained the *Basic* or *Proficient* levels than percentages of students who are not eligible.

Summary

The preceding sections provide a detailed picture of achievement levels attained by eighth-grade students within states and in various subgroups defined by gender, race and ethnicity, highest level of parental education, type of school, Title I participation, and eligibility for the free or reduced-price lunch program. Although results differed slightly by achievement level, the following major findings emerged:

- On average, significant differences between males and females were found in about one-fifth of the jurisdictions at grade 8. These differences were particularly evident at

the *Proficient* level, with 28 percent of the jurisdictions showing significant gender differences.

- Many participating states showed wide differences in performance between Whites and Blacks, as well as Whites and Hispanics, with the majority group outperforming the minorities.
- Higher levels of parent education were generally associated with higher performance, with the highest percentages of students achieving at or above the *Proficient* level found among those reporting parents who had graduated from college.
- Of the states reporting nonpublic school achievement, about 60 percent showed higher percentages of students reaching the *Basic* level than grade 8 public schools, while 21 percent showed similar differences at the *Proficient* level.
- In both the Title I and free or reduced-price lunch subgroups, student participation in these programs was generally associated with lower percentages of students achieving at the *Basic* and *Proficient* levels.

Tables – State Comparisons

Table 9 Jurisdictions Participating in the NAEP 1996 State Assessment Program in Science

Alabama	Kentucky	New Mexico	Wisconsin*
Alaska*	Louisiana	New York*	Wyoming
Arizona	Maine	North Carolina	Guam
Arkansas*	Maryland*	North Dakota	DoDDS
California	Massachusetts	Oregon	DDESS
Colorado	Michigan*	Rhode Island	
Connecticut	Minnesota	South Carolina*	
Delaware	Mississippi	Tennessee	
District of Columbia	Missouri	Texas	
Florida	Montana*	Utah	
Georgia	Nebraska	Vermont*	
Hawaii	Nevada ‡	Virginia	
Indiana	New Hampshire ‡	Washington	
Iowa*	New Jersey ‡	West Virginia	

* Indicates that the state did not satisfy one or more of the guidelines for public school participation rates
‡ Failed to meet initial school participation rate of 70 percent for public schools; public school results not reported

Table 10 Average Score and Percentage of Grade 8 Public School Students Attaining 1996 Science Achievement Levels

	Average Score	Advanced	At or Above Proficient	At or Above Basic	Below Basic
Nation	148	3	27	60	40
Alabama	139	1	18	47	53
Alaska*	153	3	31	65	35
Arizona	145	2	23	55	45
Arkansas*	144	1	22	55	45
California	138	1	20	47	53
Colorado	155	2	32	68	32
Connecticut	155	3	36	68	32
Delaware	142	1	21	51	49
District of Columbia	113	0	5	19	81
Florida	142	1	21	51	49
Georgia	142	1	21	49	51
Hawaii	135	1	15	42	58
Indiana	153	2	30	65	35
Iowa*	158	3	36	71	29
Kentucky	147	2	23	58	42
Louisiana	132	1	13	40	60
Maine	163	4	41	78	22
Maryland*	145	2	25	55	45
Massachusetts	157	4	37	69	31
Michigan*	153	3	32	65	35
Minnesota	159	3	37	72	28
Mississippi	133	1	12	39	61
Missouri	151	2	28	64	36
Montana*	162	3	41	77	23
Nebraska	157	3	35	71	29
New Mexico	141	1	19	49	51
New York*	146	2	27	57	43
North Carolina	147	2	24	56	44
North Dakota	162	3	41	78	22
Oregon	155	3	32	68	32
Rhode Island	149	2	26	59	41
South Carolina*	139	1	17	45	55
Tennessee	143	2	22	53	47
Texas	145	1	23	55	45
Utah	156	2	32	70	30
Vermont*	157	3	34	70	30
Virginia	149	2	27	59	41
Washington	150	2	27	61	39
West Virginia	147	1	21	56	44
Wisconsin*	160	4	39	73	27
Wyoming	158	2	34	71	29
Guam	120	0	7	28	72
DDESS	153	2	27	65	35
DoDDS	155	2	31	68	32

* Indicates that the state did not satisfy one or more of the guidelines for school participation rates
DoDDS: Department of Defense Dependents Schools (Overseas)
DDESS: Department of Defense Domestic Dependent Elementary and Secondary Schools
SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Science Assessment

Table 11 Percentage of Grade 8 Public School Students Attaining 1996 Science Achievement Levels by Gender

	All Students				Male				Female			
	A	≥ P	≥ B	< B	A	≥ P	≥ B	< B	A	≥ P	≥ B	< B
Nation	3	27	60	40	3	29	60	40	2	26	59	41
Alabama	1	18	47	53	1	19	48	52	1	17	47	53
Alaska*	3	31	65	35	4	35	66	34	1	27	63	37
Arizona	2	23	55	45	2	25	57	43	1	20	52	48
Arkansas*	1	22	55	45	2	26	58	42	1	18	51	49
California	1	20	47	53	2	21	50	50	1	18	44	56
Colorado	2	32	68	32	3	35	70	30	2	30	66	34
Connecticut	3	36	68	32	4	37	67	33	3	35	68	32
Delaware	1	21	51	49	2	23	53	47	1	19	49	51
District of Columbia	0	5	19	81	0	6	20	80	0	4	17	83
Florida	1	21	51	49	2	23	54	46	1	18	47	53
Georgia	1	21	49	51	2	24	51	49	1	17	48	52
Hawaii	1	15	42	58	1	16	43	57	0	14	42	58
Indiana	2	30	65	35	3	32	64	36	1	28	65	35
Iowa*	3	36	71	29	3	37	72	28	2	35	70	30
Kentucky	2	23	58	42	2	25	58	42	1	21	57	43
Louisiana	1	13	40	60	1	17	45	55	0	10	36	64
Maine	4	41	78	22	5	45	79	21	3	38	76	24
Maryland*	2	25	55	45	2	26	55	45	1	24	55	45
Massachusetts	4	37	69	31	5	40	71	29	3	33	67	33
Michigan*	3	32	65	35	4	36	68	32	2	29	61	39
Minnesota	3	37	72	28	4	40	74	26	2	33	70	30
Mississippi	1	12	39	61	1	14	41	59	0	11	38	62
Missouri	2	28	64	36	2	31	65	35	2	25	62	38
Montana*	3	41	77	23	4	44	79	21	2	37	76	24
Nebraska	3	35	71	29	4	39	73	27	2	30	69	31
New Mexico	1	19	49	51	2	23	53	47	0	16	46	54
New York*	2	27	57	43	4	31	59	41	1	23	54	46
North Carolina	2	24	56	44	2	26	59	41	1	22	53	47
North Dakota	3	41	78	22	4	44	77	23	2	37	78	22
Oregon	3	32	68	32	4	35	70	30	2	29	65	35
Rhode Island	2	26	59	41	2	28	61	39	1	24	57	43
South Carolina*	1	17	45	55	2	20	48	52	1	15	42	58
Tennessee	2	22	53	47	2	24	55	45	1	20	51	49
Texas	1	23	55	45	2	27	57	43	1	20	53	47
Utah	2	32	70	30	3	37	73	27	1	27	68	32
Vermont*	3	34	70	30	3	36	70	30	2	32	70	30
Virginia	2	27	59	41	2	28	61	39	2	26	57	43
Washington	2	27	61	39	3	30	63	37	1	23	59	41
West Virginia	1	21	56	44	1	22	57	43	1	19	56	44
Wisconsin*	4	39	73	27	5	43	74	26	3	35	72	28
Wyoming	2	34	71	29	2	35	73	27	2	32	70	30
Guam	0	7	28	72	0	8	29	71	0	7	27	73
DDESS	2	27	65	35	2	32	71	29	2	21	58	42
DoDDS	2	31	68	32	2	33	71	29	2	29	66	34

Note: A = Advanced, ≥ P = At or Above Proficient, ≥ B = At or Above Basic, < B = Below Basic
* Indicates that the state did not satisfy one or more of the guidelines for school participation rates
DoDDS: Department of Defense Dependents Schools (Overseas)
DDESS: Department of Defense Domestic Dependent Elementary and Secondary Schools
SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Science Assessment

Table 12 Percentage of Grade 8 Public School Students Attaining 1996 Science Achievement Levels by Race/Ethnicity

	All Students				White Students				Black Students			
	A	≥ P	≥ B	< B	A	≥ P	≥ B	< B	A	≥ P	≥ B	< B
Nation	3	27	60	40	4	36	72	28	0	4	23	77
Alabama	1	18	47	53	1	25	63	37	0	4	19	81
Alaska*	3	31	65	35	4	39	74	26	***	***	***	***
Arizona	2	23	55	45	3	33	71	29	0	7	24	76
Arkansas*	1	22	55	45	2	29	67	33	0	3	17	83
California	1	20	47	53	2	33	69	31	0	5	28	72
Colorado	2	32	68	32	3	40	77	23	1	16	51	49
Connecticut	3	36	68	32	4	44	79	21	0	5	24	76
Delaware	1	21	51	49	2	28	64	36	0	6	26	74
District of Columbia	0	5	19	81	***	***	***	***	0	3	16	84
Florida	1	21	51	49	2	32	67	33	0	4	21	79
Georgia	1	21	49	51	2	31	67	33	0	5	24	76
Hawaii	1	15	42	58	1	23	55	45	0	9	37	63
Indiana	2	30	65	35	2	34	71	29	0	8	27	73
Iowa*	3	36	71	29	3	38	73	27	1	6	32	68
Kentucky	2	23	58	42	2	25	62	38	0	6	30	70
Louisiana	1	13	40	60	1	21	58	42	0	3	16	84
Maine	4	41	78	22	4	43	79	21	***	***	***	***
Maryland*	2	25	55	45	3	38	74	26	0	5	26	74
Massachusetts	4	37	69	31	4	41	77	23	0	9	28	72
Michigan*	3	32	65	35	3	39	75	25	0	6	23	77
Minnesota	3	37	72	28	3	40	76	24	0	9	33	67
Mississippi	1	12	39	61	1	22	60	40	0	3	19	81
Missouri	2	28	64	36	3	34	73	27	0	3	22	78
Montana*	3	41	77	23	3	45	83	17	***	***	***	***
Nebraska	3	35	71	29	3	38	76	24	0	7	30	70
New Mexico	1	19	49	51	2	36	74	26	***	***	***	***
New York*	2	27	57	43	4	39	75	25	0	4	21	79
North Carolina	2	24	56	44	2	33	70	30	0	6	28	72
North Dakota	3	41	78	22	3	43	80	20	***	***	***	***
Oregon	3	32	68	32	3	34	72	28	***	***	***	***
Rhode Island	2	26	59	41	2	31	68	32	0	7	31	69
South Carolina*	1	17	45	55	3	29	65	35	0	4	22	78
Tennessee	2	22	53	47	2	26	61	39	0	5	22	78
Texas	1	23	55	45	3	38	77	23	0	6	28	72
Utah	2	32	70	30	2	34	74	26	***	***	***	***
Vermont*	3	34	70	30	3	36	72	28	***	***	***	***
Virginia	2	27	59	41	3	36	72	28	0	6	27	73
Washington	2	27	61	39	3	31	68	32	0	6	31	69
West Virginia	1	21	56	44	1	22	59	41	0	4	23	77
Wisconsin*	4	39	73	27	5	44	81	19	0	5	17	83
Wyoming	2	34	71	29	2	37	77	23	***	***	***	***
Guam	0	7	28	72	3	23	49	51	***	***	***	***
DDESS	2	27	65	35	4	39	77	23	0	8	43	57
DoDDS	2	31	68	32	4	42	80	20	0	13	47	53

Note: A = Advanced, ≥ P = At or Above Proficient, ≥ B = At or Above Basic, < B = Below Basic
* Indicates that the state did not satisfy one or more of the guidelines for school participation rates
*** Sample size is insufficient to permit a reliable estimate
DoDDS: Department of Defense Dependents Schools (Overseas)
DDESS: Department of Defense Domestic Dependent Elementary and Secondary Schools
SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Science Assessment

Table 12 Percentage of Grade 8 Public School Students Attaining 1996 Science Achievement Levels by Race/Ethnicity (continued)

