# NATIONAL ASSESSMENT OF EDUCATIONAL PROGRESS

# ACHIEVEMENT LEVELS

## 1992–1998

## SCIENCE

THE NATION'S REPORT CARD

National Assessment of Educational Progress
National Assessment Governing Board
U.S. Department of Education

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# National Assessment of Educational Progress Achievement Levels 1992–1998 for Science

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July 2001

National Assessment of Educational Progress
National Assessment Governing Board
U.S. Department of Education

THE NATION'S REPORT CARD

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# Table of Contents

# Understanding Achievement Levels for the Science National Assessment of Educational Progress

## Purpose of This Report

The purpose of this report is to increase understanding of the achievement levels for the National Assessment of Educational Progress (NAEP): what they are, and what they are **not.** The report is a reference for the American public, especially educators, parents, students, and policymakers. Seven booklets make up the report; each booklet focuses on one of the subjects for which NAEP achievement levels have been set. These include mathematics, science, reading, writing, civics, U.S. history, and geography.

The information in this report will be helpful in interpreting accurately the meaning of the *Science* NAEP achievement levels and student performance relative to the levels. The information will also aid in understanding the NAEP reports, commonly known as *The Nation's Report Card*.

## What Is the National Assessment of Educational Progress?

NAEP is a survey of American students' knowledge and skills in different subjects at grades 4, 8, and 12. NAEP combines the samples of performances to provide information about the knowledge and skills of students in the nation as a whole, in each participating state, and in different demographic groupings.

## What Are NAEP Achievement Levels?

Congress authorized the National Assessment Governing Board (NAGB) to set achievement goals for student performance on NAEP. NAGB identified and defined the goals in terms of three levels of achievement: Basic, Proficient, and Advanced. NAEP achievement levels define ***what students should know and be able to do*** at the Basic, Proficient, and Advanced levels established by NAGB.

There are three parts to NAEP achievement levels: descriptions, cutscores, and sample items. The achievement levels descriptions are statements of what students should know and be able to do at each level. The cutscores represent the minimum score required for performance at each NAEP achievement level and are usually reported along with the percentage of students who scored *at or above* the level. Sample items provide illustrations of student knowledge and skills required within each level of achievement.

Achievement levels for the Science NAEP should not be compared to those for other subjects because the Science achievement levels describe what students know and can do. For other subjects, the achievement levels describe what students *should* be able to do.

## What Constitutes Basic, Proficient, and Advanced Achievement?[1]

Proficient achievement is defined by NAGB as ***"solid academic performance*** exhibiting competency over challenging subject matter." The Basic and Advanced achievement levels are defined relative to this central level. Basic achievement is performance that exhibits ***"partial mastery*** over skills fundamental to Proficient performance." Advanced achievement exhibits ***superior performance.*** Achievement that is less than partial mastery is referred to simply as "below Basic."

## How Good Is Good Enough?

The overall achievement goal for American students is performance that qualifies at the Proficient level or higher. Meeting this goal for the nation as a whole will take time. Competency over challenging subject matter is not easily attained. The average performance score on NAEP in most subjects falls within the Basic achievement level.

## How Should Achievement Levels Be Interpreted?

Unlike most assessments, there are no individual scores on NAEP. Achievement levels define performance, not students. Notice that there is no mention of "at grade level" performance in these achievement goals. In particular, it is important to understand clearly that the Proficient achievement level does not refer to "at grade" performance. Nor is performance at the Proficient level synonymous with "proficiency" in the subject. That is, students who may be considered proficient in a subject, given the common usage of the term, might not satisfy the requirements for performance at the NAEP achievement level. Further, Basic achievement is more than minimal competency. Basic achievement is less than mastery but more than the lowest level of performance on NAEP. Finally, even the best students you know may not meet the requirements for Advanced performance on NAEP.

## How Are the Achievement Levels Developed?

The achievement levels-setting process is carefully designed, implemented, and evaluated with great attention to detail and technical precision. The process of developing achievement levels involves the judgments of informed, well-qualified people from throughout the nation and its territories. Approximately 30 persons serve on each of three grade-level panels to develop NAEP achievement levels. These 90 panelists include teachers (about 55 percent), other educators (about 15 percent), and members of the general public (about 30 percent). To the extent possible, the panels are proportionally representative of the nation's population with respect to region, race/ethnicity, and gender.

Panelists participate in a five-day process that includes training and instruction to prepare them for the standard-setting tasks. Panelists make three separate sets of judgments of student performance on NAEP items, and they receive a variety of feedback information about the implications of their judgments. Sophisticated psychometric methods are used to produce the feedback and guide the process.

[1]These general descriptions of the NAEP achievement levels do not apply to the Science NAEP. Please see Who Sets the Achievement Levels? on page 3.

Highly experienced staff and technical advisors carefully monitor the achievement levels-setting process. Panelists evaluate every conceivable aspect of the process, and their responses are fully analyzed. Extensive analyses are conducted to determine whether panelists seemed to be making logical, informed judgments and whether similar panelists would make similar judgments. Yet, there is no way of knowing that the standards are "right" because there is no true standard against which to evaluate the panelists' judgments.

## Who Sets the Achievement Levels?

Under the law, the National Assessment Governing Board is the final authority on determining the levels and their use for reporting NAEP performance results. The Board reviews information about the process for setting the achievement levels and panelists' opinions of it. NAGB considers the recommendations of panelists and technical advisors regarding the levels. The Board also considers additional information about student course-taking patterns in the subject area and student performance on other assessments in the subject. NAGB then judges whether the standards are reasonable and makes the final decisions for setting the standards.

Before setting the Science Achievement Levels, NAGB reviewed achievement level data from other subjects, the 1997 Advanced Placement results in science for twelfth-grade students, and information about eighth-grade student performance on the Third International Mathematics and Science Study. NAGB concluded that the recommendations based on the work of the achievement levels-setting panels were not reasonable. The Governing Board judged that some levels were set too high and some were set too low. NAGB analyzed the relationship of cutscores to percentages of students scoring at or above different levels and adopted levels that it judged to be reasonable.

New descriptions of achievement levels were developed to describe the performance of students scoring within the score range of each achievement level. In addition, new exemplar items were selected to represent the performance of students scoring within the achievement levels.

# Overview of the Framework for the National Assessment of Educational Progress in Science

This overview of the Science Framework for the National Assessment of Educational Progress (NAEP) details what the Science NAEP assesses. The framework defines the structure, organization, and general content of the assessment. Many questions must be answered before an assessment can be developed, and answers to those questions are presented in the framework.

## What Is the Science NAEP Framework?

The framework is **the** guide to the assessment,[2] and it represents what is considered essential learning in science. The framework defines the structure, organization, and general content for the Science assessment.

## How Was the Framework Developed?

A national consensus process was used to develop the content of the framework documents for the 1996 NAEP in Science and the other assessments. Panels of content experts, practitioners, and professionals in related fields developed the Science NAEP Framework to reflect the input collected through the consensus process. The committees who developed the framework were broad-based groups of scientists and educators.

These committees reviewed and evaluated state frameworks and assessments in science in their development of the Science NAEP Framework. Comments were collected in public hearings held in San Francisco and Washington, D.C. Reports on the development of the framework were presented at regional and national science education meetings where participants provided feedback to the committees. Draft copies of the framework were circulated widely to generate additional comments and feedback.

## What Are the Components of the Framework?

The Science NAEP Framework is organized along two major dimensions: the three fields of earth, physical, and life sciences, and ways of knowing and doing science, which encompass conceptual understanding, scientific investigation, and practical reasoning. Some assessment items merge technology with the science content areas. Further, the "Nature of Science" and "Themes" of science (models, systems, and patterns of change) integrate the three fields of science for the assessment.

[2]Frameworks are available on the Internet at *www.nagb.org*. Printed copies of the framework for Science and for other NAEP subjects are available from the National Assessment Governing Board. Copies are also available through the U.S. Department of Education's ED Pubs information center at 1–877–4ED–Pubs.

With respect to the three fields of science, the main emphasis of the assessment is on knowledge in the content areas. The framework recommends an approximately equal distribution of content areas across the three fields of science for the grade 4 and grade 12 science assessments. The grade 8 assessment includes a heavier emphasis on life sciences (approximately 40 percent of the content), with physical and earth sciences each covering about 30 percent. At each grade level, knowledge and understanding of technology is assessed in at least a few exercises. To the extent practicable, exercises at each grade cover more than one field of science to reflect real-world needs for science knowledge and skills.

Within earth science, knowledge and skills related to solid Earth, water, air, and Earth in space are assessed. The assessment of physical science includes topics in matter and its transformations, energy and its transformations, and motion. The assessment of life science includes change and evolution, cells and their functions, organisms, and ecology. The framework provides several examples of the content to be assessed in each of these topics. With respect to ways of knowing and doing science, the assessment requires students to demonstrate conceptual understanding. The framework recommends that the assessment address conceptual understanding—the ability to understand basic concepts and tools in the process of a scientific investigation—in about 45 percent of the content assessed at each grade. Scientific investigation—the ability to use the appropriate tools and thinking processes in science—should be more heavily emphasized in grade 4 (45 percent) than in grades 8 and 12 (30 percent each). Assessing practical reasoning involves determining if students can find effective solutions to everyday problems by applying scientific knowledge and skills. Practical reasoning should be assessed at all grades; about 10 percent of the assessment at grade 4 and about 25 percent at grades 8 and 12 should address practical reasoning skills.

In addition, a limited subset of items must assess students' understanding of the nature of science: the historical development of science and technology, the ways of knowing and types of reasoning that characterize these fields, and the methods of inquiry and problem solving.

Further, themes of science, big ideas or key organizing concepts in science, are to be assessed. Students in grade 4 should demonstrate beginning-level understanding of systems, models, and patterns of change. About one-third of the grade 4 assessment and one-half of the assessments at grades 8 and 12 should integrate measurement of students' understanding of themes into the measurement of content from one or more fields of science.

