

## **Chapter One**

### **Indicators of Student Achievement in Mathematics and Science**

#### **NAEP Assessment: Results Comparable by State**

CCSSO has a record of involvement with the state-level NAEP and strongly supports the development and use of the state-level assessment as a primary indicator of student learning in science and mathematics. In the mid-1980s, CCSSO became an advocate for comparable state-level indicators for K-12 education. The NAEP math and science assessment results have become a valuable source of student achievement indicators due to its reliable, comparable measures state to state. CCSSO led the consensus process for development of several NAEP assessment frameworks, including the 2005 mathematics framework, and through this process state leaders have the opportunity to ensure that the range of content topics and expectations for learning reflect state content standards.

#### **Policy Issues:**

- **Is student achievement in mathematics and science improving, and how does achievement compare state to state?**
- **Are students learning challenging content in science and math?**
- **Are schools improving the performance of all students?**

The NAEP assessment results and supporting data on students, teachers, and schools are based on a sample of 2,000 students per state at each assessed grade. Although the data do not provide a way for states to analyze student achievement for each school and district, the results are extremely valuable as indicators for state and local policymakers, subject specialists, and teachers.

NAEP results at the state and national levels provide

- valid, reliable data to monitor and compare state progress in student achievement;
- data to evaluate the quality of education received by specific groups of students;
- trends for each state against a common set of challenging standards for student learning and performance;
- a comprehensive source of data to measure by state the relationship of student achievement to characteristics of schools, classroom practices, and teachers.

The state-level NAEP results reported for 2003 and trends from 1990 are drawn from reports by NCES and are available at the NCES/NAEP website <http://nces.ed.gov/nationsreportcard/>.<sup>1</sup>

<sup>1</sup> For reports with NAEP math results for 2000 and earlier see Reese, et al., 1997, and Shaughnessy, et al., 1998; for science results see Bourque, et al., 1997, and Keiser, et al., 1998.

## Student Achievement

### ***Improvement in Mathematics Proficiency on NAEP, Grade 8***

- **State gains on NAEP math.** From 1990 to 2003, two states, North Carolina and Minnesota, improved their proficiency percentages by more than 20 percentage points. In Minnesota, nearly half of the students scored proficient or higher.
- **National proficiency rate at 27 percent in 2003.** Although significant progress was made nationally, only slightly more than one quarter of grade 8 students met the math proficiency level established for NAEP, with the rate of improvement at one percentage point per year from 1990 to 2003.

Table 1.1 shows that every state made statistically significant gains (more than three percentage points), and more than half of the states made gains of more than 12 points for grade 8 students reaching the proficiency level on the NAEP mathematics assessment. Figure 1.1 shows that the states with the highest gains from 1990 to 2003 were North Carolina, Minnesota, Colorado, Ohio, Illinois, New York, and New Hampshire.

**As you study** table 1.1 and figure 1.1, consider the following questions about state trends on NAEP math, grade 8:

- What is the level of improvement for your state for the decade in comparison to improvement for the nation and other states?
- For the states making significant gains above the national average, do you have information about the programmatic efforts made in these states to improve math education—or to improve public school education as a whole?
- What initiatives or programs in your state would you cite as related to your state’s performance on NAEP mathematics assessments? Do the NAEP trends agree with other data within your state (such as trends on state assessment)?
- What is a benchmark or goal for improvement for your state on this indicator? How does your state set a benchmark for improvement?