	Hispanic Students				Asian/Pacific Islander Students				American Indian Students			
	A	≥ P	≥ B	< B	A	≥ P	≥ B	< B	A	≥ P	≥ B	< B
Nation	0	10	35	65	2	27	59	41	3	24	59	41
Alabama	0	7	20	80	***	***	***	***	***	***	***	***
Alaska*	2	12	45	55	1	29	66	34	1	13	38	62
Arizona	0	8	32	68	***	***	***	***	3	6	22	78
Arkansas*	0	9	32	68	***	***	***	***	***	***	***	***
California	0	6	26	74	3	27	58	42	***	***	***	***
Colorado	0	12	43	57	3	39	64	36	0	21	49	51
Connecticut	0	7	29	71	4	45	72	28	***	***	***	***
Delaware	0	5	22	78	***	***	***	***	***	***	***	***
District of Columbia	0	3	13	87	***	***	***	***	***	***	***	***
Florida	0	9	35	65	***	***	***	***	***	***	***	***
Georgia	1	14	36	64	***	***	***	***	***	***	***	***
Hawaii	0	6	26	74	0	16	45	55	***	***	***	***
Indiana	0	15	45	55	***	***	***	***	***	***	***	***
Iowa*	0	16	49	51	***	***	***	***	***	***	***	***
Kentucky	0	9	19	81	***	***	***	***	***	***	***	***
Louisiana	0	7	22	78	***	***	***	***	***	***	***	***
Maine	0	16	47	53	***	***	***	***	***	***	***	***
Maryland*	0	8	28	72	6	38	73	27	***	***	***	***
Massachusetts	0	11	35	65	5	38	64	36	***	***	***	***
Michigan*	1	14	43	57	***	***	***	***	***	***	***	***
Minnesota	1	13	42	58	3	30	60	40	***	***	***	***
Mississippi	1	3	13	87	***	***	***	***	***	***	***	***
Missouri	0	12	39	61	***	***	***	***	***	***	***	***
Montana*	1	19	56	44	***	***	***	***	0	12	44	56
Nebraska	1	16	42	58	***	***	***	***	***	***	***	***
New Mexico	0	9	34	66	***	***	***	***	0	8	25	75
New York*	1	7	26	74	4	37	70	30	***	***	***	***
North Carolina	1	8	26	74	***	***	***	***	1	14	42	58
North Dakota	1	16	47	53	***	***	***	***	0	12	43	57
Oregon	1	13	38	62	2	35	72	28	1	21	50	50
Rhode Island	0	4	20	80	2	16	46	54	***	***	***	***
South Carolina*	0	7	28	72	***	***	***	***	***	***	***	***
Tennessee	0	3	20	80	***	***	***	***	***	***	***	***
Texas	0	8	33	67	2	34	72	28	***	***	***	***
Utah	0	13	39	61	1	17	53	47	***	***	***	***
Vermont*	0	16	45	55	***	***	***	***	***	***	***	***
Virginia	0	12	37	63	6	41	82	18	***	***	***	***
Washington	1	12	33	67	1	22	60	40	1	11	34	66
West Virginia	0	3	23	77	***	***	***	***	***	***	***	***
Wisconsin*	0	19	46	54	***	***	***	***	***	***	***	***
Wyoming	0	14	45	55	***	***	***	***	0	8	38	62
Guam	0	4	17	83	0	6	28	72	***	***	***	***
DDESS	1	20	63	37	***	***	***	***	***	***	***	***
DoDDS	1	20	57	43	1	33	71	29	***	***	***	***

Note: A = Advanced, ≥ P = At or Above Proficient, ≥ B = At or Above Basic, < B = Below Basic
* Indicates that the state did not satisfy one or more of the guidelines for school participation rates
*** Sample size is insufficient to permit a reliable estimate
DoDDS: Department of Defense Dependents Schools (Overseas)
DDESS: Department of Defense Domestic Dependent Elementary and Secondary Schools
SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Science Assessment

Endnotes – State Comparisons

1 McKenzie, F. D., "Educational Strategies for the 1990's" in *The state of Black America* (New York: National Urban League, Inc., 1991); Swinton, D. H., "The Economic Status of African Americans: Permanent Poverty and Inequity" in *The state of Black America* (New York: National Urban League, Inc., 1991).

2 U.S. Department of Education. Office of Elementary and Secondary Compensatory Education Programs, *Improving basic programs operated by local education agencies* (Washington, DC: U.S. Department of Education, 1996).

3 U.S General Services Administration, *Catalog of federal domestic assistance* (Washington, DC: Executive Office of the President, Office of Management and Budget, 1995).

Appendix A: Achievement Level Descriptions

Content Descriptions

Grade 4

1996 NAEP Science Achievement Level Descriptions	
Cut Score	**Content Descriptions***
	Grade 4
Basic 138	Students performing at the *Basic* level demonstrate some of the knowledge and reasoning required for understanding of the earth, physical, and life sciences at a level appropriate to Grade 4. For example, they can carry out simple investigations and read uncomplicated graphs and diagrams. Students at this level also show a beginning understanding of classification, simple relationships, and energy.
	Fourth-grade students performing at the *Basic* level are able to follow simple procedures, manipulate simple materials, make observations, and record data. They are able to read simple graphs and diagrams and draw reasonable but limited conclusions based on data provided to them. These students can recognize appropriate experimental designs, although they are unable to justify their decisions. When presented with diagrams, students at this level can identify seasons; distinguish between day and night; and place the position of the Earth, sun, and planets. They are able to recognize major energy sources and simple energy changes. In addition, they show an understanding of the relationship between sound and vibrations. These students are able to identify organisms by physical characteristics and group organisms with similar physical features. They can also describe simple relationships among structure, function, habitat, life cycles, and different organisms.
Proficient 170	Students performing at the *Proficient* level demonstrate the knowledge and reasoning required for understanding of the earth, physical, and life sciences at a level appropriate to Grade 4. For example, they understand concepts relating to the Earth's features, physical properties, and structure and function. In addition, student can formulate solutions to familiar problems as well as show a beginning awareness of issues associated with technology.
	Fourth-grade students performing at the *Proficient* level are able to provide an explanation of day and night when given a diagram. They can recognize major features of the Earth's surface and the impact of natural forces. They are also able to recognize water in its various forms in the water cycle and can suggest ways to conserve it. These students recognize that various materials possess different properties that make them useful. Students at this level are able to explain how structure and function help living things survive. They have a beginning awareness of the benefits and challenges associated with technology and recognize some human effects on the environment. They can also make straightforward predictions and justify their position.
Advanced 204	Students performing at the *Advanced* level demonstrate a solid understanding of the earth, physical, and life sciences as well as the ability to apply their understanding to practical situations at a level appropriate to Grade 4. For example, they can perform and critique simple investigations, make connections from one or more of the sciences to predict or conclude, and apply fundamental concepts to practical applications.
	Fourth-grade students performing at the *Advanced* level are able to combine information, data, and knowledge from one or more of the sciences to reach a conclusion or to make a valid prediction. They can also recognize, design, and explain simple experimental procedures. Students at this level recognize nonrenewable sources of energy. They also recognize that light and sound travel at different speeds. These students understand some principles of ecology and are able to compare and contrast life cycles of various common organisms. In addition, they have a developmental awareness of the benefits and challenges associated with technology.

* Shaded areas indicate summary of content descriptions

Grade 8

1996 NAEP Science Achievement Level Descriptions	
Cut Score	**Content Descriptions***
	Grade 8
Basic 143	Students performing at the *Basic* level demonstrate some of the knowledge and reasoning required for understanding of the earth, physical, and life sciences at a level appropriate to Grade 8. For example, they can carry out investigations and obtain information from graphs, diagrams, and tables. In addition, they demonstrate some understanding of concepts relating to the solar system and relative motion. Students at this level also have a beginning understanding of cause-and-effect relationships. Eighth-grade students performing at the *Basic* level are able to observe, measure, collect, record, and compute data from investigations. They can read simple graphs and tables and are able to make simple data comparisons. These students are able to follow directions and use basic science equipment to perform simple experiments. In addition, they have an emerging ability to design experiments. Students at this level have some awareness of causal relationships. They recognize the position of planets and their movement around the sun and know basic weather-related phenomena. These students can explain changes in position and motion such as the movement of a truck in relation to that of a car. They also have an emerging understanding of the interrelationships among plants, animals, and the environment.
Proficient 170	Students performing at the *Proficient* level demonstrate much of the knowledge and many of the reasoning abilities essential for understanding of the earth, physical, and life sciences at a level appropriate to Grade 8. For example, students can interpret graphic information, design simple investigations, and explain such scientific concepts as energy transfer. Students at this level also show an awareness of environmental issues, especially those addressing energy and pollution. Eighth-grade students performing at the *Proficient* level are able to create, interpret, and make predictions from charts, diagrams, and graphs based on information provided to them or from their own investigations. They have the ability to design an experiment and have an emerging understanding of variables and controls. These students are able to read and interpret geographic and topographic maps. In addition, they have an emerging ability to use and understand models, can partially formulate explanations of their understanding of scientific phenomena, and can design plans to solve problems. Students at this level can begin to identify forms of energy and describe the role of energy transformations in living and nonliving systems. They have knowledge of organization, gravity, and motions within the solar system and can identify some factors that shape the surface of the Earth. These students have some understanding of properties of materials and have an emerging understanding of the particulate nature of matter, especially the effect of temperature on states of matter. They also know that light and sound travel at different speeds and can apply their knowledge of force, speed, and motion. These students demonstrate a developmental understanding of the flow of energy from the sun through living systems, especially plants. They know that organisms reproduce and that characteristics are inherited from previous generations. These students also understand that organisms are made up of cells and that cells have subcomponents with different functions. In addition, they are able to develop their own classification system based on physical characteristics. These students can list some effects of air and water pollution as well as demonstrate knowledge of the advantages and disadvantages of different energy sources in terms of how they affect the environment and the economy.
Advanced 207	Students performing at the *Advanced* level demonstrate a solid understanding of the earth, physical, and life sciences as well as the abilities required to apply their understanding in practical situations at a level appropriate to Grade 8. For example, students perform and critique the design of investigations, relate scientific concepts to each other, explain their reasoning, and discuss the impact of human activities on the environment. Eighth-grade students performing at the *Advanced* level are able to provide an explanation for scientific results. They have a modest understanding of scale and are able to design a controlled experiment. These students have an understanding of models as representations of natural systems and can describe energy transfer in living and nonliving systems. Students at this level are able to understand that present physical clues, including fossils and geological formations, are indications that the Earth has not always been the same and that the present is a key to understanding the past. They have a solid knowledge of forces and motions within the solar system and an emerging understanding of atmospheric pressure. These students can recognize a wide range of physical and chemical properties of matter and some of their interactions and understand some of the properties of light and sound. Also, they can infer relationships between structure and function. These students know the differences between plant and animal cells and can apply their knowledge of food as a source of energy to a practical situation. In addition, they are able to explain the impact of human activities on the environment and the economy.

* Shaded areas indicate summary of content descriptions

Grade 12

1996 NAEP Science Achievement Level Descriptions	
Cut Score	**Content Descriptions***
	Grade 12
Basic 145	Students performing at the *Basic* level demonstrate some knowledge and certain reasoning abilities required for understanding of the earth, physical, and life sciences at a level appropriate to Grade 12. In addition, they demonstrate knowledge of the themes of science (models, systems, patterns of change) required for understanding the most basic relationships among the earth, physical, and life sciences. They are able to conduct investigations, critique the design of investigations, and demonstrate a rudimentary understanding of scientific principles.
	Twelfth-grade students performing at the *Basic* level are able to select and use appropriate simple laboratory equipment and write down simple procedures that others can follow. They also have a developmental ability to design complex experiments. These students are able to make classifications based on definitions such as physical properties and characteristics. Students at this level demonstrate a rudimentary understanding of basic models and can identify some parts of physical and biological systems. They are also able to identify some patterns in nature and rates of change over time. These students have the ability to identify basic scientific facts and terminology and have a rudimentary understanding of the scientific principles underlying such phenomena as volcanic activity, disease transmission, and energy transformation. In addition, they have some familiarity with the application of technology.
Proficient 178	Students performing at the *Proficient* level demonstrate the knowledge and reasoning abilities required for understanding of the earth, physical, and life sciences at a level appropriate to Grade 12. In addition, they demonstrate knowledge of the themes of science (models, systems, patterns of change) required for understanding how these themes illustrate essential relationships among the earth, physical, and life sciences. They are able to analyze data and apply scientific principles to everyday situations.
	Twelfth-grade students performing at the *Proficient* level are able to demonstrate a working ability to design and conduct scientific investigations. They are able to analyze data in various forms and utilize information to provide explanations and to draw reasonable conclusions. Students at this level have a developmental understanding of both physical and conceptual models and are able to compare various models. They recognize some inputs and outputs, causes and effects, and interactions of a system. In addition, they can correlate structure to function for the parts of a system that they can identify. These students also recognize that rate of change depends on initial conditions and other factors. They are able to apply scientific concepts and principles to practical applications and solutions for problems in the real world and show a developmental understanding of technology, its uses, and its applications.
Advanced 210	Students performing at the *Advanced* level demonstrate the knowledge and reasoning abilities required for a solid understanding of the earth, physical, and life sciences at a level appropriate to Grade 12. In addition, they demonstrate knowledge of the themes of science (models, systems, patterns of change) required for integrating knowledge and understanding of scientific principles from the earth, physical, and life sciences. Students can design investigations that answer questions about real-world situations and use their reasoning abilities to make predications.
	Twelfth-grade students performing at the *Advanced* level are able to design scientific investigations to solve complex, real-world situations. They can integrate, interpolate, and extrapolate information embedded in data to draw well-formulated explanations and conclusions. They are also able to use complex reasoning skills to apply scientific knowledge to make predictions based on conditions, variables, and interactions. Students at this level recognize the inherent strengths and limitations of models and can revise models based on additional information. They are able to recognize cause-and-effect relationships within systems and can utilize this knowledge to make reasonable predictions of future events. These students are able to recognize that patterns can be constant, exponential, or irregular and can apply this recognition to make predictions. They can also design a technological solution for a given problem.