The Science NAEP represents a breakthrough in large-scale assessments in that each student engages in one hands-on science task. The tasks cover all fields of science. The last set of questions in the assessment for each student is related to the hands-on task. The Science NAEP's assessment period was extended to 90 minutes to allow additional time for the hands-on task.

Students spend at least 50 percent of the assessment time responding to questions that require a written response and the remainder responding to multiple-choice questions. The framework directs that about 30 percent of the assessment time be devoted to questions requiring extended written responses. Further, assessments for at least half the students include an in-depth examination of a single topic or problem in science.

# Achievement Levels: Descriptions and Cutscores

Note: The performance of students on the Science NAEP is reported on a scale of 0 to 300. The average score for all grades is 150 with a standard deviation of 35 scale score points. Italicized text is a summary of the achievement level description.

## 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, students 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 (205)

*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.

## 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 (208)

*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.

## GRADE 12

### Basic (146)

*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 predictions.*

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.

# Achievement Levels: Sample Items

## Interpreting the Data

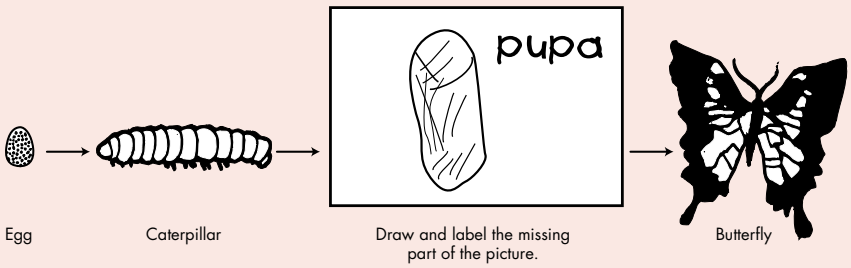
Because a representative sample of students at each grade level is selected to take the NAEP, each assessment exercise is administered to a relatively small subsample of students in each grade. Typically, around 10,000 students are assessed in each grade, and each item is administered to just under 2,000 students. The values reported in the tables accompanying each item are probability estimates of performance at each level of achievement for students at each grade level tested in NAEP. The data reported for the sample items show the probability of a correct response to multiple choice items and of a specific score on items requiring students to construct a response. The probabilities are estimates of how students scoring within each range of achievement on the NAEP score scale would perform on each item. These probabilities are, in fact, averages of performance within each achievement level. Some students who score within the Basic range of achievement, for example, will answer a specific multiple choice item correctly and some will not. Furthermore, student performance within the Basic range of achievement may be very near the lower boundary, around the middle, or very near the upper boundary, that is, approaching the Proficient level of achievement. The probabilities reported here are weighted averages to represent performance across the range, with more weight given to scores in the middle of the achievement ranges.

Here is a suggested way to read the data for multiple choice items: "Students performing in the (Basic/Proficient/Advanced) score range have (X) probability of answering this item correctly."

For constructed response items, here is a suggested way to read the data: "Students performing in the (Basic/Proficient/Advanced) score range have (X) probability of giving a response scored at the indicated level (1, 2, 3, etc.) for this sample item."

## Grade 4 Sample 1—Basic Performance

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




| Probability of a score of 2 | |
|---|---|
| Basic | 53% |
| Proficient | 75% |
| Advanced | 89% |

**Scoring guide**

2 = Complete: Draws and labels the pupal stage of the butterfly life cycle.

1 = Partial: Draws the pupal stage of the butterfly life cycle but does not label it, OR writes the label without a diagram.

0 = Unsatisfactory/Incorrect: Does not draw the pupal stage of a butterfly life cycle.

## Grade 4 Sample 2—Basic Performance

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.

metel is hard

| Probability of a score of 1 | |
|---|---|
| Basic | 53% |
| Proficient | 75% |
| Advanced | 92% |
| **Scoring guide** | |
| 2 = Complete: Lists two properties of metal. | |
| 1 = Partial: Lists one property of metal. | |
| 0 = Unsatisfactory: Does not list any properties of metal. | |

## Grade 4 Sample 3—Proficient Performance

All animals need oxygen to live.

Describe how a frog gets oxygen into its body.

Well when its older the gills go away and they get lungs.

| Probability of a score of 1 | |
|---|---|
| Basic | 43% |
| Proficient | 56% |
| Advanced | 70% |
| **Scoring guide** | |
| 2 = Complete: Describes frogs' source of oxygen and the organ(s) they use for breathing. | |
| 1 = Partial: Describes frogs' source of oxygen, OR describes the organ(s) frogs use for respiration. | |
| 0 = Unsatisfactory/Incorrect: Does not identify frogs' source of oxygen (water, air), or the organs they use for respiration (lungs, skin). | |

## Grade 4 Sample 4—Proficient Performance

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.

An earthquake will put a split in the earth.

How is the Earth's surface changed?

The crust splits open.

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

Decay will sometimes make canoyns.

How is the Earth's surface changed?

Large holes in the earth appear.

| Probability of a score of 1 | |
|---|---|
| Basic | 40% |
| Proficient | 63% |
| Advanced | 87% |

**Scoring guide**

3 = Complete: Identifies two forces and describes how each force changes the Earth's surface.

2 = Essential: Identifies two forces and describes how one of the forces changes the Earth's surface.

1 = Partial: Identifies one force and describes how the force changes the Earth's surface. OR, identifies one or two forces that change the Earth's surface but does not describe how they change it.

0 = Unsatisfactory/Incorrect: Does not identify forces that change the Earth's surface.

## Grade 4 Sample 5—Advanced Performance

Think about how humans grow and develop from newborn babies to adults. Is a human's life cycle more like a frog's life cycle or more like a grasshopper's life cycle? Explain your answer.

A grasshopper. Grasshoppers and humans don't change their physical looks. They only continue to grow.

| Probability of correct response | |
|---|---|
| Basic | 14% |
| Proficient | 35% |
| Advanced | 67% |

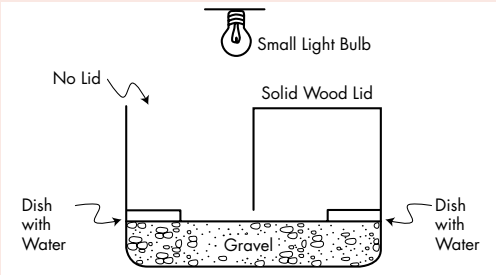
**Scoring guide**

1 = Complete: Offers a brief description of one correct similarity between the human life cycle and the frog or grasshopper life cycle.

0 = Unsatisfactory/Incorrect: Describes no correct similarities between the human life cycle and the grasshopper or frog life cycles, OR describes an incorrect similarity, OR gives a characteristic that all three have.

## Grade 4 Sample 6—Advanced Performance

Some fourth-grade students were doing a project for their science class. They were trying to find the answer to the question "Do beetles choose to live in bright light or in the shade?" The next three pictures show the ways that three different students set up an experiment to find out if beetles choose to live in bright light or in the shade.




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

Yes because the have gravel in each box, and water. They can find out if they like to live in the shade or bright light.

| Probability of a score of 2 | |
|---|---|
| Basic | 15% |
| Proficient | 31% |
| Advanced | 55% |

**Scoring guide**

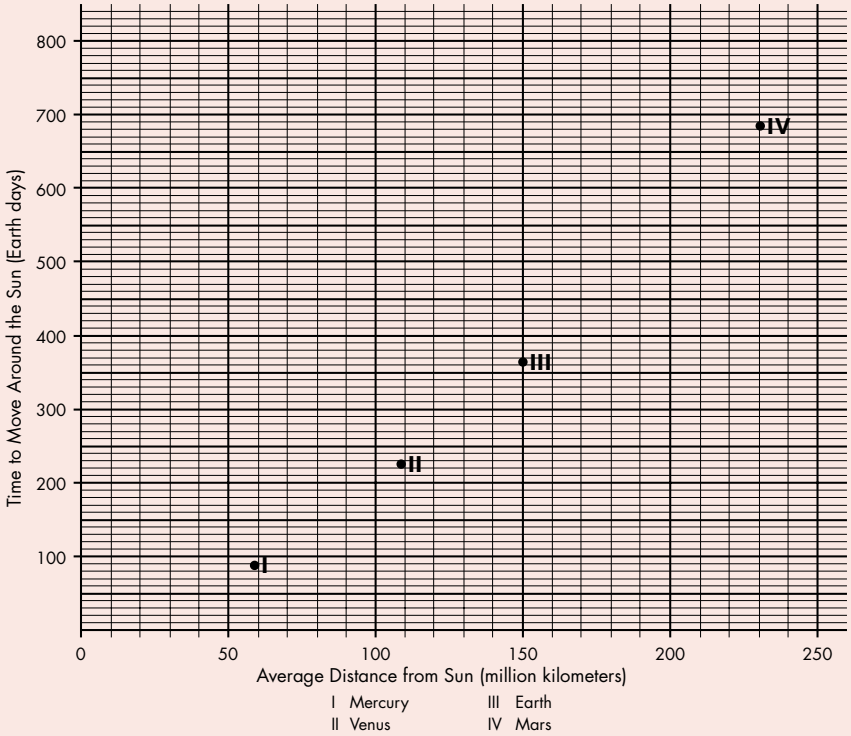
2 = Complete: States that the experimental design is appropriate because the beetles are provided with a choice of bright light or shade and/or have a dish of water in bright light and in the shade, OR states that the only condition that changes on each side is the light, all other conditions are the same.

1 = Partial: States that the experimental design is appropriate and offers no, or an incorrect, explanation.

0 = Unsatisfactory/Incorrect: States that the experimental design is not appropriate and may or may not offer an explanation.

## Grade 8 Sample 1—Basic Performance

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.




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.

Mecury and Venus Because the graph said so

| Probability of a score of 1 | |
|---|---|
| Basic | 73% |
| Proficient | 91% |
| Advanced | 98% |

**Scoring guide**

2 = Complete: Identifies both Mercury and Venus and gives a correct explanation of the procedure (i.e., stating data from the graph: Mercury year = 90 days, Venus year = 225 days).

1 = Partial: Identifies Mercury and/or Venus but fails to give a correct explanation, OR identifies either Mercury or Venus and gives a correct explanation.