**Table 1.1 Mathematics Proficiency of Grade 8 Students, 2003 NAEP; Improvement 1990 to 2003**

State	PROFICIENT		% at Advanced Level, 2003	Average Proficiency, 2003
	% at or above 2003	Change 1990 to '03		
Minnesota	44	+20	9	291
Massachusetts	38	—	8	287
North Dakota	36	+9	5	287
Connecticut	35	+13	8	284
Wisconsin	35	+12	6	284
Vermont	35	—	7	286
Montana	35	+8	6	286
New Hampshire	35	+14	7	286
South Dakota	35	—	5	285
DoDEA/DoDDS	35	—	5	286
Colorado	34	+17	8	283
Kansas	34	—	6	284
Iowa	33	+8	5	284
New Jersey	33	+12	6	281
Wyoming	32	+14	4	284
Nebraska	32	+8	5	282
Washington	32	—	6	281
North Carolina	32	+24	7	281
New York	32	+17	6	280
Oregon	32	+11	7	281
Virginia	31	+14	6	282
Utah	31	—	6	281
Indiana	31	+14	5	281
Ohio	30	+16	5	282
Alaska	30	—	6	279
Pennsylvania	30	+13	5	279
Maryland	30	+13	7	278
Maine	29	—	5	282
Illinois	29	+15	6	277
Idaho	28	+10	4	280
Missouri	28	—	4	279
Michigan	28	+12	5	276
<b>NATION</b>	<b>27</b>	<b>+12</b>	<b>5</b>	<b>276</b>
DoDEA/DDESS	27	—	5	282
South Carolina	26	—	5	277
Delaware	26	+12	4	277
Texas	25	+12	4	277
Rhode Island	24	+9	3	272
Kentucky	24	+13	4	274
Florida	23	+11	4	271
California	22	+9	4	267
Georgia	22	+8	4	270
Tennessee	21	—	3	268
Arizona	21	+8	3	271
Nevada	20	—	3	268
Oklahoma	20	+7	2	272
West Virginia	20	+10	2	271
Arkansas	19	+9	2	266
Louisiana	17	+12	2	266
Hawaii	17	+5	2	266
Alabama	16	+7	2	262
New Mexico	15	+5	2	263
Mississippi	12	—	1	261
District of Columbia	6	+3	1	243

All differences from 1990 to 2003 are significant.

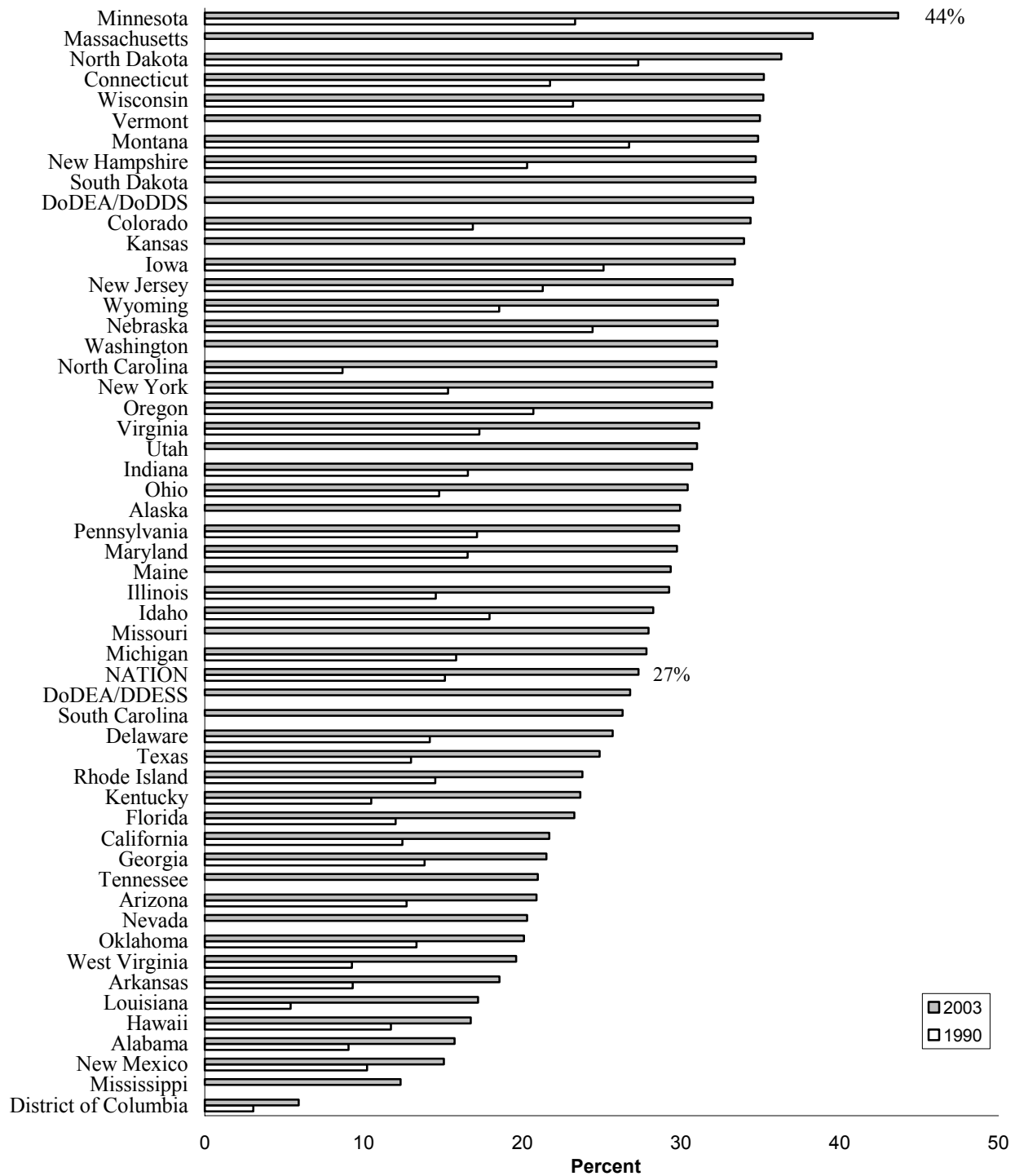
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Source: The Nation's Report Card, Mathematics 2003 (see for standard errors of estimates).