* Shaded areas indicate summary of content descriptions

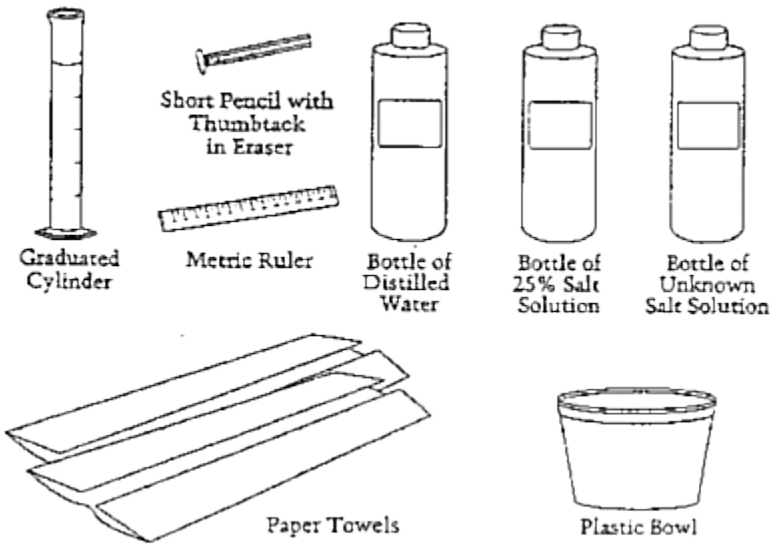
Appendix B: Grade 8 Hands-on Tasks

Salt Solutions

Estimating the Salt Concentration of an Unknown Salt Solution Using the "Floating Pencil Test"

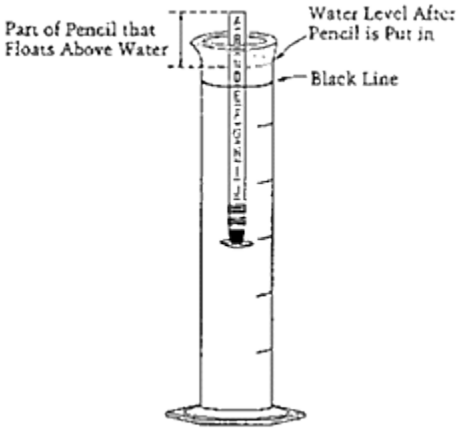
For this task, you have been given a kit that contains materials that you will use to perform an investigation during the next 30 minutes. Please open your kit now and use the following diagram to check that all of the materials in the diagram are included in your kit. If any materials are missing, raise your hand and the administrator will provide you with the materials that you need.

Every body of water in natural ecosystems has salts and other substances dissolved in it. The concentration of dissolved salt varies from less than 0.2 percent in most freshwater streams and lakes to about 3.5 percent in most of the world's oceans. In this task, you will observe and measure how much of the length of a pencil floats above the water surface in water with very **low** salt concentration and in water with very **high** salt concentration. You will then use the same procedures to estimate the salt concentration of an unknown solution. Follow the directions step-by-step and write your answers to the questions in the space provided in your booklet.



1. Open the plastic bottle labeled **Distilled Water**. The salt concentration of this water is very close to 0 percent. Pour the distilled water into the cylinder **up to the black line**. Put the cap back on the bottle.

   Now take the pencil and put it in the water in the cylinder, eraser-end down. Part of the pencil will float above the water, as shown in the picture below.



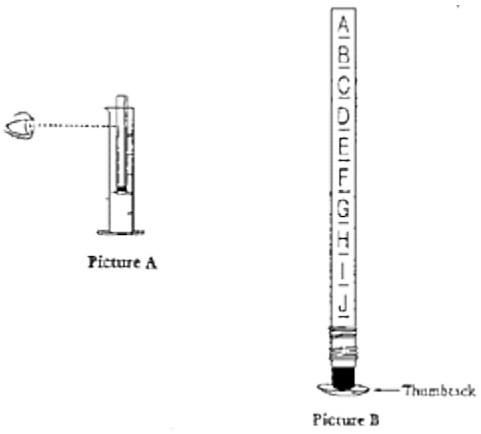
   Explain why the pencil floats when it is put in the water.

   _____

   _____

   _____

2. Look at the pencil in the water. There are letters along the side of the pencil. Make sure that the pencil is not touching the side of the cylinder. Note the exact level where the water surface meets the side of the pencil, as shown in Picture A. Then draw a line on Picture B where the **water surface** comes to on your pencil. This line will help you to remember where the water level came to on your pencil for the next step (3).



Picture A

Picture B

3. Now take the pencil out of the water and dry it with a paper towel. Use the ruler to measure the length of the pencil that was **above** the water. Record the length in Table 1 below under **Measurement 1**.

Table 1

	Length of Pencil Above Water Surface (cm)		
Type of Solution	Measurement 1	Measurement 2	Measurement 3
Distilled water			
Salt Solution			
Unknown Salt Solution			

4. Now place the pencil back in the distilled waster and repeat steps 2 and 3. Record your measurement in Table 1 under **Measurement 2**.
5. Calculate the average of Measurements 1 and 2 and record the result in the data table.

   (You can calculate the average by adding Measurement 1 + Measurement 2 and then dividing by two.)

   _____

6. Explain why it is better to measure the length of the pencil that was above the water more than once.

Now pour the distilled water out of the cylinder into the large plastic bowl. Later you will throw this water away.

Open the plastic bottle labeled **Salt Solution**. This solution contains 25% salt. Pour the salt solution into the cylinder **up to the black line**. Put the cap back on the bottle.

7. Now take the pencil and put it in the 25% salt solution in the cylinder, eraser-end down. How does the pencil float in this solution compared to how it floated in the distilled water? (Circle the letter in front of the correct answer.)

   A. In the salt solution, more of the pencil is above the surface.

   B. In the salt solution, more of the pencil is below the surface.

8. Now use the same procedure that you used with the pencil in the distilled water to obtain two measurements of the length of the pencil that floats above the surface of the 25% salt solution. Record these two measurements in Table 1. Then calculate the average and record this result in the table.
9. Why does the pencil float at a different level in the salt solution than in the distilled water?
10. If you added more salt to the 25% salt solution and stirred the solution until the salt was dissolved, how would this change the way the pencil floats? (Circle the letter in front of the correct answer.)

    A. Less of the pencil would be above the surface.

    B. More of the pencil would be above the surface.

    C. There would be no difference in the amount of the pencil above the surface.

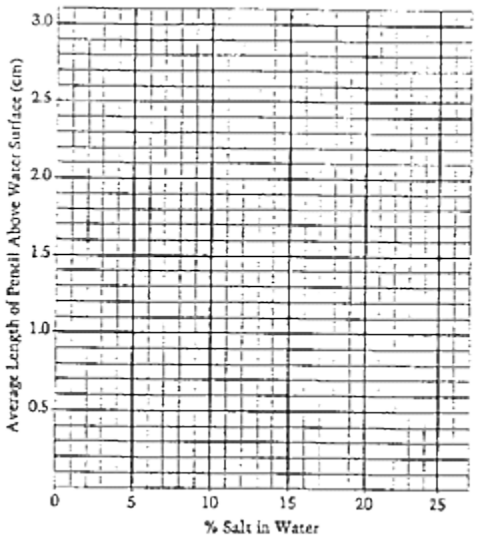
    Now pour the 25% salt solution out of the cylinder into the large plastic bowl. Later you will throw this solution away.

    Now open the plastic bottle labeled Unknown Salt Solution. You will now estimate the concentration of this unknown salt solution. Pour the unknown solution into the cylinder up to the black line. Put the cap back on the bottle.

11. Put the pencil in the solution in the cylinder, eraser-end down. Then repeat the same procedure that you used for the distilled water and the

25% salt solution. Obtain two measurements of the length of the pencil that floats above the surface of the unknown salt solution. Record these two measurements in Table 1. Then calculate the average and record this result in the table.

12. On the graph below, plot the average values you obtained for the distilled water and the 25% salt solution. Draw a straight line between the two data points. Assume that this line represents the relationship between the length of the pencil that is above the water surface and the concentration of salt in the water.



13. Based on the graph that you plotted, how does the length of the pencil that is above the surface change when the salt concentration changes? (Circle the letter in front of the correct answer.)

_____

A. It increases as the salt concentration increases.

B. It decreases as the salt concentration increases.

C. It remains constant as the salt concentration increases.

14. Based on the graph that you plotted, what is the salt concentration of the unknown solution?

Explain how you determined your answer.

_____

_____

_____

Cleaning Up

Use the paper towels to wipe up any spills. Be sure that the caps on the bottles are tightly closed. Then put the cylinder, the ruler, the pencil, and the bottles back into the large plastic bag. Someone will collect the paper towels and the bowl with the solutions in it.

Appendix C: Standard Error Tables

Achievement Level Results: National and Regional Comparisons

The comparisons presented in this report are based on statistical tests that consider the magnitude of the difference between group averages or percentages and the standard errors of those statistics. This Standard Error Tables appendix contains the standard errors for the averages and percentages discussed in Chapters 2 and 3.

Table C.1 -- 1996 Science Achievement Level Standard Errors -- Grade 4

Table C.1 1996 Science Achievement Level Standard Errors—Grade 4

	Average Scale Score	Advanced	At or Above Proficient	At or Above Basic	Below Basic
All Students	0.8	0.4	0.9	1.2	1.2
Region					
Northeast	1.8	0.9	2.3	2.4	2.4
Southeast	2.0	0.5	1.8	2.5	2.5
Central	2.1	0.6	2.0	3.2	3.2
West	2.0	0.6	2.2	3.0	3.0
Gender					
Male	0.9	0.5	1.1	1.4	1.4
Female	0.9	0.4	1.2	1.5	1.5
Race/Ethnicity					
White	0.9	0.5	1.3	1.3	1.3
Black	1.9	****	1.3	2.1	2.1
Hispanic	1.7	0.2	1.2	2.1	2.1
Asian/Pacific Islander	3.6	1.4	4.8	4.8	4.8
American Indian	3.8	****	4.4	4.8	4.8
Parents' Highest Education Level					
Did Not Finish High School	2.2	****	3.2	4.4	4.4
Graduated from High School	1.5	0.7	2.0	2.3	2.3
Some Education after High School	1.6	1.0	2.4	2.3	2.3
Graduated from College	1.0	0.6	1.4	1.4	1.4
I Don't Know	1.1	0.3	1.5	1.7	1.7
Type of School					
Public	0.9	0.4	1.1	1.3	1.3
Nonpublic	1.8	1.1	2.8	2.2	2.2
Catholic	1.9	0.9	3.4	2.3	2.3
Other Nonpublic	3.6	2.3	4.7	4.5	4.5
Participation in Title I					
Participated	1.9	0.2	1.5	2.6	2.6
Did Not Participate	1.0	0.5	1.2	1.4	1.4
Eligibility for Free/Reduced-Price Lunch Program					
Eligible	1.3	0.2	1.1	2.0	2.0
Not Eligible	0.9	0.5	1.4	1.4	1.4
Information Not Available	3.5	1.1	4.2	4.3	4.3

****Standard error cannot be accurately determined
SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Science Assessment

Table C.2 -- 1996 Science Achievement Level Standard Errors -- Grade 8

Table C.2 1996 Science Achievement Level Standard Errors—Grade 8

	Average Scale Score	Advanced	At or Above Proficient	At or Above Basic	Below Basic
All Students	0.9	0.5	1.3	1.1	1.1
Region					
Northeast	2.6	1.1	3.5	3.2	3.2
Southeast	1.9	0.3	1.8	2.6	2.6
Central	2.5	1.1	3.1	2.8	2.8
West	2.2	1.0	2.3	2.5	2.5
Gender					
Male	1.0	0.5	1.2	1.3	1.3
Female	1.1	0.6	1.7	1.4	1.4
Race/Ethnicity					
White	1.1	0.7	1.7	1.3	1.3
Black	1.1	****	0.8	1.7	1.7
Hispanic	1.7	****	1.1	2.2	2.2
Asian/Pacific Islander	3.1	1.7	3.7	4.0	4.0
American Indian	4.1	****	5.7	6.7	6.7
Parents' Highest Education Level					
Did Not Finish High School	1.9	****	1.8	3.1	3.1
Graduated from High School	1.5	0.5	1.7	2.2	2.2
Some Education after High School	1.1	0.9	2.2	1.6	1.6
Graduated from College	1.2	0.8	1.7	1.4	1.4
I Don't Know	2.4	****	2.6	4.0	4.0
Type of School					
Public	0.9	0.5	1.3	1.1	1.1
Nonpublic	2.5	1.2	3.5	3.2	3.2
Catholic	2.7	1.8	4.2	3.7	3.7
Other Nonpublic	4.2	1.5	5.3	5.3	5.3
Participation in Title I					
Participated	4.6	0.3	3.0	6.2	6.2
Did Not Participate	1.1	0.5	1.4	1.3	1.3
Eligibility for Free/Reduced-Price Lunch Program					
Eligible	1.6	0.5	1.6	2.3	2.3
Not Eligible	1.2	0.6	1.8	1.5	1.5
Information Not Available	2.9	1.4	3.2	3.1	3.1

****Standard error cannot be accurately determined
SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Science Assessment