0 = Unsatisfactory/Incorrect: Identifies Mars.

*Note: If all 3 planets are identified, a score of 1 is given.*

## Grade 8 Sample 2—Basic Performance

For the following question, think about what happens inside your body when you eat bread.

Describe how the nutrients from digested bread move from the digestive organs to muscles and other tissues where they are needed.

It goves throw the wall of the stomach and in to the blood than the heart pumpes it to the tissues and museles

| Probability of a score of 1 | |
|---|---|
| Basic | 52% |
| Proficient | 77% |
| Advanced | 94% |

**Scoring guide**

2 = Complete: Describes the absorption of materials through the (wall) of the small intestine and the transport of these absorbed materials to tissues by the circulatory system (e.g., blood system, veins, arteries, blood).

1 = Partial: Describes the absorption of digested materials through the (wall) of the (small) intestine, OR describes the transport of digested materials to tissues by the circulatory system.

0 = Unsatisfactory/Incorrect: Describes neither absorption nor circulation.

## Grade 8 Sample 3—Proficient Performance

Raul's little sister, Sarah, wants to know why she can see herself *in* a mirror, but she can see *through* a window. What should Raul tell his sister to explain the differences between mirrors and windows?

The back of mirrors are painted a dark color. This reflects light and any other object that can be seen. Glass doesn't have anything on the back or front that reflects.

| Probability of a score of 2 | |
|---|---|
| Basic | 29% |
| Proficient | 60% |
| Advanced | 86% |

**Scoring guide**

2 = Complete: Identifies the physical and reflective properties of mirrors and windows (light must be mentioned). Refers to both the backing of reflective materials and the reflective properties.

1 = Partial: Demonstrates some understanding of the properties of reflective materials by identifying that mirrors have a backing on them but windows do not, OR, by identifying that light bounces off a mirror but goes through glass.

0 = Unsatisfactory/Incorrect: States that mirrors and windows differ, but gives no reason for the difference.

## Grade 8 Sample 4—Proficient Performance

The following question refers to an experiment your teacher asks you to perform to compare the heating rate of soil with that of water. To do this, you are given the following materials.

2 heat lamps
2 bins
2 thermometers
1 sample of soil
1 sample of water
1 timer

You are instructed to heat a sample of soil and a sample of water with heat lamps, measuring the temperature of each sample once a minute for 8 minutes.

There are many experimental variables that must be controlled for in order to perform this experiment accurately. Name three of these variables.

heat of the bulb (must be equal temp.)
Same kind of soil
Same temprature of water.

**Probability of a score of 1**

| | |
|---|---|
| Basic | 33% |
| Proficient | 64% |
| Advanced | 92% |

**Scoring guide**

3 = Complete: Provides three experimental variables that need to be controlled from the following list: samples (equal volume or equal amounts, size; adequate separation or insulation from each other; same starting temperatures), bins (same size, shape, color, capacity), heat lamps (equal wattage, voltage, power; equal distance from the sample), thermometers (bulb placed equal distance under the surface; bulb placed in similar position in the sample relative to the heat lamp; temperatures measured at the same time).

2 = Essential: Provides two experimental variables that need to be controlled from the list above.

1 = Partial: Provides one experimental variable that needs to be controlled from the list above.

0 = Unsatisfactory/Incorrect: Provides no reasonable experimental variables that need to be controlled.

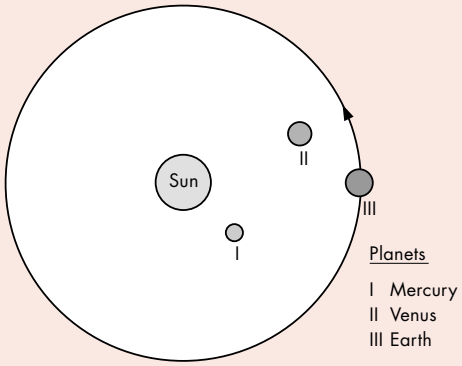
*External factors: no external sources of heat or cooling, have identical surroundings (same room temperature), do experiments at same time (simultaneously).*

*Note: Students need not say that things must be equal (e.g., equal amounts in sample) but must clearly specify the variable (e.g., amount in the samples, not just samples).*

*Note: Continual timing (i.e. every minute) is not acceptable—it is in the prompt.*

*Note: Must mention amount of both materials to receive credit.*

## Grade 8 Sample 5—Advanced Performance




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.

Venus could be on the outher side of the Sun and Mercury can be near Earth.

| Probability of a score of 2 | |
|---|---|
| Basic | 18% |
| Proficient | 39% |
| Advanced | 68% |

**Scoring guide**

2 = Complete: Demonstrates understanding of how Mercury could be the planet closest to Earth by explaining or showing a picture in which Earth and Mercury are on one side of their orbits and Venus (and Mars) are in position(s) that are further away, such as being on the other sides of their orbits. Must allude to or show possible configuration. Picture alone can be adequate. All information must be correct.

1 = Partial: Demonstrates an awareness that the planets do not stay aligned and may offer an explanation of a situation in which Mercury is the closest planet to Earth.

0 = Unsatisfactory/Incorrect: Shows no understanding of how Mercury could be the planet closest to Earth, OR answers "Yes" with no or incorrect explanation.

## Grade 8 Sample 6—Advanced Performance

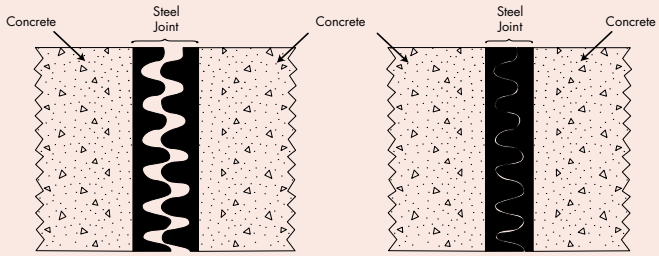



Figure A Figure B

A concrete bridge was built using special steel joints between the sections of concrete. The figures above show one of these joints at two different times. Which of the following best explains why Figure A and Figure B look different?

(A) Figure A shows the joint on a hot day and Figure B shows the joint on a cold day.

(B) Figure A shows the joint on a cold day and Figure B shows the joint on a hot day.

(C) Figure A shows the joint on a warm, dry day and Figure B shows the joint on a cool, rainy day.

(D) Figure A shows the joint during the day and Figure B shows the joint at night.

| Probability of correct response | |
|---|---|
| Basic | 28% |
| Proficient | 41% |
| Advanced | 78% |

## Grade 12 Sample 1—Basic Performance

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.

Salt water will conduct electricity and fresh water will not, so test a water sample from each jar for conductivity. The water sample that does conduct electricity is from the salt water jar.

| Probability of a score of 2 | |
|---|---|
| Basic | 54% |
| Proficient | 76% |
| Advanced | 91% |

**Scoring guide**

3 = Complete: Describes both a method and its results.

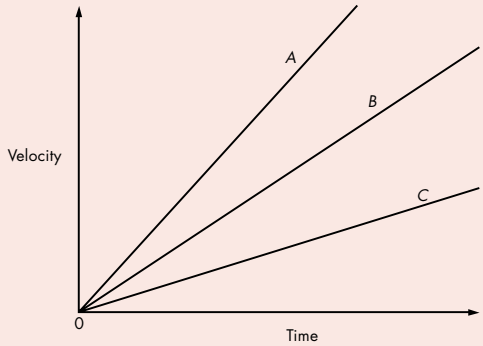
2 = Essential: Describes a method and its results but provides minimal detail, or provides a partial or flawed method.

1 = Partial: Describes a method but does not indicate how it would work.

0 = Unsatisfactory/Incorrect: Describes an inconclusive method.

## Grade 12 Sample 2—Basic Performance

A graph of velocity as a function of time when the same net force is applied to three different objects is shown below.




Which object has the greatest mass?

(A) A

(B) B

(C) C

(D) They all have the same mass.

| Probability of correct response | |
|---|---|
| Basic | 61% |
| Proficient | 90% |
| Advanced | 99% |

## Grade 12 Sample 3—Proficient Performance

A woman travelling in a train watches a train on an adjacent track go past her window. The time the other train takes to completely pass her depends on all of the following EXCEPT

(A) the speed of the train on which the woman is travelling

(B) the speed of the other train

(C) the length of the train on which the woman is travelling

(D) whether the trains are travelling in the same direction or in opposite directions

| Probability of correct response | |
|---|---|
| Basic | 40% |
| Proficient | 73% |
| Advanced | 96% |

## Grade 12 Sample 4—Proficient Performance

The Pacific Ring of Fire is a belt-shaped region that roughly coincides with the seacoasts bordering the Pacific Ocean. Explain why volcanic activity and earthquakes occur frequently in this region.

Volcanic activity and earthquakes occur frequently in this region because this region contains several tectonic plates. When the plates move, the movement causes earthquakes or a large amount of pressure that results in a volcano.

| Probability of a score of 2 | |
|---|---|
| Basic | 33% |
| Proficient | 62% |
| Advanced | 86% |

**Scoring guide**

3 = Complete: Demonstrates a thorough understanding of why volcanic activity and earthquakes occur in the region of the Pacific Rim.

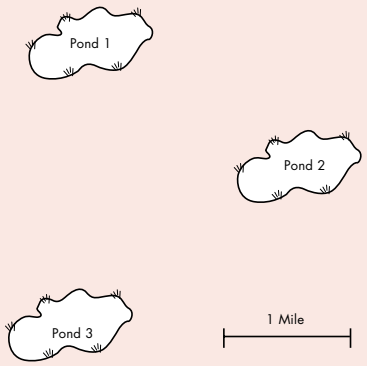
2 = Essential: Demonstrates some understanding of the causes of volcanic activity and earthquakes around the Pacific Rim. Mentions plates or faults and relative movement of them, but does not specifically describe the activity that causes earthquakes and volcanoes, OR mentions plates and some aspect of volcanic (igneous) activity but does not describe relative movement.