*Council of Chief State School Officers, State Services and Technical Assistance, Washington, DC, 2003.*

## Student Achievement

**Figure 1.1 Percent of Grade 8 Students at or above Proficient Mathematics Level, 1990 to 2003 NAEP**



Source: The Nation's Report Card, Mathematics 2003, U.S. Department of Education.

Council of Chief State School Officers, State Services and Technical Assistance, Washington, DC, 2003.

**Goal for Improvement**

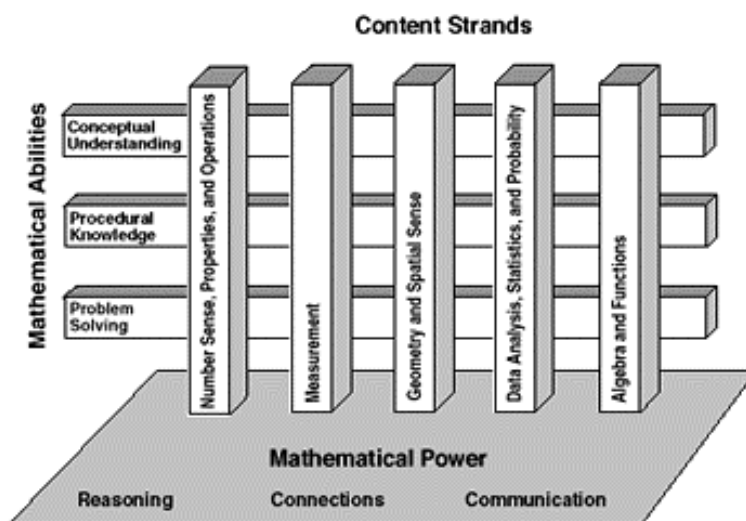
In using statistical indicators, state educators and policymakers typically ask about the performance of students in their state relative to other states, how much improvement has occurred over time, and what the state performance goals should be. Concerning the latter issue, state educators can plan targets for improvement in scores on NAEP as they would scores on their state assessments. Student improvement in mathematics should be reflected in NAEP scores as well as on the tests mandated by the state. Thus, one approach for a state to set a benchmark on NAEP would be to set a similar level of gain as expected on the state assessment in math.