Table C.3 -- 1996 Science Achievement Level Standard Errors -- Grade 12

Table C.3 1996 Science Achievement Level Standard Errors—Grade 12

	Average Scale Score	Advanced	At or Above Proficient	At or Above Basic	Below Basic
All Students	0.9	0.3	1.1	1.1	1.1
Region					
Northeast	2.8	0.8	2.8	3.5	3.5
Southeast	1.4	0.4	1.3	1.8	1.8
Central	2.0	0.6	2.2	2.4	2.4
West	2.3	0.7	2.3	2.8	2.8
Gender					
Male	1.2	0.6	1.6	1.3	1.3
Female	0.9	0.3	1.2	1.3	1.3
Race/Ethnicity					
White	1.0	0.5	1.6	1.1	1.1
Black	1.5	****	0.9	2.0	2.0
Hispanic	2.3	0.5	1.3	3.0	3.0
Asian/Pacific Islander	2.9	1.1	3.3	4.1	4.1
American Indian	4.7	****	5.1	9.8	9.8
Parents' Highest Education Level					
Did Not Finish High School	1.8	****	0.9	2.7	2.7
Graduated from High School	1.5	0.4	1.8	2.4	2.4
Some Education after High School	1.1	0.7	1.8	1.4	1.4
Graduated from College	1.0	0.5	1.7	1.2	1.2
I Don't Know	3.1	****	2.1	3.0	3.0
Type of School					
Public	1.0	0.4	1.3	1.2	1.2
Nonpublic	2.2	0.8	2.5	2.5	2.5
Catholic	2.5	0.9	2.9	3.1	3.1
Other Nonpublic	3.9	1.5	4.7	4.5	4.5
Participation in Title I					
Participated	5.7	****	****	7.9	7.9
Did Not Participate	0.9	0.4	1.2	1.1	1.1
Eligibility for Free/Reduced-Price Lunch Program					
Eligible	1.9	****	1.4	2.4	2.4
Not Eligible	0.9	0.4	1.3	1.2	1.2
Information Not Available	2.9	0.8	2.8	3.7	3.7

****Standard error cannot be accurately determined
SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Science Assessment

Table C.4 -- 1996 Science Scale Score Standard Errors by State -- Grade 8 Public Schools

Table C.4 1996 Science Scale Score Standard Errors by State—Grade 8 Public Schools

	Average Scale Score	Advanced	At or Above Proficient	At or Above Basic	Below Basic
Nation	0.9	0.5	1.3	1.1	1.1
Alabama	1.6	0.4	1.5	2.1	2.1
Alaska*	1.3	0.6	1.6	1.8	1.8
Arizona	1.6	0.6	1.7	2.0	2.0
Arkansas*	1.3	0.4	1.5	1.8	1.8
California	1.7	0.4	1.7	2.1	2.1
Colorado	0.9	0.4	1.2	1.5	1.5
Connecticut	1.3	0.4	1.7	1.6	1.6
Delaware	0.8	0.3	1.0	1.2	1.2
District of Columbia	0.7	0.2	0.9	1.0	1.0
Florida	1.6	0.4	1.6	2.3	2.3
Georgia	1.4	0.3	1.7	2.1	2.1
Hawaii	0.7	0.2	1.0	1.2	1.2
Indiana	1.4	0.5	1.9	1.9	1.9
Iowa*	1.2	0.5	1.6	1.6	1.6
Kentucky	1.2	0.6	1.3	1.6	1.6
Louisiana	1.6	0.2	1.2	1.8	1.8
Maine	1.0	0.6	1.8	1.4	1.4
Maryland*	1.5	0.4	1.8	2.0	2.0
Massachusetts	1.4	0.6	1.7	1.8	1.8
Michigan*	1.4	0.4	2.0	1.9	1.9
Minnesota	1.3	0.6	1.7	1.7	1.7
Mississippi	1.4	0.2	1.0	1.8	1.8
Missouri	1.2	0.4	1.3	1.7	1.7
Montana*	1.2	0.5	2.1	1.7	1.7
Nebraska	1.0	0.5	1.5	1.2	1.2
New Mexico	1.0	0.4	0.7	1.5	1.5
New York*	1.6	0.6	1.7	2.0	2.0
North Carolina	1.2	0.3	1.4	1.5	1.5
North Dakota	0.8	0.6	1.5	1.3	1.3
Oregon	1.6	0.4	1.8	2.0	2.0
Rhode Island	0.8	0.4	1.5	1.5	1.5
South Carolina*	1.5	0.4	1.4	2.1	2.1
Tennessee	1.8	0.5	1.7	2.4	2.4
Texas	1.8	0.5	1.5	2.3	2.3
Utah	0.8	0.4	1.2	1.2	1.2
Vermont*	1.0	0.5	1.6	1.8	1.8
Virginia	1.6	0.4	2.1	1.9	1.9
Washington	1.3	0.4	1.6	1.9	1.9
West Virginia	0.9	0.2	1.1	1.6	1.6
Wisconsin*	1.7	0.7	1.9	2.0	2.0
Wyoming	0.6	0.5	1.3	1.2	1.2
Guam	1.1	****	1.0	1.6	1.6
DDESS	1.1	0.7	2.2	2.5	2.5
DoDDS	0.7	0.4	1.3	1.0	1.0

*Indicates that the state did not satisfy one or more of the guidelines for school participation rates
DoDDS: Department of Defense Dependents Schools (Overseas)
DDESS: Department of Defense Domestic Dependent Elementary and Secondary Schools
SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Science Assessment

Table C.5 -- Standard Errors for Grade 8 Public School Students Attaining 1996 Science Achievement Levels by State and Gender

Table C.5 Standard Errors for Grade 8 Public School Students Attaining 1996 Science Achievement Levels by State and Gender

	All Students				Male				Female			
	A	≥ P	≥ B	< B	A	≥ P	≥ B	< B	A	≥ P	≥ B	< B
Nation	0.5	1.3	1.1	1.1	0.6	1.3	1.5	1.5	0.6	1.8	1.5	1.5
Alabama	0.4	1.5	2.1	2.1	0.5	1.9	2.4	2.4	0.4	1.7	2.5	2.5
Alaska*	0.6	1.6	1.8	1.8	0.8	2.2	2.4	2.4	0.8	2.3	2.5	2.5
Arizona	0.6	1.7	2.0	2.0	1.2	2.0	2.2	2.2	0.4	1.8	2.4	2.4
Arkansas*	0.4	1.5	1.8	1.8	0.5	2.3	2.1	2.1	0.4	1.4	2.5	2.5
California	0.4	1.7	2.1	2.1	0.5	1.9	2.5	2.5	0.6	1.8	2.4	2.4
Colorado	0.4	1.2	1.5	1.5	0.7	1.5	1.8	1.8	0.5	1.8	2.1	2.1
Connecticut	0.4	1.7	1.6	1.6	0.6	1.9	1.8	1.8	0.5	2.3	2.1	2.1
Delaware	0.3	1.0	1.2	1.2	0.4	1.8	1.8	1.8	0.5	1.2	1.6	1.6
District of Columbia	0.2	0.9	1.0	1.0	0.2	1.1	1.3	1.3	****	1.1	1.5	1.5
Florida	0.4	1.6	2.3	2.3	0.6	1.9	2.5	2.5	0.4	2.0	2.7	2.7
Georgia	0.3	1.7	2.1	2.1	0.5	2.0	2.8	2.8	0.3	1.7	2.3	2.3
Hawaii	0.2	1.0	1.2	1.2	0.3	1.2	1.8	1.8	****	1.5	1.6	1.6
Indiana	0.5	1.9	1.9	1.9	0.8	2.3	2.6	2.6	0.5	2.2	2.1	2.1
Iowa*	0.5	1.6	1.6	1.6	0.8	2.1	1.9	1.9	0.6	2.0	1.9	1.9
Kentucky	0.6	1.3	1.6	1.6	0.7	1.6	2.3	2.3	0.5	1.6	2.0	2.0
Louisiana	0.2	1.2	1.8	1.8	0.4	1.9	2.5	2.5	****	1.2	2.0	2.0
Maine	0.6	1.8	1.4	1.4	0.8	1.7	1.7	1.7	0.7	2.5	1.8	1.8
Maryland*	0.4	1.8	2.0	2.0	0.7	2.2	2.6	2.6	0.5	2.2	2.1	2.1
Massachusetts	0.6	1.7	1.8	1.8	1.2	2.1	2.1	2.1	0.8	2.0	2.1	2.1
Michigan*	0.4	2.0	1.9	1.9	0.7	2.4	2.1	2.1	0.6	2.5	2.4	2.4
Minnesota	0.6	1.7	1.7	1.7	1.0	2.0	1.8	1.8	0.8	2.0	1.9	1.9
Mississippi	0.2	1.0	1.8	1.8	0.4	1.4	2.1	2.1	0.3	1.1	2.1	2.1
Missouri	0.4	1.3	1.7	1.7	0.5	1.7	2.1	2.1	0.5	1.7	2.0	2.0
Montana*	0.5	2.1	1.7	1.7	1.1	2.9	2.5	2.5	0.5	2.3	2.0	2.0
Nebraska	0.5	1.5	1.2	1.2	0.7	1.9	1.5	1.5	0.6	1.9	1.8	1.8
New Mexico	0.4	0.7	1.5	1.5	0.6	1.2	1.9	1.9	0.3	1.2	1.9	1.9
New York*	0.6	1.7	2.0	2.0	0.9	2.7	2.9	2.9	0.4	1.8	2.1	2.1
North Carolina	0.3	1.4	1.5	1.5	0.5	2.0	1.9	1.9	0.3	1.5	1.9	1.9
North Dakota	0.6	1.5	1.3	1.3	0.9	1.9	1.5	1.5	0.7	1.8	1.8	1.8
Oregon	0.4	1.8	2.0	2.0	0.7	2.3	2.4	2.4	0.4	1.9	2.5	2.5
Rhode Island	0.4	1.5	1.5	1.5	0.5	1.6	1.8	1.8	0.5	2.0	2.2	2.2
South Carolina*	0.4	1.4	2.1	2.1	0.6	2.2	2.7	2.7	0.4	1.3	2.1	2.1
Tennessee	0.5	1.7	2.4	2.4	0.8	1.9	2.5	2.5	0.5	2.1	3.0	3.0
Texas	0.5	1.5	2.3	2.3	0.8	1.9	2.4	2.4	0.4	1.8	2.9	2.9
Utah	0.4	1.2	1.2	1.2	0.6	1.6	1.6	1.6	0.5	1.6	1.4	1.4
Vermont*	0.5	1.6	1.8	1.8	0.8	2.3	2.2	2.2	0.7	2.0	2.2	2.2
Virginia	0.4	2.1	1.9	1.9	0.5	2.4	2.1	2.1	0.5	2.5	2.2	2.2
Washington	0.4	1.6	1.9	1.9	0.7	2.2	2.3	2.3	0.3	1.5	2.1	2.1
West Virginia	0.2	1.1	1.6	1.6	0.3	1.7	2.2	2.2	0.4	1.6	1.9	1.9
Wisconsin*	0.7	1.9	2.0	2.0	1.0	2.5	2.3	2.3	0.9	2.3	2.2	2.2
Wyoming	0.5	1.3	1.2	1.2	0.7	1.5	1.8	1.8	0.4	1.6	1.7	1.7
Guam	****	1.0	1.6	1.6	****	1.3	2.2	2.2	****	1.5	2.5	2.5
DDESS	0.7	2.2	2.5	2.5	1.4	2.9	3.2	3.2	0.8	2.6	3.2	3.2
DoDDS	0.4	1.3	1.0	1.0	0.7	1.9	1.6	1.6	0.5	1.6	1.4	1.4

Note: A = Advanced, ≥ P = At or Above Proficient, ≥ B = At or Above Basic, < B = Below Basic
*Indicates that the state did not satisfy one or more of the guidelines for school participation rates
**** Standard error cannot be accurately determined
DoDDS: Department of Defense Dependent Schools (Overseas)
DDESS: Department of Defense Domestic Dependent Elementary and Secondary Schools
SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Science Assessment

Table C.6 -- Standard Errors for Grade 8 Public School Students Attaining 1996 Science Achievement Levels by State and Race/Ethnicity

Table C.6 Standard Errors for Grade 8 Public School Students Attaining 1996 Science Achievement Levels by State and Race/Ethnicity