1 = Partial: Mentions the term "tectonic plate" or "plate" or "faults," but does not describe any relative movement of these, OR explains that the motion of parts of the earth relative to each other causes volcanic activity and earthquakes without mentioning plates or faults.

0 = Unsatisfactory/Incorrect: Does not mention the movement of tectonic plates as the cause of the volcanoes and earthquakes.

## Grade 12 Sample 5—Advanced Performance

Biologists can study how new species form by studying established populations of plants and animals. One biologist was studying the populations of frogs in three ponds that were isolated, as shown in the figure below.




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 |

The biologist wondered what would happen if the frogs could not easily travel from one pond to another. Do you think the frogs from the populations in Ponds 1, 2, and 3 would still be able to mate with each other and reproduce after hundreds of generations of being separated from one another? Explain your answer.

No. The frogs in each pond would evolve according to the conditions specific to their own pond. They would eventually evolve to a point where they are so different from each other that they could not mate.

| Probability of a score of 1 | |
|---|---|
| Basic | 15% |
| Proficient | 39% |
| Advanced | 75% |

**Scoring guide**

2 = Complete: Responds that the three populations may have changed enough during isolation so that they can no longer reproduce, but it depends on how much genetic change they accumulate (mutations). May explain that the population in Pond 3 is the "best candidate" for this change because these frogs already differ in their mating behavior (where they look for mates); therefore, they might become unable to mate and produce viable young with the other populations after a shorter period of time.

1 = Partial: Predicts that because of a period of isolation, the three frog populations may have changed enough so that they can no longer interbreed, OR may state that the three frog populations might not have been isolated long enough for three separate species to form. A limited explanation is included such as "they would evolve separately."

0 = Unsatisfactory/Incorrect: Does not provide an explanation that can justify the answer, OR states that the three populations will still be able to mate and reproduce because populations do not change over time.

## Grade 12 Sample 6—Advanced Performance

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.

Coal releases heat energy, the power plant makes heat energy into electricity, the bulb turns electricity back into heat energy and lights.

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.

Energy from the coal is greater than the other two. Energy recieved by the house is lesser than the coal but greater than the light. The light energy is the least. The reason for this is that with each transfer, energy is lost.

| Probability of a score of 3 | |
|---|---|
| Basic | 2% |
| Proficient | 16% |
| Advanced | 54% |

**Scoring guide**

3 = Complete: Includes all three of the following elements: First, the transformation of energy from chemical energy to heat (burning coal heats water), then to mechanical energy (production of steam), then to electrical energy (turning of turbines in generators), to light (electricity that lights the bulb), with a byproduct of heat. Second, the rate of energy decreases as each transformation takes place. Third, an explanation of why these energy losses occur.

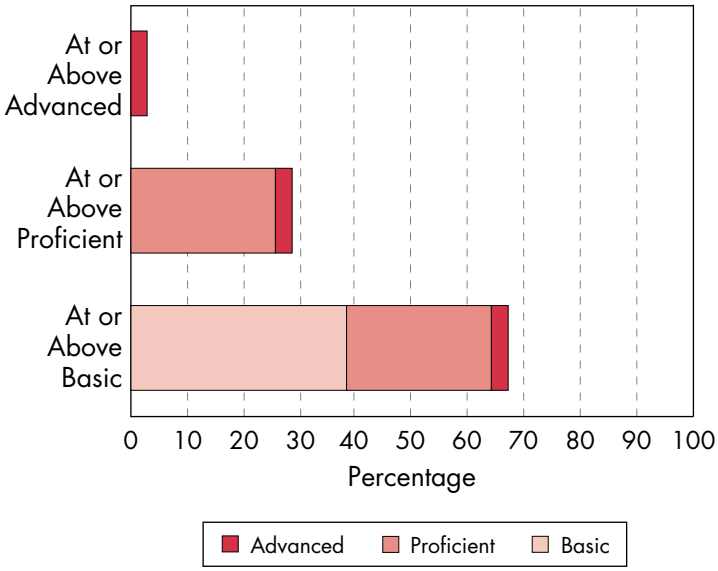
2 = Essential: Includes two of the important elements listed above.

1 = Partial: Includes one of the important elements listed above.

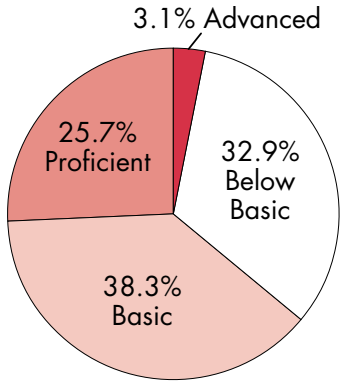
0 = Unsatisfactory/Incorrect: Includes none of the three important elements listed above.

# Performance Data

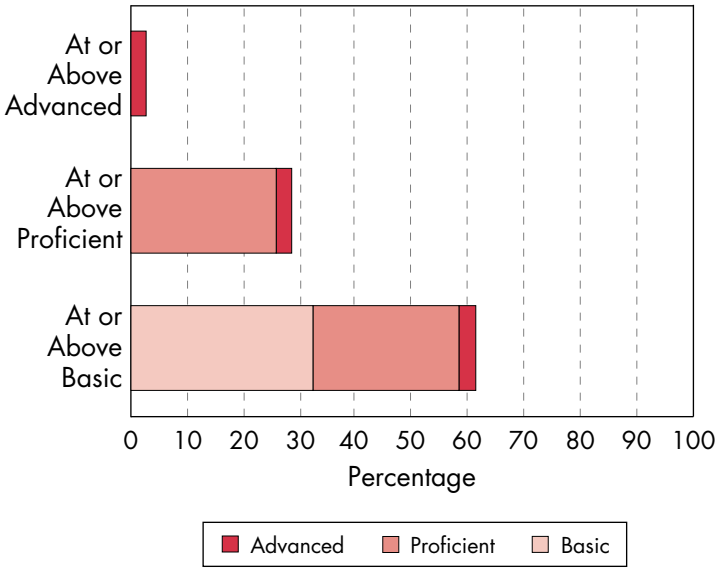
### Exhibit 1. 1996 Science NAEP, Grade 4: Percentage of Students At or Above Each Achievement Level