States are advised to set a goal for improvement on NAEP, because it is a standard, reliable measure across states. There are significant differences between most state assessments in math and the NAEP math assessment, and a comparative analysis of the NAEP mathematics framework should be completed so that leaders have a basis for confidence in their target benchmark for improvement during the four-year NAEP assessment intervals (i.e., level of improvement from 2000 to 2004).

**How do NAEP scores vary within a state vs. between states?**

In table 1.1, the far right column displays the NAEP scores by the state average on the NAEP scale. The scale ranges from 0 to 500 and includes grades 4, 8, and 12. The state averages are divided into deciles in the NAEP report card (<http://nces.ed.gov/nationsreportcard>). Examining the distribution of grade 8 NAEP 2000 scores by state, the data show that variation in math proficiency was much greater within each state than were the differences among states. For example, according to the distribution of student scores in Minnesota, the difference in scores between students at the 10th percentile and students at the 90th percentile was 84 points (243 vs. 327). The difference between the average proficiency of Minnesota students and the average proficiency of Mississippi students was 30 points (291 vs. 261). Students in the highest-scoring state were performing in mathematics at approximately three grades higher than students in the lowest-scoring state (based on grade 8 average score at 276 vs. grade 4 average at 234, or a difference of about 10 scale points per grade).

## Framework for the 1996, 2000, and 2003 Mathematics Assessments



The definition of the proficient level is established by the National Assessment Governing Board (NAGB), as stated in the 2003 NAEP mathematics assessment framework:

*Eighth grade students performing at the proficient level should apply mathematical concepts and procedures consistently to complex problems in the five NAEP content strands—number sense, properties, and operations; measurement; geometry and spatial sense; data analysis, statistics and probability; and algebra and functions.*

### **NAEP Assessments and Levels**

In 1993, NAEP results began to be reported using three achievement levels: basic, proficient, and advanced (Mullis, et al.). Prior to that point, only the NAEP scale was reported. NAEP scores are more understandable and interpretable by the public and by educators when reported against standards for the expected knowledge and skills in a particular subject, rather than being reported in relation to the performance of other students as is done in norm-referenced testing and reporting. In the 1990s, states moved toward the use of achievement or proficiency levels for reporting student achievement results in state assessment programs, partly due to requirements for Title I programs under the Improving America's Schools Act of 1994 and NCLB in 2001.

The NAEP assessments in mathematics and science are based on rigorous, challenging academic standards and include multiple types of tasks: multiple-choice items, short open-ended questions, extended or “constructed response” tasks in mathematics, and hands-on laboratory tasks in science. When state assessment results are compared to NAEP scores, the proficient level on NAEP mathematics could be viewed as a more challenging standard than that defined by many state assessments. The annual state education indicators report from U.S. Department of Education (prepared by CCSSO) provides both sets of data for every state (CCSSO, 2003b).

**Improvement in Mathematics Proficiency on NAEP, Grade 4**

- **State gains on NAEP math.** From 1992 to 2003, four states increased the percentages of students scoring at the grade 4 proficient level by 20 points or more: North Carolina, Wyoming, Ohio, and Indiana; and 16 states improved at the proficient level by more than 16 percentage points.
- **Nationally, 31 percent of grade 4 students scored at or above the proficient level.** The percentage of students at this level gained by 14 points from 1992 to 2003.

Table 1.2 and figure 1.2 show that seven states had at least 40 percent of students score at or above the proficient level in 2003. The basic level or higher was accomplished by 76 percent of grade 4 students in 2003, and every state made significant gains at this level in 1992, when NAEP moved to state level assessments at grade 4.