	All Students				White Students				Black Students			
	A	≥ P	≥ B	< B	A	≥ P	≥ B	< B	A	≥ P	≥ B	< B
Nation	0.5	1.3	1.1	1.1	0.8	1.8	1.4	1.4	****	0.8	1.7	1.7
Alabama	0.4	1.5	2.1	2.1	0.6	2.0	2.1	2.1	****	1.1	1.9	1.9
Alaska*	0.6	1.6	1.8	1.8	0.8	1.9	2.2	2.2	****	****	****	****
Arizona	0.6	1.7	2.0	2.0	0.9	1.9	2.1	2.1	****	3.5	6.3	6.3
Arkansas*	0.4	1.5	1.8	1.8	0.5	1.9	1.9	1.9	****	1.5	2.4	2.4
California	0.4	1.7	2.1	2.1	0.8	2.7	2.5	2.5	****	2.5	4.6	4.6
Colorado	0.4	1.2	1.5	1.5	0.6	1.4	1.3	1.3	****	4.2	5.5	5.5
Connecticut	0.4	1.7	1.6	1.6	0.5	2.0	1.4	1.4	****	2.9	4.8	4.8
Delaware	0.3	1.0	1.2	1.2	0.5	1.3	1.4	1.4	****	1.2	3.0	3.0
District of Columbia	0.2	0.9	1.0	1.0	****	****	****	****	****	0.8	1.0	1.0
Florida	0.4	1.6	2.3	2.3	0.7	2.2	2.4	2.4	****	1.3	3.4	3.4
Georgia	0.3	1.7	2.1	2.1	0.5	2.0	2.2	2.2	****	1.2	1.8	1.8
Hawaii	0.2	1.0	1.2	1.2	****	3.6	2.9	2.9	****	4.1	7.8	7.8
Indiana	0.5	1.9	1.9	1.9	0.6	2.0	1.8	1.8	****	2.3	4.6	4.6
Iowa*	0.5	1.6	1.6	1.6	0.5	1.7	1.6	1.6	****	3.0	5.2	5.2
Kentucky	0.6	1.3	1.6	1.6	0.6	1.3	1.7	1.7	****	1.8	3.5	3.5
Louisiana	0.2	1.2	1.8	1.8	0.3	1.6	2.1	2.1	****	0.9	2.0	2.0
Maine	0.6	1.8	1.4	1.4	0.6	1.7	1.3	1.3	****	****	****	****
Maryland*	0.4	1.8	2.0	2.0	0.7	2.3	1.9	1.9	****	1.3	1.9	1.9
Massachusetts	0.6	1.7	1.8	1.8	0.6	1.8	1.5	1.5	****	2.7	4.9	4.9
Michigan*	0.4	2.0	1.9	1.9	0.5	2.3	1.9	1.9	0.1	1.5	3.3	3.3
Minnesota	0.6	1.7	1.7	1.7	0.8	1.7	1.6	1.6	****	3.2	8.2	8.2
Mississippi	0.2	1.0	1.8	1.8	0.3	1.5	1.9	1.9	0.1	0.6	1.7	1.7
Missouri	0.4	1.3	1.7	1.7	0.5	1.6	1.6	1.6	****	1.3	3.0	3.0
Montana*	0.5	2.1	1.7	1.7	0.6	2.0	1.4	1.4	****	****	****	****
Nebraska	0.5	1.5	1.2	1.2	0.6	1.6	1.2	1.2	****	2.6	5.9	5.9
New Mexico	0.4	0.7	1.5	1.5	1.0	1.4	1.7	1.7	****	****	****	****
New York*	0.6	1.7	2.0	2.0	0.9	2.2	2.3	2.3	****	1.2	2.7	2.7
North Carolina	0.3	1.4	1.5	1.5	0.4	1.7	1.6	1.6	****	1.0	1.9	1.9
North Dakota	0.6	1.5	1.3	1.3	0.6	1.6	1.3	1.3	****	****	****	****
Oregon	0.4	1.8	2.0	2.0	0.5	1.9	1.9	1.9	****	****	****	****
Rhode Island	0.4	1.5	1.5	1.5	0.5	1.8	1.8	1.8	****	2.4	5.9	5.9
South Carolina*	0.4	1.4	2.1	2.1	0.7	2.3	2.3	2.3	****	0.9	2.1	2.1
Tennessee	0.5	1.7	2.4	2.4	0.6	2.0	2.5	2.5	****	1.6	3.4	3.4
Texas	0.5	1.5	2.3	2.3	0.9	2.1	1.9	1.9	****	2.1	3.9	3.9
Utah	0.4	1.2	1.2	1.2	0.5	1.3	1.1	1.1	****	****	****	****
Vermont*	0.5	1.6	1.8	1.8	0.6	1.7	1.6	1.6	****	****	****	****
Virginia	0.4	2.1	1.9	1.9	0.5	2.4	1.9	1.9	****	1.4	2.8	2.8
Washington	0.4	1.6	1.9	1.9	0.5	1.8	1.7	1.7	****	2.5	6.2	6.2
West Virginia	0.2	1.1	1.6	1.6	0.2	1.1	1.5	1.5	****	2.8	4.4	4.4
Wisconsin*	0.7	1.9	2.0	2.0	0.7	1.9	1.5	1.5	****	2.7	4.1	4.1
Wyoming	0.5	1.3	1.2	1.2	0.6	1.4	1.1	1.1	****	****	****	****
Guam	****	1.0	1.6	1.6	****	4.7	6.7	6.7	****	****	****	****
DDESS	0.7	2.2	2.5	2.5	1.5	4.1	3.0	3.0	****	2.7	6.0	6.0
DoDDS	0.4	1.3	1.0	1.0	0.7	2.0	1.7	1.7	****	1.8	2.7	2.7

Note: A = Advanced, ≥ P = At or Above Proficient, ≥ B = At or Above Basic, < B = Below Basic
* Indicates that the state did not satisfy one or more of the guidelines for school participation rates
**** Standard error cannot be accurately determined
DoDDS: Department of Defense Dependent Schools (Overseas)
DDESS: Department of Defense Domestic Dependent Elementary and Secondary Schools
SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Science Assessment

Table C.6 -- Standard Errors for Grade 8 Public School Students Attaining 1996 Science Achievement Levels by State and Race/Ethnicity (continued)

Table C.6 Standard Errors for Grade 8 Public School Students Attaining 1996 Science Achievement Levels by State and Race/Ethnicity (continued)

	Hispanic Students				Asian/Pacific Islander Students				American Indian Students			
	A	≥ P	≥ B	< B	A	≥ P	≥ B	< B	A	≥ P	≥ B	< B
Nation	****	1.2	2.3	2.3	1.5	3.6	4.5	4.5	****	5.8	6.6	6.6
Alabama	****	3.2	7.7	7.7	****	****	****	****	****	****	****	****
Alaska*	****	3.8	6.3	6.3	****	6.2	6.2	6.2	****	2.7	3.9	3.9
Arizona	****	1.9	2.3	2.3	****	****	****	****	****	3.9	7.8	7.8
Arkansas*	****	4.0	6.9	6.9	****	****	****	****	****	****	****	****
California	****	1.5	2.0	2.0	1.7	3.6	4.5	4.5	****	****	****	****
Colorado	0.3	2.0	3.0	3.0	****	6.5	6.9	6.9	****	6.5	9.8	9.8
Connecticut	****	1.8	3.4	3.4	****	6.3	7.1	7.1	****	****	****	****
Delaware	****	2.5	4.8	4.8	****	****	****	****	****	****	****	****
District of Columbia	****	2.2	3.6	3.6	****	****	****	****	****	****	****	****
Florida	****	1.4	3.1	3.1	****	****	****	****	****	****	****	****
Georgia	****	4.1	5.4	5.4	****	****	****	****	****	****	****	****
Hawaii	****	1.1	2.3	2.3	0.2	1.2	1.8	1.8	****	****	****	****
Indiana	****	3.2	4.4	4.4	****	****	****	****	****	****	****	****
Iowa*	****	5.7	7.3	7.3	****	****	****	****	****	****	****	****
Kentucky	****	4.3	5.9	5.9	****	****	****	****	****	****	****	****
Louisiana	****	2.9	4.5	4.5	****	****	****	****	****	****	****	****
Maine	****	7.3	7.3	7.3	****	****	****	****	****	****	****	****
Maryland*	****	2.8	5.0	5.0	2.6	6.7	5.1	5.1	****	****	****	****
Massachusetts	****	2.8	5.6	5.6	3.9	7.9	8.0	8.0	****	****	****	****
Michigan*	****	4.4	8.0	8.0	****	****	****	****	****	****	****	****
Minnesota	****	5.7	8.7	8.7	1.8	10.8	12.2	12.2	****	****	****	****
Mississippi	****	1.7	3.6	3.6	****	****	****	****	****	****	****	****
Missouri	****	3.6	6.1	6.1	****	****	****	****	****	****	****	****
Montana*	****	4.8	4.7	4.7	****	****	****	****	****	3.6	4.0	4.0
Nebraska	****	4.0	3.5	3.5	****	****	****	****	****	****	****	****
New Mexico	****	0.8	1.6	1.6	****	****	****	****	****	1.6	4.7	4.7
New York*	0.2	2.3	3.2	3.2	****	8.3	6.2	6.2	****	****	****	****
North Carolina	****	3.2	6.2	6.2	****	****	****	****	****	5.0	7.7	7.7
North Dakota	****	4.8	7.9	7.9	****	****	****	****	****	4.6	7.4	7.4
Oregon	****	2.7	6.4	6.4	****	5.2	4.7	4.7	****	6.9	10.4	10.4
Rhode Island	****	1.2	2.5	2.5	****	4.7	6.3	6.3	****	****	****	****
South Carolina*	****	2.7	4.5	4.5	****	****	****	****	****	****	****	****
Tennessee	****	****	5.7	5.7	****	****	****	****	****	****	****	****
Texas	****	1.1	2.6	2.6	****	5.7	7.0	7.0	****	****	****	****
Utah	****	2.8	4.4	4.4	****	4.7	7.8	7.8	****	****	****	****
Vermont*	****	6.2	7.0	7.0	****	****	****	****	****	****	****	****
Virginia	****	4.1	5.8	5.8	2.0	7.1	4.8	4.8	****	****	****	****
Washington	****	2.2	4.0	4.0	****	4.8	5.3	5.3	****	4.5	6.3	6.3
West Virginia	****	****	9.1	9.1	****	****	****	****	****	****	****	****
Wisconsin*	****	6.4	6.4	6.4	****	****	****	****	****	****	****	****
Wyoming	****	2.3	4.6	4.6	****	****	****	****	****	3.2	5.8	5.8
Guam	****	1.5	2.7	2.7	****	1.1	2.2	2.2	****	****	****	****
DDESS	****	3.7	5.0	5.0	****	****	****	****	****	****	****	****
DoDDS	****	2.7	3.0	3.0	0.7	3.5	2.9	2.9	****	****	****	****

Note: A = Advanced, ≥P = At or Above Proficient, ≥ B = At or Above Basic, < B = Below Basic
* Indicates that the state did not satisfy one or more of the guidelines for school participation rates
**** Standard error cannot be accurately determined
DoDDS: Department of Defense Dependent Schools (Overseas)
DDESS: Department of Defense Domestic Dependent Elementary and Secondary Schools
SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Science Assessment

Table C.7 -- Standard Errors for Grade 8 Public School Students Attaining 1996 Science Achievement Levels by State and Parents' Highest Education Level

Table C.7 Standard Errors for Grade 8 Public School Students Attaining 1996 Science Achievement Levels by State and Parents' Highest Education Level

	All Students				Did Not Finish High School				Graduated from High School			
	A	≥ P	≥ B	< B	A	≥ P	< B	< B	A	≥ P	≥ B	< B
Nation	0.5	1.3	1.1	1.1	****	1.8	3.2	3.2	0.6	1.8	2.4	2.4
Alabama	0.4	1.5	2.1	2.1	****	2.4	4.4	4.4	0.3	1.3	2.8	2.8
Alaska*	0.6	1.6	1.8	1.8	****	****	****	****	1.4	3.2	4.8	4.8
Arizona	0.6	1.7	2.0	2.0	****	1.6	4.1	4.1	0.5	2.4	3.9	3.9
Arkansas*	0.4	1.5	1.8	1.8	****	1.6	5.6	5.6	****	2.0	3.3	3.3
California	0.4	1.7	2.1	2.1	****	1.5	3.1	3.1	****	1.9	3.1	3.1
Colorado	0.4	1.2	1.5	1.5	****	3.3	6.2	6.2	****	2.7	3.4	3.4
Connecticut	0.4	1.7	1.6	1.6	****	3.6	5.7	5.7	****	3.4	2.7	2.7
Delaware	0.3	1.0	1.2	1.2	****	3.1	5.9	5.9	****	2.1	3.1	3.1
District of Columbia	0.2	0.9	1.0	1.0	****	****	3.5	3.5	****	0.8	2.1	2.1
Florida	0.4	1.6	2.3	2.3	****	3.0	5.4	5.4	****	1.8	3.6	3.6
Georgia	0.3	1.7	2.1	2.1	****	1.9	4.9	4.9	****	2.0	3.2	3.2
Hawaii	0.2	1.0	1.2	1.2	****	3.9	4.9	4.9	****	1.7	2.9	2.9
Indiana	0.5	1.9	1.9	1.9	****	3.3	5.1	5.1	0.3	2.6	2.4	2.4
Iowa*	0.5	1.6	1.6	1.6	****	4.6	6.7	6.7	****	2.5	3.9	3.9
Kentucky	0.6	1.3	1.6	1.6	****	1.5	4.0	4.0	0.5	1.6	2.7	2.7
Louisiana	0.2	1.2	1.8	1.8	****	2.0	4.1	4.1	****	1.3	2.2	2.2
Maine	0.6	1.8	1.4	1.4	****	4.0	6.7	6.7	0.6	2.5	3.2	3.2
Maryland*	0.4	1.8	2.0	2.0	****	3.6	5.1	5.1	****	3.0	3.3	3.3
Massachusetts	0.6	1.7	1.8	1.8	****	4.0	5.8	5.8	0.6	2.8	3.7	3.7
Michigan*	0.4	2.0	1.9	1.9	****	3.6	11.2	11.2	0.7	2.7	3.3	3.3
Minnesota	0.6	1.7	1.7	1.7	****	5.2	6.4	6.4	0.8	3.1	2.9	2.9
Mississippi	0.2	1.0	1.8	1.8	****	2.0	6.2	6.2	****	1.2	2.3	2.3
Missouri	0.4	1.3	1.7	1.7	****	2.2	4.7	4.7	****	2.2	2.5	2.5
Montana*	0.5	2.1	1.7	1.7	****	5.8	6.6	6.6	0.8	4.0	3.9	3.9
Nebraska	0.5	1.5	1.2	1.2	****	2.3	4.2	4.2	0.5	2.2	3.4	3.4
New Mexico	0.4	0.7	1.5	1.5	****	1.1	3.8	3.8	****	1.4	2.6	2.6
New York*	0.6	1.7	2.0	2.0	****	5.5	5.1	5.1	****	3.0	4.4	4.4
North Carolina	0.3	1.4	1.5	1.5	****	2.2	4.0	4.0	****	1.8	2.9	2.9
North Dakota	0.6	1.5	1.3	1.3	0.4	5.9	6.6	6.6	0.5	3.1	3.9	3.9
Oregon	0.4	1.8	2.0	2.0	****	3.7	4.6	4.6	****	2.3	3.5	3.5
Rhode Island	0.4	1.5	1.5	1.5	****	1.8	3.8	3.8	****	2.5	4.1	4.1
South Carolina*	0.4	1.4	2.1	2.1	****	3.3	4.7	4.7	****	1.7	2.8	2.8
Tennessee	0.5	1.7	2.4	2.4	****	2.3	4.3	4.3	****	2.0	3.4	3.4
Texas	0.5	1.5	2.3	2.3	****	2.4	3.5	3.5	****	2.0	3.2	3.2
Utah	0.4	1.2	1.2	1.2	****	5.1	7.6	7.6	****	2.5	2.7	2.7
Vermont*	0.5	1.6	1.8	1.8	****	2.8	6.0	6.0	****	2.4	3.4	3.4
Virginia	0.4	2.1	1.9	1.9	****	2.0	4.1	4.1	****	1.9	3.5	3.5
Washington	0.4	1.6	1.9	1.9	****	3.4	5.4	5.4	0.4	2.2	3.9	3.9
West Virginia	0.2	1.1	1.6	1.6	****	1.4	4.3	4.3	0.2	1.4	2.3	2.3
Wisconsin*	0.7	1.9	2.0	2.0	****	5.4	6.4	6.4	0.8	4.1	3.3	3.3
Wyoming	0.5	1.3	1.2	1.2	****	4.5	5.4	5.4	****	3.1	2.9	2.9
Guam	****	1.0	1.6	1.6	****	****	4.9	4.9	****	1.2	3.1	3.1
DDESS	0.7	2.2	2.5	2.5	****	****	****	****	****	5.4	5.6	5.6
DoDDS	0.4	1.3	1.0	1.0	****	****	****	****	****	2.6	3.9	3.9