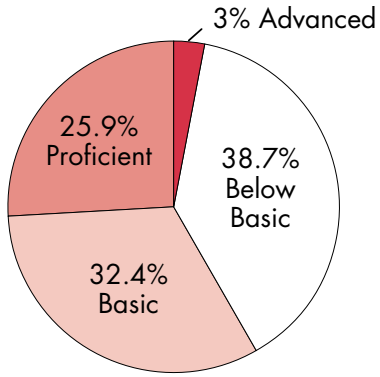

### Exhibit 2. 1996 Science NAEP, Grade 4: Percentage of Students Within Each Achievement Level



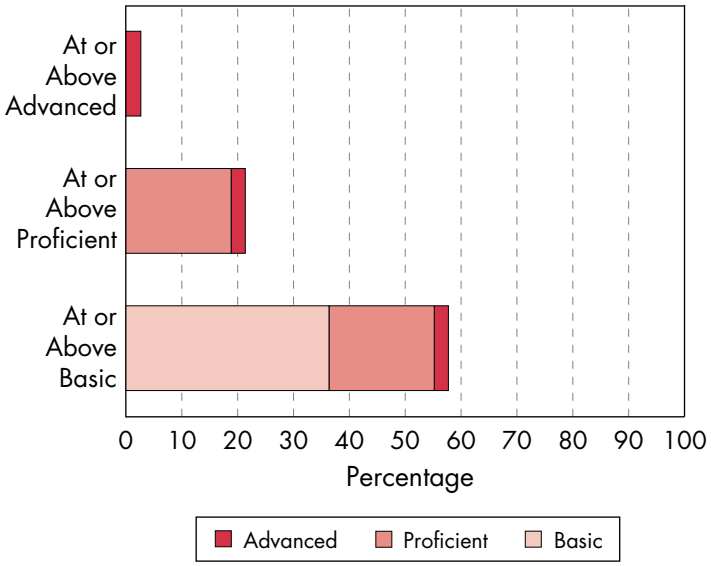

### Exhibit 3. 1996 Science NAEP, Grade 8: Percentage of Students At or Above Each Achievement Level



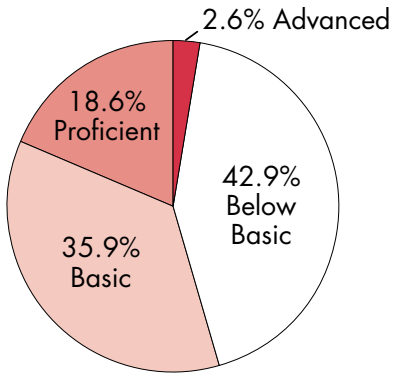

### Exhibit 4. 1996 Science NAEP, Grade 8: Percentage of Students Within Each Achievement Level



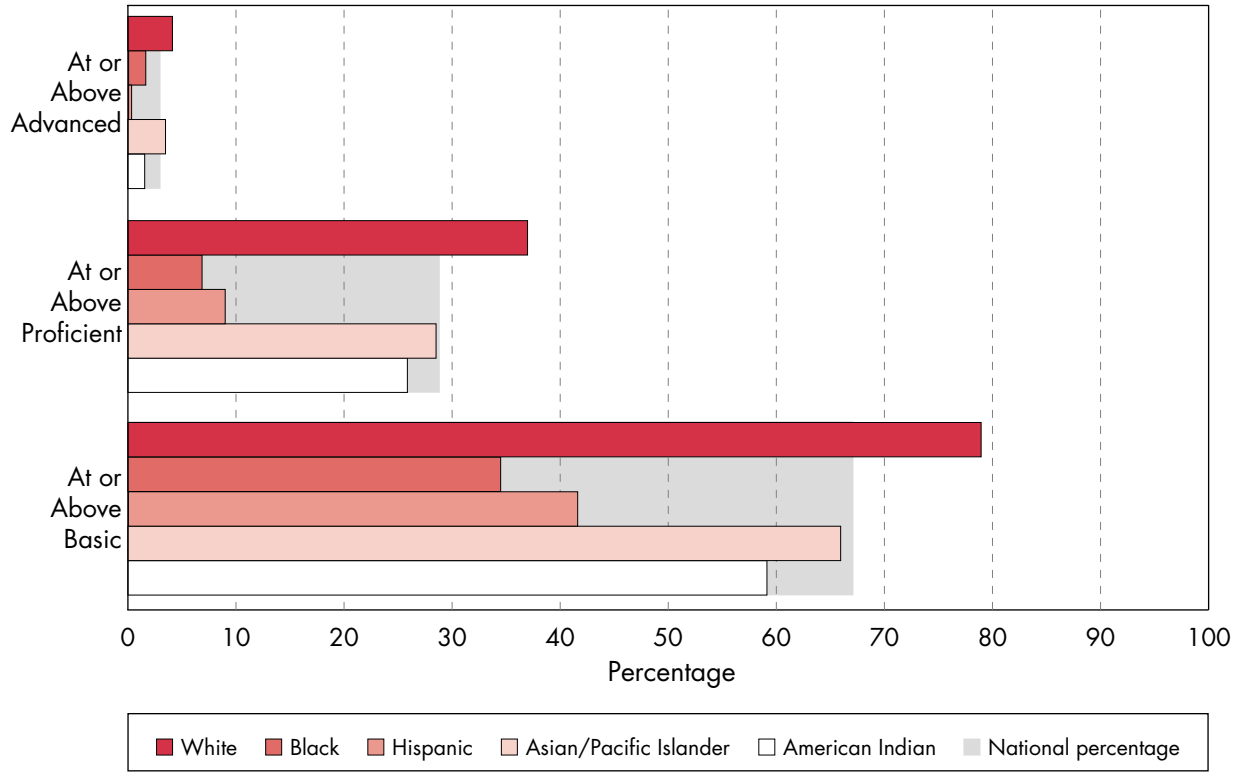
## Exhibit 5. 1996 Science NAEP, Grade 12: Percentage of Students At or Above Each Achievement Level