Note: A = Advanced, ≥ P = At or Above Proficient, ≥ B = At or Above Basic, < B = Below Basic
*Indicates that the state did not satisfy one or more of the guidelines for school participation rates
**** Standard error cannot be accurately determined
DoDDS: Department of Defense Dependent Schools (Overseas)
DDESS: Department of Defense Domestic Dependent Elementary and Secondary Schools
SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Science Assessment

Table C.7 -- Standard Errors for Grade 8 Public School Students Attaining 1996 Science Achievement Levels by State and Parents' Highest Education Level (continued)

Table C.7 Standard Errors for Grade 8 Public School Students Attaining 1996 Science Achievement Levels by State and Parents' Highest Education Level (continued)

	Some Education after High School				Graduated from College				I Don't Know			
	A	≥ P	≥ B	< B	A	≥ P	≥ B	< B	A	≥ P	≥ B	< B
Nation	0.9	2.5	1.8	1.8	0.9	1.7	1.5	1.5	****	2.9	4.4	4.4
Alabama	****	2.1	3.1	3.1	0.8	2.4	3.1	3.1	****	2.6	4.0	4.0
Alaska*	0.9	3.5	3.3	3.3	1.1	2.6	2.1	2.1	****	3.0	4.4	4.4
Arizona	1.1	2.7	3.4	3.4	1.0	2.4	2.1	2.1	****	2.0	3.1	3.1
Arkansas*	0.6	2.6	3.0	3.0	0.8	2.3	2.6	2.6	****	4.8	5.5	5.5
California	0.9	2.2	3.2	3.2	0.8	2.6	2.7	2.7	****	1.3	3.0	3.0
Colorado	0.8	2.4	2.6	2.6	0.8	1.5	1.7	1.7	****	2.8	4.0	4.0
Connecticut	0.9	3.0	2.5	2.5	0.7	2.4	1.5	1.5	****	3.0	3.8	3.8
Delaware	****	2.3	2.1	2.1	0.7	2.1	2.1	2.1	****	2.3	5.2	5.2
District of Columbia	****	2.2	2.8	2.8	0.6	1.8	2.1	2.1	****	****	2.6	2.6
Florida	0.7	2.7	2.8	2.8	0.9	2.7	2.8	2.8	****	2.3	4.5	4.5
Georgia	0.5	2.1	3.4	3.4	0.7	3.1	2.9	2.9	****	2.5	3.9	3.9
Hawaii	****	3.3	2.4	2.4	0.4	1.5	1.9	1.9	****	2.3	2.7	2.7
Indiana	0.7	2.5	3.0	3.0	1.0	3.0	2.3	2.3	****	3.6	7.6	7.6
Iowa*	1.1	2.8	3.1	3.1	0.8	2.2	1.7	1.7	****	4.3	5.3	5.3
Kentucky	****	2.4	2.5	2.5	1.1	2.8	2.5	2.5	****	2.6	4.8	4.8
Louisiana	0.4	2.5	3.1	3.1	0.4	2.1	2.5	2.5	****	1.7	4.4	4.4
Maine	1.3	3.8	2.1	2.1	1.1	2.2	1.3	1.3	****	4.0	5.5	5.5
Maryland*	0.7	2.8	3.4	3.4	0.9	2.9	2.4	2.4	****	3.1	3.7	3.7
Massachusetts	0.9	3.6	2.7	2.7	0.9	2.0	1.7	1.7	****	3.7	4.6	4.6
Michigan*	0.7	2.5	2.9	2.9	0.9	2.5	2.3	2.3	****	3.0	4.9	4.9
Minnesota	1.1	3.4	2.8	2.8	0.9	2.0	1.7	1.7	****	3.9	5.4	5.4
Mississippi	****	2.3	3.0	3.0	0.5	2.0	2.7	2.7	****	1.5	3.3	3.3
Missouri	0.7	2.7	2.6	2.6	0.9	2.0	1.8	1.8	****	3.1	5.3	5.3
Montana*	0.9	3.7	2.4	2.4	1.0	2.7	1.6	1.6	****	5.1	6.0	6.0
Nebraska	1.0	2.9	2.5	2.5	0.8	2.2	1.5	1.5	****	3.5	4.2	4.2
New Mexico	0.6	2.1	2.4	2.4	0.7	1.6	2.0	2.0	****	2.0	3.0	3.0
New York*	****	3.4	3.0	3.0	1.1	2.5	2.5	2.5	****	2.6	4.4	4.4
North Carolina	0.7	2.4	2.3	2.3	0.7	2.1	2.0	2.0	****	2.5	3.7	3.7
North Dakota	0.9	3.0	2.9	2.9	0.9	1.6	1.5	1.5	****	3.4	7.9	7.9
Oregon	0.5	2.7	2.7	2.7	0.8	2.4	2.1	2.1	****	3.1	4.7	4.7
Rhode Island	1.0	3.1	3.2	3.2	0.8	2.2	1.8	1.8	****	2.1	3.7	3.7
South Carolina*	****	2.6	3.7	3.7	0.9	2.9	3.0	3.0	****	2.9	5.0	5.0
Tennessee	0.7	2.6	3.4	3.4	1.0	2.9	2.8	2.8	****	3.6	4.7	4.7
Texas	0.9	3.0	3.1	3.1	1.0	2.0	2.4	2.4	****	1.8	3.5	3.5
Utah	0.6	2.3	2.5	2.5	0.7	1.7	1.3	1.3	****	2.7	3.5	3.5
Vermont*	0.6	3.2	3.2	3.2	1.1	2.7	1.9	1.9	****	4.1	5.7	5.7
Virginia	0.5	2.5	3.1	3.1	0.8	2.9	2.3	2.3	****	4.1	4.7	4.7
Washington	0.7	2.3	2.7	2.7	0.6	2.4	1.9	1.9	0.9	3.0	4.4	4.4
West Virginia	0.4	2.5	2.5	2.5	0.5	1.9	2.5	2.5	****	2.1	5.2	5.2
Wisconsin*	1.0	2.3	2.7	2.7	1.6	2.2	2.2	2.2	****	3.3	5.2	5.2
Wyoming	0.7	2.5	2.7	2.7	0.9	1.8	1.6	1.6	****	4.9	5.2	5.2
Guam	****	2.9	4.8	4.8	****	2.0	3.2	3.2	****	1.3	3.6	3.6
DDESS	****	4.0	4.6	4.6	1.1	2.9	3.6	3.6	****	****	****	****
DoDDS	0.6	2.9	2.6	2.6	0.6	1.8	1.4	1.4	****	2.7	3.9	3.9

Note: A = Advanced, ≥ P = At or Above Proficient, ≥ B = At or Above Basic, < B = Below Basic
* Indicates that the state did not satisfy one or more of the guidelines for school participation rates
**** Standard error cannot be accurately determined
DoDDS: Department of Defense Dependent Schools (Overseas)
DDESS: Department of Defense Domestic Dependent Elementary and Secondary Schools
SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Science Assessment

Table C.8 -- Standard Errors for Grade 8 Public School Students Attaining 1996 Science Achievement Levels by State and Participation in Title I

Table C.8 Standard Errors for Grade 8 Public School Students Attaining 1996 Science Achievement Levels by State and Participation in Title I

	All Students				Participated				Did Not Participate			
	A	≥ P	≥ B	< B	A	≥ P	≥ B	< B	A	≥ P	≥ B	< B
Nation	0.5	1.3	1.1	1.1	0.4	3.2	6.6	6.6	0.6	1.5	1.5	1.5
Alabama	0.4	1.5	2.1	2.1	****	1.3	3.5	3.5	0.4	1.8	2.2	2.2
Alaska*	0.6	1.6	1.8	1.8	****	****	****	****	0.6	1.6	1.9	1.9
Arizona	0.6	1.7	2.0	2.0	****	2.2	4.1	4.1	0.7	1.8	2.2	2.2
Arkansas*	0.4	1.5	1.8	1.8	****	2.3	4.3	4.3	0.4	1.8	2.2	2.2
California	0.4	1.7	2.1	2.1	****	1.2	3.0	3.0	0.6	1.9	2.3	2.3
Colorado	0.4	1.2	1.5	1.5	****	****	****	****	0.4	1.1	1.4	1.4
Connecticut	0.4	1.7	1.6	1.6	****	2.7	5.3	5.3	0.4	1.8	1.8	1.8
Delaware	0.3	1.0	1.2	1.2	****	****	****	****	0.3	1.0	1.2	1.2
District of Columbia	0.2	0.9	1.0	1.0	****	****	3.3	3.3	0.2	0.9	1.1	1.1
Florida	0.4	1.6	2.3	2.3	****	2.5	6.1	6.1	0.5	1.7	2.1	2.1
Georgia	0.3	1.7	2.1	2.1	****	2.0	4.3	4.3	0.3	1.9	2.3	2.3
Hawaii	0.2	1.0	1.2	1.2	****	****	4.1	4.1	0.2	1.1	1.2	1.2
Indiana	0.5	1.9	1.9	1.9	****	****	****	****	0.5	1.9	1.8	1.8
Iowa*	0.5	1.6	1.6	1.6	****	****	****	****	0.5	1.6	1.6	1.6
Kentucky	0.6	1.3	1.6	1.6	****	1.8	3.2	3.2	0.7	1.4	1.8	1.8
Louisiana	0.2	1.2	1.8	1.8	****	1.3	4.7	4.7	0.2	1.4	2.0	2.0
Maine	0.6	1.8	1.4	1.4	****	3.3	5.6	5.6	0.6	1.8	1.4	1.4
Maryland*	0.4	1.8	2.0	2.0	****	****	****	****	0.4	1.8	1.9	1.9
Massachusetts	0.6	1.7	1.8	1.8	****	2.0	4.8	4.8	0.6	1.9	1.9	1.9
Michigan*	0.4	2.0	1.9	1.9	****	5.5	5.5	5.5	0.5	2.1	2.2	2.2
Minnesota	0.6	1.7	1.7	1.7	****	3.9	8.0	8.0	0.6	1.7	1.7	1.7
Mississippi	0.2	1.0	1.8	1.8	****	1.0	2.9	2.9	0.3	1.3	2.3	2.3
Missouri	0.4	1.3	1.7	1.7	****	1.9	4.0	4.0	0.4	1.3	1.5	1.5
Montana*	0.5	2.1	1.7	1.7	****	2.6	6.6	6.6	0.6	2.3	1.7	1.7
Nebraska	0.5	1.5	1.2	1.2	****	****	****	****	0.5	1.5	1.2	1.2
New Mexico	0.4	0.7	1.5	1.5	****	0.8	2.3	2.3	0.4	0.8	1.5	1.5
New York*	0.6	1.7	2.0	2.0	****	****	4.4	4.4	0.7	1.9	2.2	2.2
North Carolina	0.3	1.4	1.5	1.5	****	1.9	5.1	5.1	0.3	1.5	1.5	1.5
North Dakota	0.6	1.5	1.3	1.3	****	2.4	7.1	7.1	0.6	1.6	1.1	1.1
Oregon	0.4	1.8	2.0	2.0	****	2.8	6.1	6.1	0.4	1.8	1.9	1.9
Rhode Island	0.4	1.5	1.5	1.5	****	1.0	3.7	3.7	0.4	1.6	1.6	1.6
South Carolina*	0.4	1.4	2.1	2.1	****	2.6	3.9	3.9	0.4	1.5	2.1	2.1
Tennessee	0.5	1.7	2.4	2.4	****	2.4	6.3	6.3	0.5	1.9	2.5	2.5
Texas	0.5	1.5	2.3	2.3	****	1.6	3.1	3.1	0.7	1.9	2.7	2.7
Utah	0.4	1.2	1.2	1.2	****	****	8.4	8.4	0.4	1.2	1.2	1.2
Vermont*	0.5	1.6	1.8	1.8	****	2.0	6.3	6.3	0.6	1.6	1.6	1.6
Virginia	0.4	2.1	1.9	1.9	****	****	****	****	0.4	2.1	1.9	1.9
Washington	0.4	1.6	1.9	1.9	****	3.4	6.2	6.2	0.4	1.6	1.8	1.8
West Virginia	0.2	1.1	1.6	1.6	****	2.2	5.1	5.1	0.2	1.1	1.5	1.5
Wisconsin*	0.7	1.9	2.0	2.0	****	3.1	5.1	5.1	0.7	1.7	1.6	1.6
Wyoming	0.5	1.3	1.2	1.2	****	4.1	5.6	5.6	0.5	1.3	1.2	1.2
Guam	****	1.0	1.6	1.6	****	****	****	****	****	1.0	1.6	1.6
DDESS	0.7	2.2	2.5	2.5	****	****	****	****	0.7	2.2	2.5	2.5
DoDDS	0.4	1.3	1.0	1.0	****	****	****	****	0.4	1.3	1.0	1.0