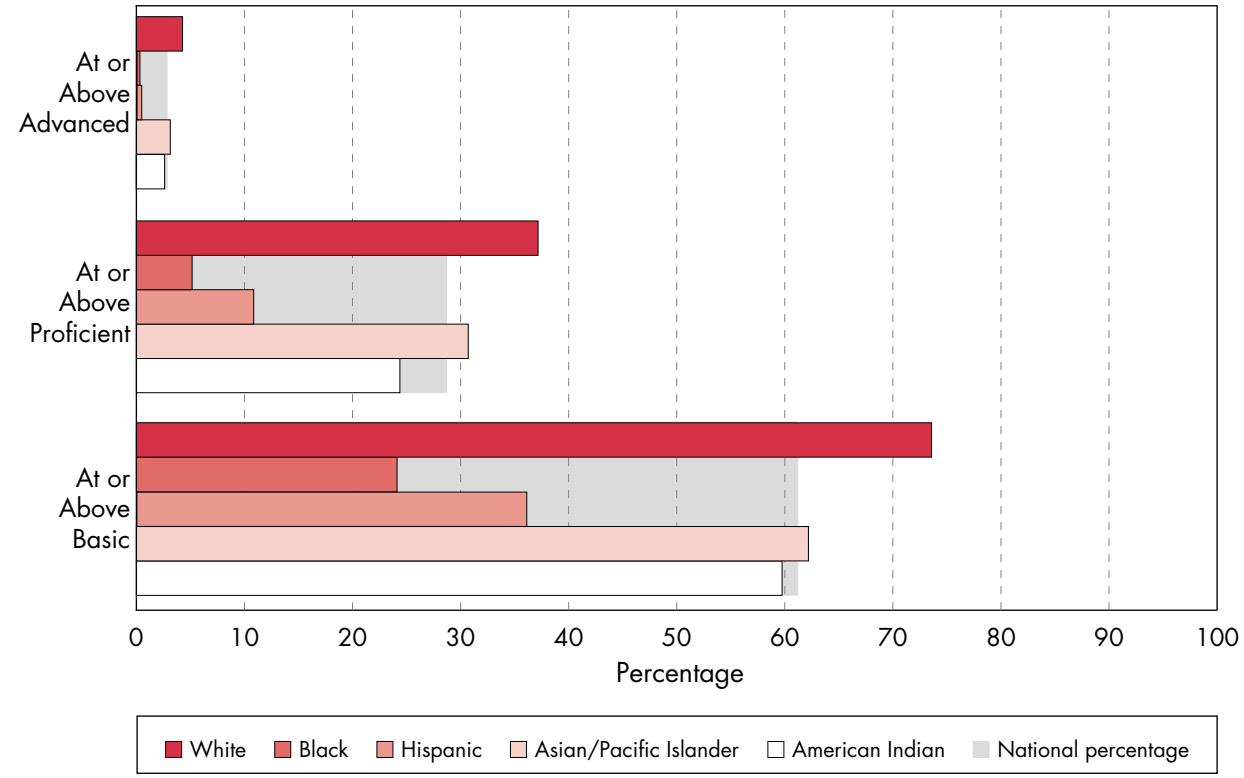

## Exhibit 6. 1996 Science NAEP, Grade 12: Percentage of Students Within Each Achievement Level



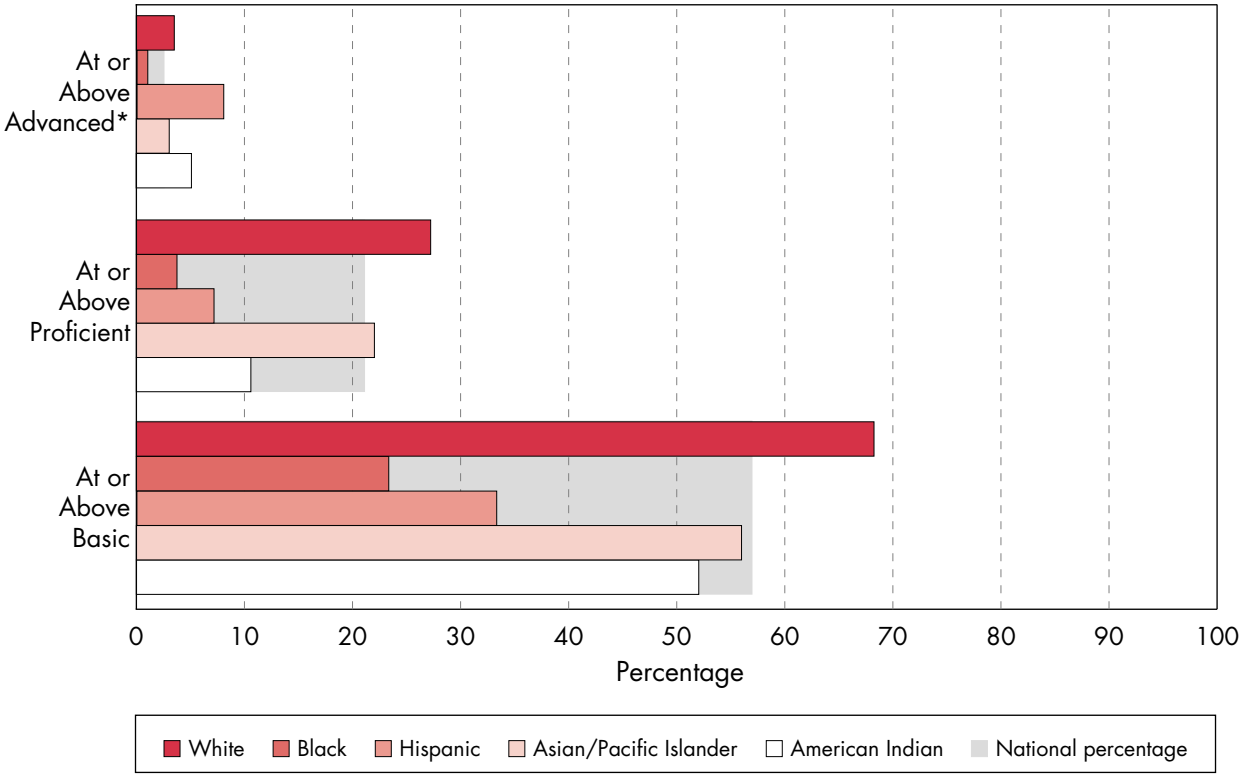

## Exhibit 7. 1996 Science NAEP, Grade 4: Percentage of Students At or Above Each Achievement Level by Race/Ethnicity



## Exhibit 8. 1996 Science NAEP, Grade 8: Percentage of Students At or Above Each Achievement Level by Race/Ethnicity



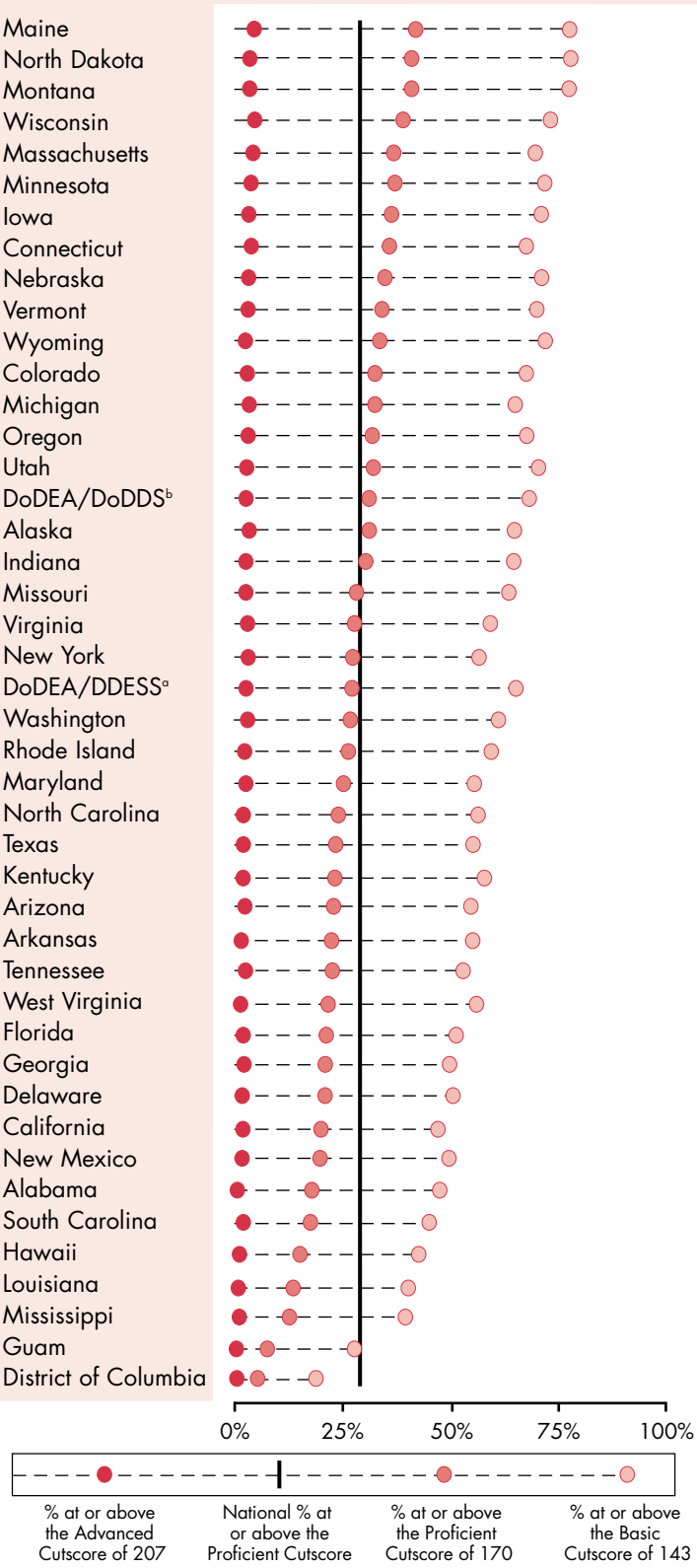

## Exhibit 9. 1996 Science NAEP, Grade 12: Percentage of Students At or Above Each Achievement Level by Race/Ethnicity




*The percentage of Black students at or above Advanced is 0.1.

## Exhibit 10. 1996 Science NAEP, Grade 8: Percentage of Students At or Above Each Achievement Level by Jurisdiction (Standard errors in parentheses)

| Jurisdiction Ordered by % At or Above Proficient | N | At or Above Advanced | At or Above Proficient | At or Above Basic |
|---|---|---|---|---|
| Maine | 2254 | 4.1 (0.6) | 41.5 (1.8) | 77.5 (1.4) |
| North Dakota | 2489 | 3.0 (0.6) | 40.6 (1.5) | 77.7 (1.3) |
| Montana | 2029 | 2.9 (0.5) | 40.6 (2.1) | 77.5 (1.7) |
| Wisconsin | 2148 | 4.1 (0.7) | 38.9 (1.9) | 73.4 (2.0) |
| Massachusetts | 2287 | 3.8 (0.6) | 36.8 (1.7) | 69.4 (1.8) |
| Minnesota | 2383 | 3.1 (0.6) | 36.7 (1.7) | 71.9 (1.7) |
| Iowa | 2172 | 2.7 (0.5) | 36.0 (1.6) | 71.1 (1.6) |
| Connecticut | 2489 | 3.3 (0.4) | 35.6 (1.7) | 67.5 (1.6) |
| Nebraska | 2724 | 2.7 (0.5) | 34.7 (1.5) | 71.1 (1.2) |
| Vermont | 1914 | 2.7 (0.5) | 34.0 (1.6) | 70.1 (1.8) |
| Wyoming | 2619 | 1.9 (0.5) | 33.5 (1.3) | 71.5 (1.2) |
| Colorado | 2514 | 2.2 (0.4) | 32.4 (1.2) | 67.6 (1.5) |
| Michigan | 2186 | 2.8 (0.4) | 32.3 (2.0) | 64.9 (1.9) |
| Oregon | 2275 | 2.6 (0.4) | 31.9 (1.8) | 67.6 (2.0) |
| Utah | 2715 | 2.1 (0.4) | 31.7 (1.2) | 70.2 (1.2) |
| DoDEA/DoDDS[b] | 2223 | 2.1 (0.4) | 31.1 (1.3) | 68.1 (1.0) |
| Alaska | 1517 | 2.7 (0.6) | 31.0 (1.6) | 64.5 (1.8) |
| Indiana | 2313 | 2.0 (0.5) | 30.1 (1.9) | 64.6 (1.9) |
| Missouri | 2389 | 2.0 (0.4) | 27.9 (1.3) | 63.7 (1.7) |
| Virginia | 2552 | 2.4 (0.4) | 27.3 (2.1) | 59.1 (1.9) |
| New York | 1876 | 2.5 (0.6) | 26.9 (1.7) | 56.6 (2.0) |
| DoDEA/DDESS[a] | 602 | 1.9 (0.7) | 26.7 (2.2) | 64.9 (2.5) |
| Washington | 2501 | 2.2 (0.4) | 26.6 (1.6) | 60.8 (1.9) |
| Rhode Island | 2087 | 1.8 (0.4) | 26.0 (1.5) | 59.1 (1.5) |
| Maryland | 2092 | 1.9 (0.4) | 25.1 (1.8) | 55.1 (2.0) |
| North Carolina | 2616 | 1.6 (0.3) | 23.9 (1.4) | 56.4 (1.5) |
| Texas | 2300 | 1.5 (0.5) | 23.3 (1.5) | 54.9 (2.3) |
| Kentucky | 2459 | 1.5 (0.6) | 23.1 (1.3) | 57.6 (1.6) |
| Arizona | 2151 | 1.7 (0.6) | 22.6 (1.7) | 54.6 (2.0) |
| Arkansas | 1858 | 1.2 (0.4) | 22.2 (1.5) | 54.6 (1.8) |
| Tennessee | 2287 | 1.6 (0.5) | 22.0 (1.7) | 53.1 (2.4) |
| West Virginia | 2602 | 1.0 (0.2) | 21.0 (1.1) | 56.2 (1.6) |
| Florida | 2353 | 1.5 (0.4) | 20.9 (1.6) | 51.0 (2.3) |
| Georgia | 2470 | 1.5 (0.3) | 20.9 (1.7) | 49.5 (2.1) |
| Delaware | 1903 | 1.2 (0.3) | 20.6 (1.0) | 50.9 (1.2) |
| California | 2292 | 1.5 (0.4) | 19.5 (1.7) | 46.8 (2.1) |
| New Mexico | 2377 | 1.1 (0.4) | 19.3 (0.7) | 49.3 (1.5) |
| Alabama | 2186 | 0.8 (0.4) | 17.8 (1.5) | 47.2 (2.1) |
| South Carolina | 2162 | 1.4 (0.4) | 17.2 (1.4) | 45.0 (2.1) |
| Hawaii | 2153 | 0.5 (0.2) | 14.7 (1.0) | 42.3 (1.2) |
| Louisiana | 2615 | 0.6 (0.2) | 13.4 (1.2) | 40.3 (1.8) |
| Mississippi | 2469 | 0.7 (0.2) | 12.3 (1.0) | 39.3 (1.8) |
| Guam | 930 | 0.3 (*) | 7.3 (1.0) | 27.7 (1.6) |
| District of Columbia | 1700 | 0.3 (0.2) | 4.8 (0.9) | 18.5 (1.0) |




(*)Standard error estimates cannot be precisely determined.
[a]DoDEA/DDESS: Department of Defense Educational Activity/Department of Defense Domestic Dependent Elementary and Secondary Schools
[b]DoDEA/DoDDS: Department of Defense Educational Activity/Department of Defense Dependent Schools (Overseas)

## Exhibit 11. 1996 Science NAEP, Grade 8: Percentage of Students in Each Participating Jurisdiction At or Above Each Achievement Level, by Race/Ethnicity (Standard errors in parentheses)

Note: Data were collected in each participating state on the number of White, Black, Hispanic, Asian/Pacific Islander, and American Indian students who took the NAEP. If the sample size of one or more of these populations was too small to produce accurate data, the categories were omitted for the state in the table below.