Note: A = Advanced, ≥ P = At or Above Proficient, ≥ B = At or Above Basic, < B = Below Basic
*Indicates that the state did not satisfy one or more of the guidelines for school participation rates
**** Standard error cannot be accurately determined
DoDDS: Department of Defense Dependent Schools (Overseas)
DDESS: Department of Defense Domestic Dependent Elementary and Secondary Schools
SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Science Assessment

Table C.9 -- Standard Errors for Grade 8 Public School Students Attaining 1996 Science Achievement Levels by State and Eligibility for Free/Reduced-Price Lunch Program

Table C.9 Standard Errors for Grade 8 Public School Students Attaining 1996 Science Achievement Levels by State and Eligibility for Free/Reduced-Price Lunch Program

	All Students				Not Eligible			
	A	≥ P	≥ B	< B	A	≥ P	≥ B	< B
Nation	0.5	1.3	1.1	1.1	0.7	1.9	1.6	1.6
Alabama	0.4	1.5	2.1	2.1	0.6	2.2	2.2	2.2
Alaska*	0.6	1.6	1.8	1.8	0.4	2.6	2.9	2.9
Arizona	0.6	1.7	2.0	2.0	0.9	2.4	2.4	2.4
Arkansas*	0.4	1.5	1.8	1.8	0.5	1.8	1.8	1.8
California	0.4	1.7	2.1	2.1	0.9	2.5	2.9	2.9
Colorado	0.4	1.2	1.5	1.5	0.6	1.6	1.9	1.9
Connecticut	0.4	1.7	1.6	1.6	0.5	2.1	1.6	1.6
Delaware	0.3	1.0	1.2	1.2	0.6	1.5	1.7	1.7
District of Columbia	0.2	0.9	1.0	1.0	****	2.2	2.3	2.3
Florida	0.4	1.6	2.3	2.3	0.7	2.1	2.4	2.4
Georgia	0.3	1.7	2.1	2.1	0.5	2.3	2.2	2.2
Hawaii	0.2	1.0	1.2	1.2	0.3	1.3	1.5	1.5
Indiana	0.5	1.9	1.9	1.9	0.6	1.9	1.8	1.8
Iowa*	0.5	1.6	1.6	1.6	0.6	1.8	1.7	1.7
Kentucky	0.6	1.3	1.6	1.6	0.8	1.6	1.9	1.9
Louisiana	0.2	1.2	1.8	1.8	0.3	2.0	2.2	2.2
Maine	0.6	1.8	1.4	1.4	0.8	2.3	1.6	1.6
Maryland*	0.4	1.8	2.0	2.0	0.6	2.4	2.3	2.3
Massachusetts	0.6	1.7	1.8	1.8	0.7	2.0	1.5	1.5
Michigan*	0.4	2.0	1.9	1.9	0.5	2.1	2.0	2.0
Minnesota	0.6	1.7	1.7	1.7	0.7	1.9	1.6	1.6
Mississippi	0.2	1.0	1.8	1.8	0.5	1.7	2.4	2.4
Missouri	0.4	1.3	1.7	1.7	0.5	1.6	1.6	1.6
Montana*	0.5	2.1	1.7	1.7	0.7	2.4	1.6	1.6
Nebraska	0.5	1.5	1.2	1.2	0.6	1.7	1.0	1.0
New Mexico	0.4	0.7	1.5	1.5	0.6	1.5	2.3	2.3
New York*	0.6	1.7	2.0	2.0	1.0	2.5	2.6	2.6
North Carolina	0.3	1.4	1.5	1.5	0.5	1.8	1.8	1.8
North Dakota	0.6	1.5	1.3	1.3	0.8	1.7	1.3	1.3
Oregon	0.4	1.8	2.0	2.0	0.6	1.8	2.0	2.0
Rhode Island	0.4	1.5	1.5	1.5	0.5	1.9	1.8	1.8
South Carolina*	0.4	1.4	2.1	2.1	0.6	2.1	2.2	2.2
Tennessee	0.5	1.7	2.4	2.4	0.7	2.2	2.5	2.5
Texas	0.5	1.5	2.3	2.3	0.8	2.1	2.1	2.1
Utah	0.4	1.2	1.2	1.2	0.6	1.5	1.5	1.5
Vermont*	0.5	1.6	1.8	1.8	0.8	1.9	1.4	1.4
Virginia	0.4	2.1	1.9	1.9	0.5	2.5	1.9	1.9
Washington	0.4	1.6	1.9	1.9	0.5	1.9	1.8	1.8
West Virginia	0.2	1.1	1.6	1.6	0.3	1.4	1.6	1.6
Wisconsin*	0.7	1.9	2.0	2.0	1.1	2.1	1.4	1.4
Wyoming	0.5	1.3	1.2	1.2	0.6	1.4	1.4	1.4
Guam	****	1.0	1.6	1.6	****	1.2	1.8	1.8
DDESS	0.7	2.2	2.5	2.5	1.2	3.1	3.5	3.5
DoDDS	0.4	1.3	1.0	1.0	0.6	1.9	1.3	1.3

Note: A = Advanced, ≥ P = At or Above Proficient, ≥ B = At or Above Basic, < B = Below Basic.
* Indicates that the state did not satisfy one or more of the guidelines for school participation rates
**** Standard error cannot be accurately determined.
DoDDS: Department of Defense Dependent Schools (Overseas)
DDESS: Department of Defense Domestic Dependent Elementary and Secondary Schools
SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Science Assessment.

Table C.9 -- Standard Errors for Grade 8 Public School Students Attaining 1996 Science Achievement Levels by State and Eligibility for Free/Reduced-Price Lunch Program (continued)

Table C.9 Standard Errors for Grade 8 Public School Students Attaining 1996 Science Achievement Levels by State and Eligibility for Free/Reduced-Price Lunch Program (continued)

	Eligible				Information Not Available			
	A	≥ P	≥ B	< B	A	≥ P	≥ B	< B
Nation	0.5	1.6	2.3	2.3	1.7	3.9	3.8	3.8
Alabama	****	1.0	2.1	2.1	****	9.9	12.0	12.0
Alaska*	0.6	2.9	4.2	4.2	1.1	2.5	2.8	2.8
Arizona	****	1.5	2.8	2.8	****	2.2	3.8	3.8
Arkansas*	****	1.6	2.5	2.5	****	10.1	10.3	10.3
California	****	1.2	2.4	2.4	0.5	2.3	5.1	5.1
Colorado	0.4	2.1	2.2	2.2	1.3	4.4	5.0	5.0
Connecticut	0.5	3.0	4.3	4.3	2.1	10.1	9.1	9.1
Delaware	****	1.6	3.0	3.0	****	1.5	2.8	2.8
District of Columbia	****	0.5	1.4	1.4	0.2	2.0	2.7	2.7
Florida	****	1.5	2.7	2.7	****	4.4	6.5	6.5
Georgia	****	1.0	2.2	2.2	1.1	5.9	8.1	8.1
Hawaii	****	1.5	2.3	2.3	****	2.0	5.5	5.5
Indiana	****	2.7	3.7	3.7	****	****	****	****
Iowa*	0.8	2.0	2.9	2.9	****	5.7	4.9	4.9
Kentucky	****	1.5	2.2	2.2	****	3.6	5.3	5.3
Louisiana	0.2	1.1	1.8	1.8	****	4.1	7.8	7.8
Maine	0.7	2.4	2.7	2.7	1.7	7.7	5.1	5.1
Maryland*	****	1.2	2.5	2.5	****	7.3	12.3	12.3
Massachusetts	0.6	1.6	2.3	2.3	1.3	6.7	9.9	9.9
Michigan*	0.5	2.7	3.5	3.5	1.7	9.2	10.4	10.4
Minnesota	0.7	1.9	3.2	3.2	2.6	6.5	5.6	5.6
Mississippi	****	0.8	1.7	1.7	****	5.1	7.8	7.8
Missouri	0.4	1.8	2.8	2.8	1.1	5.5	10.2	10.2
Montana*	0.8	2.9	2.9	2.9	1.4	4.9	3.1	3.1
Nebraska	****	2.3	2.8	2.8	1.7	8.6	7.0	7.0
New Mexico	****	1.0	2.0	2.0	1.0	2.2	4.0	4.0
New York*	****	1.6	2.5	2.5	1.0	7.4	9.8	9.8
North Carolina	****	0.8	1.8	1.8	****	2.7	6.5	6.5
North Dakota	0.6	2.9	3.2	3.2	0.9	3.9	4.6	4.6
Oregon	****	2.2	2.9	2.9	1.2	6.3	6.8	6.8
Rhode Island	0.4	1.5	2.3	2.3	****	2.7	6.3	6.3
South Carolina*	****	1.1	2.4	2.4	****	****	****	****
Tennessee	****	1.3	3.1	3.1	****	5.5	5.2	5.2
Texas	****	1.2	2.6	2.6	****	6.6	11.9	11.9
Utah	0.9	2.6	2.7	2.7	0.9	2.7	3.9	3.9
Vermont*	0.6	2.7	4.0	4.0	****	3.7	6.1	6.1
Virginia	****	1.2	2.8	2.8	1.3	6.0	6.6	6.6
Washington	0.4	1.8	2.7	2.7	****	2.8	6.5	6.5
West Virginia	****	1.0	2.7	2.7	****	6.0	8.5	8.5
Wisconsin*	0.8	2.8	4.1	4.1	2.3	6.0	5.2	5.2
Wyoming	0.4	2.0	3.1	3.1	****	4.9	9.1	9.1
Guam	****	****	2.6	2.6	****	****	****	****
DDESS	****	3.4	5.7	5.7	****	3.5	4.2	4.2
DoDDS	****	4.1	3.8	3.8	0.6	2.2	1.7	1.7

Note. A = Advanced, ≥ P = At or Above Proficient, ≥ B = At or Above Basic, < B = Below Basic
* Indicates that the state did not satisfy one or more of the guidelines for school participation rates
**** Standard error cannot be accurately determined
DoDDS: Department of Defense Dependent Schools (Overseas)
DDESS: Department of Defense Domestic Dependent Elementary and Secondary Schools
SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Science Assessment

Table C.10 -- Standard Errors for Grade 8 Students Attaining 1996 Achievement Levels in Selected States and Guam by Type of School

Table C.10 Standard Errors for Grade 8 Students Attaining 1996 Achievement Levels in Selected States and Guam by Type of School

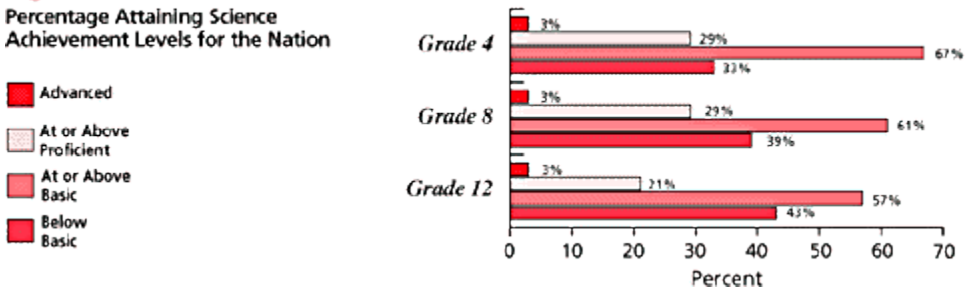
	All Schools				Public Schools				Nonpublic Schools			
	A	≥ P	≥ B	< B	A	≥ P	≥ B	< B	A	≥ P	≥ B	< B
Arkansas*	0.4	1.6	1.8	1.8	0.4	1.5	1.8	1.8	****	7.0	5.4	5.4
California	0.5	1.6	2.0	2.0	0.4	1.7	2.1	2.1	3.5	6.8	4.7	4.7
Georgia	0.3	1.6	2.0	2.0	0.3	1.7	2.1	2.1	****	8.7	8.0	8.0
Iowa*	0.5	1.5	1.5	1.5	0.5	1.6	1.6	1.6	1.5	6.0	4.5	4.5
Kentucky	0.5	1.4	1.5	1.5	0.6	1.3	1.6	1.6	1.6	7.7	4.8	4.8
Louisiana	0.3	1.4	1.9	1.9	0.2	1.2	1.8	1.8	1.2	3.6	4.7	4.7
Massachusetts	0.6	1.6	1.7	1.7	0.6	1.7	1.8	1.8	1.8	5.4	4.5	4.5
Michigan*	0.4	1.9	2.0	2.0	0.4	2.0	1.9	1.9	1.5	5.5	5.8	5.8
Minnesota	0.6	1.5	1.5	1.5	0.6	1.7	1.7	1.7	1.3	5.8	4.5	4.5
Missouri	0.4	1.4	1.7	1.7	0.4	1.3	1.7	1.7	2.4	6.7	4.4	4.4
Montana	0.6	2.0	1.7	1.7	0.5	2.1	1.7	1.7	****	11.6	12.1	12.1
Nebraska	0.5	1.5	1.1	1.1	0.5	1.5	1.2	1.2	2.0	4.0	3.1	3.1
New Mexico	0.3	1.1	1.9	1.9	0.4	0.7	1.5	1.5	1.8	9.9	8.2	8.2
New York	0.5	1.6	1.7	1.7	0.6	1.7	2.0	2.0	1.3	6.5	6.1	6.1
North Dakota	0.6	1.7	1.3	1.3	0.6	1.5	1.3	1.3	2.5	8.6	7.1	7.1
Texas	0.6	1.8	2.3	2.3	0.5	1.5	2.3	2.3	7.4	18.0	8.7	8.7
Vermont	0.5	1.5	1.7	1.7	0.5	1.6	1.8	1.8	3.1	7.8	5.0	5.0
Washington	0.3	1.6	1.8	1.8	0.4	1.6	1.9	1.9	2.3	7.2	7.8	7.8
Guam	0.3	0.8	1.4	1.4	****	1.0	1.6	1.6	0.8	2.9	2.8	2.8

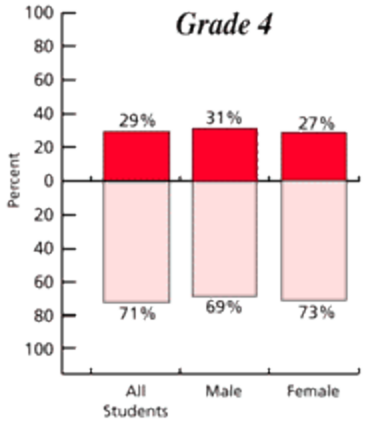
Note: A = Advanced, ≥ P = At or Above Proficient, ≥ B = At or Above Basic, < B = Below Basic
* Indicates that the state did not satisfy one or more of the guidelines for school participation rates
****Standard error cannot be accurately determined
SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Science Assessment

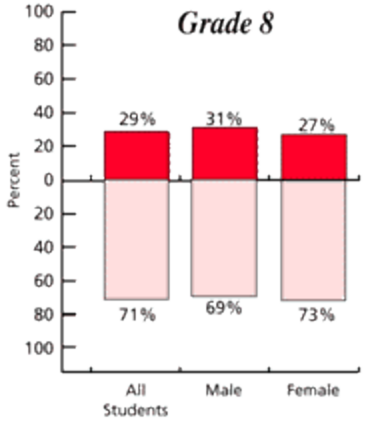
Appendix D: Figures

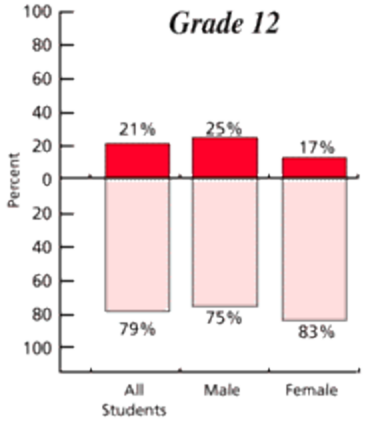
Figure 1

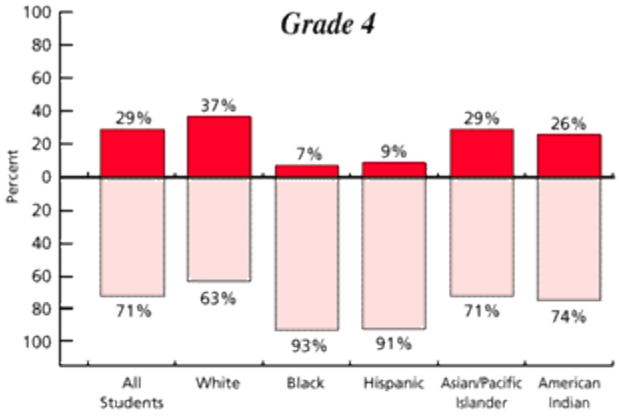
Percentage Attaining Science Achievement Levels for the Nation

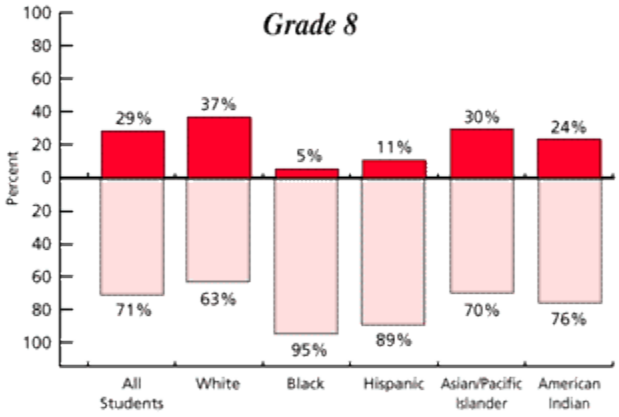


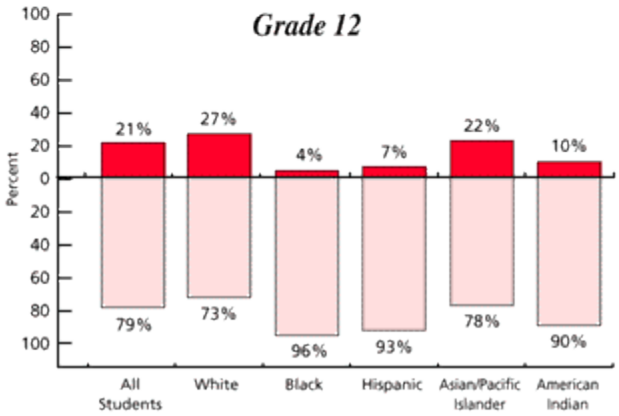

Grade 4
Percent
100
80
60
40
20
0
20
40
60
80
100
29%
31%
27%
71%
69%
73%
All Students
Male
Female

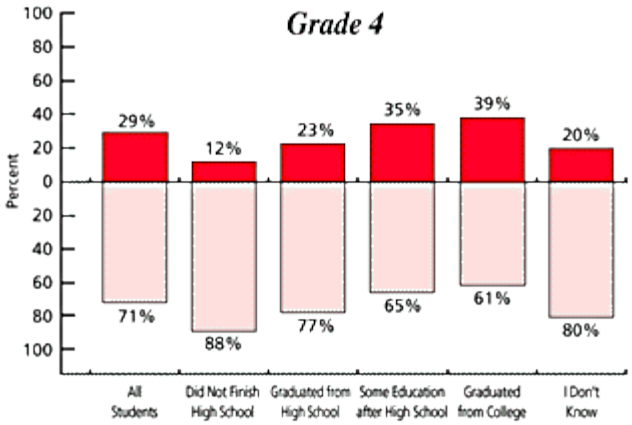

Grade 8
Percent
100
80
60
40
20
0
20
40
60
80
100
29%
31%
27%
71%
69%
73%
All Students
Male
Female

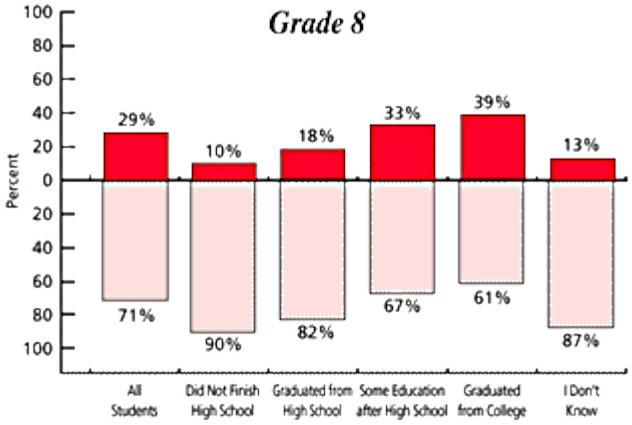

Grade 12
Percent
100
80
60
40
20
0
20
40
60
80
100
21%
25%
17%
79%
75%
83%
All Students
Male
Female

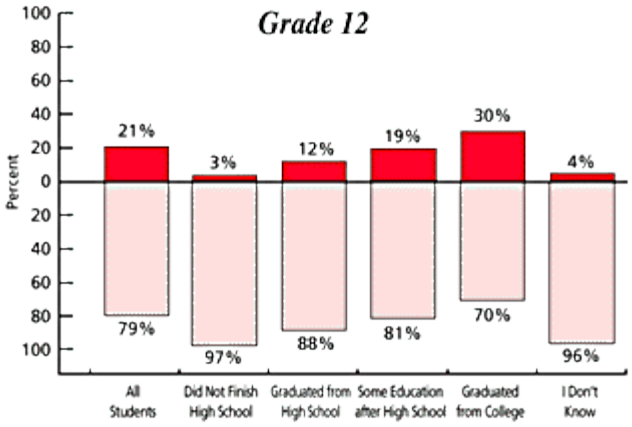

Grade 4
Percent
100
80
60
40
20
0
20
40
60
80
100
29%
37%
7%
9%
29%
26%
71%
63%
93%
91%
71%
74%
All Students
White
Black
Hispanic
Asian/Pacific Islander
American Indian

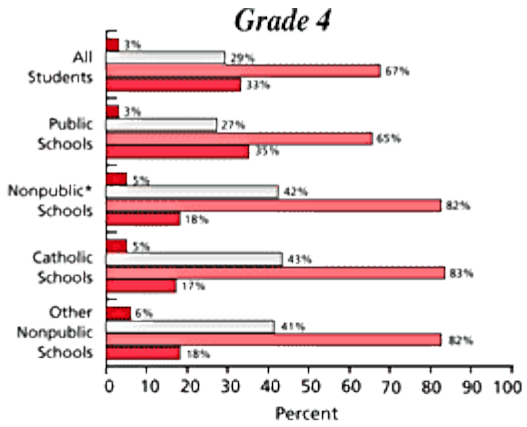

Grade 8
Percent
100
80
60
40
20
0
20
40
60
80
100
29%
37%
5%
11%
30%
24%
71%
63%
95%
89%
70%
76%
All Students
White
Black
Hispanic
Asian/Pacific Islander
American Indian

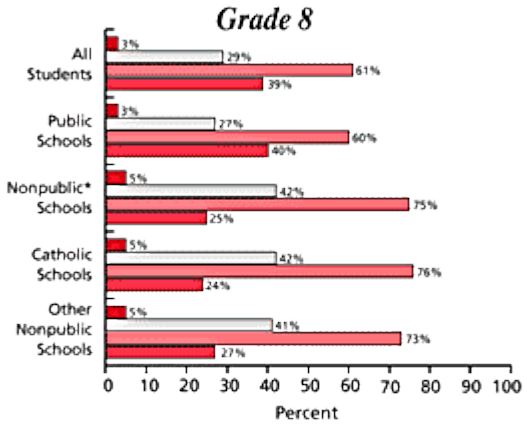

Grade 12
Percent
100
80
60
40
20
0
20
40
60
80
100
21%
27%
4%
7%
22%
10%
79%
73%
96%
93%
78%
90%
All Students
White
Black
Hispanic
Asian/Pacific Islander
American Indian

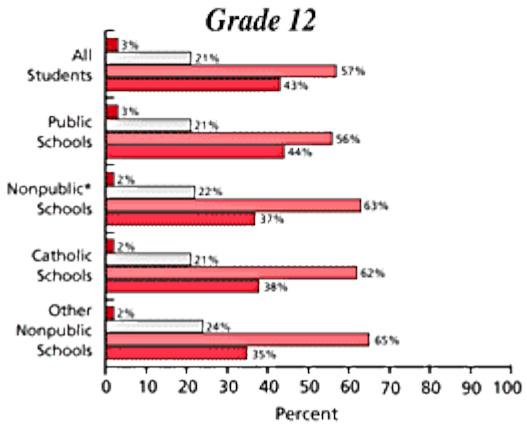

Grade 4
Percent
100
80
60
40
20
0
20
40
60
80
100
29%
12%
23%
35%
39%
20%
71%
88%
77%
65%
61%
80%
All Students
Did Not Finish High School
Graduated from High School
Some Education after High School
Graduated from College
I Don't Know


Grade 8
Percent
100
80
60
40
20
0
20
40
60
80
100
29%
10%
18%
33%
39%
13%
71%
90%
82%
67%
61%
87%
All Students
Did Not Finish High School
Graduated from High School
Some Education after High School
Graduated from College
I Don't Know


Grade 12
Percent
100
80
60
40
20
0
20
40
60
80
100
21%
3%
12%
19%
30%
4%
79%
97%
88%
81%
70%
96%
All Students
Did Not Finish High School
Graduated from High School
Some Education after High School
Graduated from College
I Don't Know







* Nonpublic schools comprise two components: Catholic schools and other nonpublic schools (which are displayed as distinct categories in this figure).

Acknowledgements

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