| Population | *N* | At or Above Advanced | At or Above Proficient | At or Above Basic |
|---|---|---|---|---|
| **Alabama total** | 2186 | 0.8 (0.4) | 17.8 (1.5) | 47.2 (2.1) |
| White | 1305 | 1.21 (0.63) | 25.24 (2.00) | 62.71 (2.08) |
| Black | 757 | 0.09 (*) | 3.97 (1.10) | 19.45 (1.91) |
| Hispanic | 69 | 0.00 (*) | 7.02 (3.25) | 20.39 (7.69) |
| **Alaska total** | 1517 | 2.7 (0.6) | 31.0 (1.6) | 64.5 (1.8) |
| White | 1029 | 3.69 (0.84) | 39.37 (1.91) | 74.45 (2.24) |
| Hispanic | 101 | 2.05 (*) | 12.45 (3.85) | 44.81 (6.26) |
| Asian/Pacific Islander | 95 | 1.42 (*) | 28.85 (6.24) | 65.73 (6.20) |
| American Indian | 239 | 0.52 (*) | 12.62 (2.75) | 37.95 (3.93) |
| **Arizona total** | 2151 | 1.7 (0.6) | 22.6 (1.7) | 54.6 (2.0) |
| White | 1246 | 2.51 (0.88) | 32.67 (1.90) | 71.31 (2.08) |
| Black | 88 | 0.00 (*) | 6.56 (3.46) | 23.66 (6.35) |
| Hispanic | 634 | 0.22 (*) | 8.48 (1.90) | 32.37 (2.34) |
| American Indian | 130 | 2.61 (*) | 6.27 (3.92) | 22.33 (7.76) |
| **Arkansas total** | 1858 | 1.2 (0.4) | 22.2 (1.5) | 54.6 (1.8) |
| White | 1336 | 1.64 (0.48) | 28.54 (1.89) | 67.05 (1.95) |
| Black | 410 | 0.00 (*) | 2.87 (1.55) | 16.86 (2.40) |
| Hispanic | 64 | 0.16 (*) | 8.86 (4.04) | 31.71 (6.91) |
| **California total** | 2292 | 1.5 (0.4) | 19.5 (1.7) | 46.8 (2.1) |
| White | 932 | 2.30 (0.76) | 33.21 (2.69) | 68.57 (2.46) |
| Black | 155 | 0.00 (*) | 4.91 (2.49) | 27.84 (4.60) |
| Hispanic | 849 | 0.23 (*) | 6.48 (1.47) | 25.83 (2.01) |
| Asian/Pacific Islander | 303 | 3.25 (1.69) | 26.83 (3.58) | 57.53 (4.50) |
| **Colorado total** | 2514 | 2.2 (0.4) | 32.4 (1.2) | 67.6 (1.5) |
| White | 1756 | 2.87 (0.57) | 39.66 (1.40) | 76.84 (1.32) |
| Black | 132 | 0.81 (*) | 16.05 (4.23) | 50.70 (5.50) |
| Hispanic | 495 | 0.46 (0.31) | 11.94 (2.05) | 42.63 (2.97) |
| Asian/Pacific Islander | 67 | 3.45 (*) | 38.91 (6.46) | 64.19 (6.93) |
| American Indian | 64 | 0.00 (*) | 21.49 (6.49) | 49.17 (9.76) |
| **Connecticut total** | 2489 | 3.3 (0.4) | 35.6 (1.7) | 67.5 (1.6) |
| White | 1872 | 4.25 (0.50) | 44.15 (1.98) | 79.47 (1.39) |
| Black | 250 | 0.00 (*) | 4.74 (2.86) | 23.58 (4.79) |
| Hispanic | 265 | 0.07 (*) | 7.33 (1.81) | 28.83 (3.44) |
| Asian/Pacific Islander | 68 | 4.37 (*) | 44.74 (6.30) | 71.80 (7.12) |
| **Delaware total** | 1903 | 1.2 (0.3) | 20.6 (1.0) | 50.9 (1.2) |
| White | 1239 | 1.59 (0.51) | 27.77 (1.33) | 63.79 (1.43) |
| Black | 470 | 0.30 (*) | 6.24 (1.19) | 25.56 (2.99) |
| Hispanic | 133 | 0.25 (*) | 4.78 (2.48) | 22.42 (4.84) |
| **District of Columbia total** | 1700 | 0.3 (0.2) | 4.8 (0.9) | 18.5 (1.0) |
| Black | 1416 | 0.02 (*) | 2.65 (0.84) | 16.11 (1.00) |
| Hispanic | 180 | 0.00 (*) | 3.28 (2.23) | 13.47 (3.61) |
| **DoDEA/DDESS[a] total** | 602 | 1.9 (0.7) | 26.7 (2.2) | 64.9 (2.5) |
| White | 283 | 3.67 (1.47) | 39.49 (4.07) | 77.11 (2.99) |
| Black | 135 | 0.00 (*) | 7.52 (2.70) | 43.07 (5.97) |
| Hispanic | 149 | 0.53 (*) | 19.94 (3.67) | 62.51 (5.03) |

## Exhibit 11. 1996 Science NAEP, Grade 8 (continued)

| Population | *N* | At or Above Advanced | At or Above Proficient | At or Above Basic |
|---|---|---|---|---|
| **DoDEA/DoDDS[b] total** | 2223 | 2.1 (0.4) | 31.1 (1.3) | 68.1 (1.0) |
| White | 1006 | 4.00 (0.66) | 42.19 (1.97) | 79.99 (1.75) |
| Black | 413 | 0.10 (*) | 12.56 (1.85) | 47.15 (2.73) |
| Hispanic | 366 | 0.67 (*) | 20.31 (2.68) | 56.86 (2.98) |
| Asian/Pacific Islander | 300 | 1.10 (0.71) | 32.71 (3.48) | 70.83 (2.91) |
| **Florida total** | 2353 | 1.5 (0.4) | 20.9 (1.6) | 51.0 (2.3) |
| White | 1336 | 2.45 (0.73) | 31.52 (2.25) | 67.26 (2.44) |
| Black | 463 | 0.22 (*) | 3.84 (1.30) | 20.84 (3.38) |
| Hispanic | 478 | 0.04 (*) | 8.63 (1.43) | 35.11 (3.14) |
| **Georgia total** | 2470 | 1.5 (0.3) | 20.9 (1.7) | 49.5 (2.1) |
| White | 1403 | 2.33 (0.51) | 31.06 (2.03) | 66.67 (2.17) |
| Black | 867 | 0.16 (*) | 5.28 (1.22) | 23.56 (1.80) |
| Hispanic | 118 | 1.02 (*) | 14.31 (4.15) | 36.24 (5.35) |
| **Guam total** | 930 | 0.3 (*) | 7.3 (1.0) | 27.7 (1.6) |
| White | 73 | 2.81 (*) | 22.82 (4.72) | 49.00 (6.69) |
| Hispanic | 171 | 0.00 (*) | 3.84 (1.54) | 17.09 (2.72) |
| Asian/Pacific Islander | 650 | 0.12 (*) | 6.41 (1.05) | 28.07 (2.19) |
| **Hawaii total** | 2153 | 0.5 (0.2) | 14.7 (1.0) | 42.3 (1.2) |
| White | 378 | 0.94 (*) | 23.04 (3.57) | 55.32 (2.92) |
| Black | 67 | 0.00 (*) | 8.90 (4.06) | 36.68 (7.79) |
| Hispanic | 459 | 0.45 (*) | 6.28 (1.15) | 26.27 (2.29) |
| Asian/Pacific Islander | 1165 | 0.45 (0.20) | 15.84 (1.23) | 45.29 (1.76) |
| **Indiana total** | 2313 | 2.0 (0.5) | 30.1 (1.9) | 64.6 (1.9) |
| White | 1826 | 2.40 (0.61) | 34.44 (1.99) | 71.11 (1.80) |
| Black | 290 | 0.07 (*) | 7.56 (2.35) | 27.05 (4.62) |
| Hispanic | 128 | 0.29 (*) | 14.73 (3.18) | 44.87 (4.44) |
| **Iowa total** | 2172 | 2.7 (0.5) | 36.0 (1.6) | 71.1 (1.6) |
| White | 1970 | 2.79 (0.55) | 37.66 (1.66) | 73.37 (1.59) |
| Black | 73 | 1.03 (*) | 6.40 (2.98) | 31.75 (5.16) |
| Hispanic | 71 | 0.00 (*) | 15.91 (5.72) | 48.70 (7.29) |
| **Kentucky total** | 2459 | 1.5 (0.6) | 23.1 (1.3) | 57.6 (1.6) |
| White | 2125 | 1.70 (0.61) | 25.44 (1.31) | 62.04 (1.67) |
| Black | 211 | 0.12 (*) | 6.34 (1.78) | 30.22 (3.48) |
| Hispanic | 73 | 0.00 (*) | 8.92 (4.32) | 18.77 (5.91) |
| **Louisiana total** | 2615 | 0.6 (0.2) | 13.4 (1.2) | 40.3 (1.8) |
| White | 1439 | 1.03 (0.29) | 20.67 (1.64) | 57.79 (2.08) |
| Black | 984 | 0.07 (*) | 3.31 (0.90) | 16.50 (1.99) |
| Hispanic | 130 | 0.00 (*) | 6.98 (2.93) | 21.68 (4.46) |
| **Maine total** | 2254 | 4.1 (0.6) | 41.5 (1.8) | 77.5 (1.4) |
| White | 2090 | 4.36 (0.59) | 43.03 (1.74) | 79.26 (1.30) |
| Hispanic | 63 | 0.00 (*) | 15.90 (7.27) | 47.11 (7.29) |
| **Maryland total** | 2092 | 1.9 (0.4) | 25.1 (1.8) | 55.1 (2.0) |
| White | 1136 | 2.96 (0.71) | 38.25 (2.31) | 74.29 (1.87) |
| Black | 709 | 0.03 (*) | 4.84 (1.27) | 26.42 (1.91) |
| Hispanic | 131 | 0.00 (*) | 8.31 (2.85) | 27.57 (5.03) |
| Asian/Pacific Islander | 86 | 6.06 (2.57) | 38.19 (6.72) | 73.24 (5.06) |
| **Massachusetts total** | 2287 | 3.8 (0.6) | 36.8 (1.7) | 69.4 (1.8) |
| White | 1840 | 4.37 (0.61) | 41.49 (1.83) | 76.59 (1.55) |
| Black | 153 | 0.00 (*) | 9.36 (2.71) | 27.53 (4.87) |
| Hispanic | 177 | 0.21 (*) | 11.43 (2.82) | 34.52 (5.56) |
| Asian/Pacific Islander | 91 | 5.48 (3.88) | 37.63 (7.92) | 64.01 (7.99) |

## Exhibit 11. 1996 Science NAEP, Grade 8 (continued)

| Population | *N* | At or Above Advanced | At or Above Proficient | At or Above Basic |
|---|---|---|---|---|
| **Michigan total** | 2186 | 2.8 (0.4) | 32.3 (2.0) | 64.9 (1.9) |
| White | 1662 | 3.48 (0.54) | 38.82 (2.30) | 74.58 (1.95) |
| Black | 327 | 0.18 (0.11) | 6.10 (1.54) | 23.19 (3.29) |
| Hispanic | 92 | 1.31 (*) | 14.24 (4.40) | 42.54 (7.98) |
| **Minnesota total** | 2383 | 3.1 (0.6) | 36.7 (1.7) | 71.9 (1.7) |
| White | 2080 | 3.42 (0.78) | 40.14 (1.70) | 76.36 (1.60) |
| Black | 84 | 0.00 (*) | 8.58 (3.16) | 33.24 (8.23) |
| Hispanic | 83 | 1.29 (*) | 12.61 (5.70) | 41.87 (8.67) |
| Asian/Pacific Islander | 78 | 3.05 (1.83) | 29.86 (10.84) | 59.76 (12.18) |
| **Mississippi total** | 2469 | 0.7 (0.2) | 12.3 (1.0) | 39.3 (1.8) |
| White | 1196 | 1.25 (0.34) | 21.58 (1.48) | 59.94 (1.92) |
| Black | 1107 | 0.13 (0.09) | 3.00 (0.64) | 19.39 (1.72) |
| Hispanic | 132 | 0.52 (*) | 3.49 (1.74) | 12.70 (3.63) |
| **Missouri total** | 2389 | 2.0 (0.4) | 27.9 (1.3) | 63.7 (1.7) |
| White | 1871 | 2.55 (0.46) | 33.63 (1.61) | 72.63 (1.57) |
| Black | 327 | 0.00 (*) | 2.54 (1.29) | 22.44 (3.04) |
| Hispanic | 110 | 0.00 (*) | 11.69 (3.58) | 38.56 (6.14) |
| **Montana total** | 2029 | 2.9 (0.5) | 40.6 (2.1) | 77.5 (1.7) |
| White | 1694 | 3.44 (0.61) | 45.33 (2.04) | 82.54 (1.41) |
| Hispanic | 113 | 0.66 (*) | 18.64 (4.76) | 56.40 (4.70) |
| American Indian | 177 | 0.14 (*) | 12.15 (3.61) | 43.69 (3.99) |
| **Nebraska total** | 2724 | 2.7 (0.5) | 34.7 (1.5) | 71.1 (1.2) |
| White | 2333 | 3.01 (0.57) | 38.19 (1.59) | 76.20 (1.19) |
| Black | 141 | 0.00 (*) | 7.39 (2.65) | 30.29 (5.86) |
| Hispanic | 169 | 0.89 (*) | 15.68 (4.05) | 41.90 (3.55) |
| **New Mexico total** | 2377 | 1.1 (0.4) | 19.3 (0.7) | 49.3 (1.5) |
| White | 884 | 2.49 (1.01) | 35.69 (1.37) | 74.41 (1.74) |
| Hispanic | 1197 | 0.12 (*) | 9.21 (0.78) | 34.38 (1.62) |
| American Indian | 207 | 0.41 (*) | 7.94 (1.55) | 24.78 (4.66) |
| **New York total** | 1876 | 2.5 (0.6) | 26.9 (1.7) | 56.6 (2.0) |
| White | 1043 | 3.72 (0.89) | 38.82 (2.15) | 74.89 (2.34) |
| Black | 352 | 0.00 (*) | 3.53 (1.18) | 21.49 (2.69) |
| Hispanic | 338 | 0.50 (0.22) | 7.22 (2.25) | 25.51 (3.17) |
| Asian/Pacific Islander | 99 | 3.87 (*) | 36.88 (8.33) | 69.56 (6.23) |
| **North Carolina total** | 2616 | 1.6 (0.3) | 23.9 (1.4) | 56.4 (1.5) |
| White | 1703 | 2.11 (0.45) | 32.77 (1.73) | 70.22 (1.58) |
| Black | 705 | 0.34 (*) | 5.99 (0.95) | 28.31 (1.87) |
| Hispanic | 106 | 1.08 (*) | 8.35 (3.21) | 25.78 (6.17) |
| American Indian | 63 | 0.59 (*) | 13.61 (5.00) | 41.50 (7.70) |
| **North Dakota total** | 2489 | 3.0 (0.6) | 40.6 (1.5) | 77.7 (1.3) |
| White | 2291 | 3.21 (0.64) | 42.55 (1.63) | 80.20 (1.25) |
| Hispanic | 78 | 0.93 (*) | 16.47 (4.80) | 46.73 (7.88) |
| American Indian | 73 | 0.00 (*) | 12.28 (4.64) | 43.28 (7.45) |
| **Oregon total** | 2275 | 2.6 (0.4) | 31.9 (1.8) | 67.6 (2.0) |
| White | 1867 | 2.86 (0.48) | 34.37 (1.95) | 71.79 (1.87) |
| Hispanic | 174 | 0.88 (*) | 13.43 (2.74) | 38.46 (6.36) |
| Asian/Pacific Islander | 100 | 2.13 (*) | 34.99 (5.21) | 71.50 (4.68) |
| American Indian | 90 | 1.31 (*) | 21.05 (6.88) | 49.69 (10.42) |
| **Rhode Island total** | 2087 | 1.8 (0.4) | 26.0 (1.5) | 59.1 (1.5) |
| White | 1628 | 2.21 (0.46) | 31.44 (1.83) | 67.89 (1.78) |
| Black | 114 | 0.00 (*) | 6.51 (2.36) | 30.84 (5.93) |
| Hispanic | 229 | 0.14 (*) | 3.98 (1.23) | 20.39 (2.49) |
| Asian/Pacific Islander | 80 | 1.51 (*) | 16.18 (4.69) | 46.18 (6.25) |

## Exhibit 11. 1996 Science NAEP, Grade 8 (continued)

| Population | *N* | At or Above Advanced | At or Above Proficient | At or Above Basic |
|---|---|---|---|---|
| **South Carolina total** | 2162 | 1.4 (0.4) | 17.2 (1.4) | 45.0 (2.1) |
| White | 1100 | 2.58 (0.68) | 28.74 (2.34) | 64.85 (2.27) |
| Black | 890 | 0.04 (*) | 3.78 (0.88) | 21.91 (2.12) |
| Hispanic | 116 | 0.38 (*) | 7.31 (2.71) | 27.58 (4.48) |
| **Tennessee total** | 2287 | 1.6 (0.5) | 22.0 (1.7) | 53.1 (2.4) |
| White | 1774 | 1.97 (0.58) | 26.28 (1.98) | 61.27 (2.46) |
| Black | 392 | 0.05 (*) | 5.41 (1.55) | 22.33 (3.44) |
| Hispanic | 68 | 0.00 (*) | 3.41 (*) | 20.19 (5.70) |
| **Texas total** | 2300 | 1.5 (0.5) | 23.3 (1.5) | 54.9 (2.3) |
| White | 1073 | 2.79 (0.94) | 38.39 (2.12) | 77.15 (1.89) |
| Black | 289 | 0.12 (*) | 6.19 (2.07) | 28.04 (3.85) |
| Hispanic | 854 | 0.14 (*) | 7.93 (1.10) | 32.78 (2.59) |
| Asian/Pacific Islander | 62 | 1.77 (*) | 33.75 (5.74) | 72.28 (6.98) |
| **Utah total** | 2715 | 2.1 (0.4) | 31.7 (1.2) | 70.2 (1.2) |
| White | 2366 | 2.32 (0.46) | 34.47 (1.28) | 74.42 (1.12) |
| Hispanic | 216 | 0.36 (*) | 13.13 (2.84) | 38.86 (4.44) |
| Asian/Pacific Islander | 75 | 0.66 (*) | 17.26 (4.66) | 52.59 (7.82) |
| **Vermont total** | 1914 | 2.7 (0.5) | 34.0 (1.6) | 70.1 (1.8) |
| White | 1738 | 2.96 (0.59) | 35.90 (1.67) | 72.43 (1.61) |
| Hispanic | 68 | 0.23 (*) | 16.28 (6.16) | 45.47 (7.02) |
| **Virginia total** | 2522 | 2.4 (0.4) | 27.3 (2.1) | 59.1 (1.9) |
| White | 1658 | 3.33 (0.55) | 35.90 (2.44) | 71.54 (1.85) |
| Black | 619 | 0.06 (*) | 5.96 (1.44) | 26.77 (2.79) |
| Hispanic | 128 | 0.13 (*) | 11.60 (4.07) | 37.17 (5.75) |
| Asian/Pacific Islander | 117 | 5.53 (2.01) | 40.56 (7.15) | 82.09 (4.82) |
| **Washington total** | 2501 | 2.2 (0.4) | 26.6 (1.6) | 60.8 (1.9) |
| White | 1863 | 2.67 (0.51) | 31.22 (1.76) | 68.12 (1.66) |
| Black | 111 | 0.00 (*) | 6.23 (2.49) | 30.82 (6.20) |
| Hispanic | 237 | 1.05 (*) | 11.85 (2.22) | 33.28 (3.99) |
| Asian/Pacific Islander | 177 | 1.02 (*) | 22.02 (4.82) | 60.39 (5.32) |
| American Indian | 102 | 1.12 (*) | 11.38 (4.52) | 33.75 (6.26) |
| **West Virginia total** | 2602 | 1.0 (0.2) | 21.0 (1.1) | 56.2 (1.6) |
| White | 2354 | 1.02 (0.22) | 22.38 (1.08) | 58.82 (1.53) |
| Black | 98 | 0.00 (*) | 4.41 (2.83) | 23.37 (4.39) |
| Hispanic | 74 | 0.27 (*) | 3.19 (*) | 23.41 (9.12) |
| **Wisconsin total** | 2148 | 4.1 (0.7) | 38.9 (1.9) | 73.4 (2.0) |
| White | 1761 | 4.79 (0.71) | 43.78 (1.91) | 80.64 (1.50) |
| Black | 165 | 0.00 (*) | 4.57 (2.67) | 17.43 (4.10) |
| Hispanic | 125 | 0.20 (*) | 18.85 (6.38) | 46.36 (6.44) |
| **Wyoming total** | 2619 | 1.9 (0.5) | 33.5 (1.3) | 71.5 (1.2) |
| White | 2197 | 2.19 (0.62) | 37.44 (1.39) | 76.74 (1.07) |
| Hispanic | 276 | 0.17 (*) | 14.00 (2.31) | 44.60 (4.56) |
| American Indian | 107 | 0.00 (*) | 7.94 (3.24) | 38.17 (5.76) |

(*)Standard error estimates cannot be precisely determined.
[a]DoDEA/DDES: Department of Defense Educational Activity/Department of Defense Domestic Dependent Elementary and Secondary Schools
[b]DoDEA/DoDDS: Department of Defense Educational Activity/Department of Defense Dependent Schools (Overseas)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