**As you study** table 1.2 and figure 1.2, consider the following questions about state trends on NAEP math, grade 4:

- What is your state's level of progress since 1992? How does your state's progress compare with grade 4 trends for other states in your region?
- How do your state's trends on NAEP since 1992 compare to trends on your state assessment for grade 4?
- How does your state's progress on grade 4 NAEP compare to trends on grade 8 NAEP?
- As you examine your NAEP state report online (<http://nces.ed.gov/nationsreportcard/mathematics/>), what is the extent of variation in grade 4 trends since 1992 for students in urban vs. suburban vs. rural schools?
- What is a benchmark or goal for improvement on grade 4 NAEP mathematics?

This report's analysis has emphasized the proficient level on NAEP; however, a state may decide that the basic level is an important, relevant target. For example, a state with two-thirds of all students currently at or above the basic level on NAEP might decide to set the goal of 100 percent of its students to be at or above the basic level. Then, benchmarks for gauging progress could be based on some portion of the difference between current performance and 100 percent.

The NAEP scores for mathematics can be disaggregated by content strands in the mathematics assessment framework. The averages by content areas—numbers/operations, measurement, statistics/probability, algebra/functions, data/statistics, and geometry—are available on the NAEP report card. The NAEP results in these tables and graphs show a statistical distribution of states in relation to other states and the nation, but they do not demonstrate the actual skills of math students at given levels. For more detail related to the mathematics content and skills of students represented by the NAEP scores and levels, go to the NAEP report card on the web to view sample tasks and obtain percentages of students scoring well on the problem and students at or above the proficient level (<http://nces.ed.gov/nationsreportcard/mathematics/>).

## Student Achievement

**Table 1.2 Mathematics Proficiency of Grade 4 Students, 2003 NAEP; Improvement 1992 to 2003**

State	PROFICIENT			% at Advanced 2003	Average Proficiency, 2003
	% at or above 2003	Change 1992 to 2003	% at or above Basic, 2003		
New Hampshire	43	+18	87	6	243
Vermont	42	—	85	5	242
Minnesota	42	+16	84	7	242
Kansas	41	—	85	6	242
Massachusetts	41	+18	84	6	242
Connecticut	41	+17	82	5	241
North Carolina	41	+28	85	6	242
New Jersey	39	+14	80	5	239
Wyoming	39	+20	87	4	241
Washington	36	—	81	5	238
Virginia	36	+17	83	5	239
Ohio	36	+20	81	4	238
Pennsylvania	36	+14	78	4	236
Iowa	36	+10	83	3	238
Wisconsin	35	+11	79	4	237
Indiana	35	+20	82	4	238
Michigan	34	+16	77	5	236
North Dakota	34	+12	83	2	238
Maine	34	+6	83	3	238
Colorado	34	+16	77	4	235
South Dakota	34	—	82	3	237
Nebraska	34	+12	80	3	236
Oregon	33	—	79	4	236
New York	33	+16	79	4	236
Texas	33	+18	82	4	237
South Carolina	32	+19	79	4	236
Illinois	32	—	73	5	233
Utah	31	+12	79	2	235
Maryland	31	+13	73	5	233
<b>NATION</b>	<b>31</b>	<b>+14</b>	<b>76</b>	<b>4</b>	<b>234</b>
Delaware	31	+15	81	3	236
Montana	31	—	81	2	236
Florida	31	+18	76	4	234
Idaho	31	+15	80	2	235
Alaska	30	—	75	4	233
Missouri	30	+11	79	3	235
Rhode Island	28	+15	72	3	230
Georgia	27	+12	72	3	230
Arkansas	26	+16	71	2	229
Arizona	25	+12	70	2	229
California	25	+12	67	3	227
West Virginia	24	+12	75	2	231
Tennessee	24	+14	70	2	228
Hawaii	23	+9	68	2	227
Nevada	23	—	69	1	228
Oklahoma	23	+9	74	1	229
Kentucky	22	+10	72	2	229
Louisiana	21	+14	67	2	226
Alabama	19	+9	65	1	223
New Mexico	17	+6	63	1	223
Mississippi	17	+11	62	1	223
District of Columbia	7	+2	36	1	205

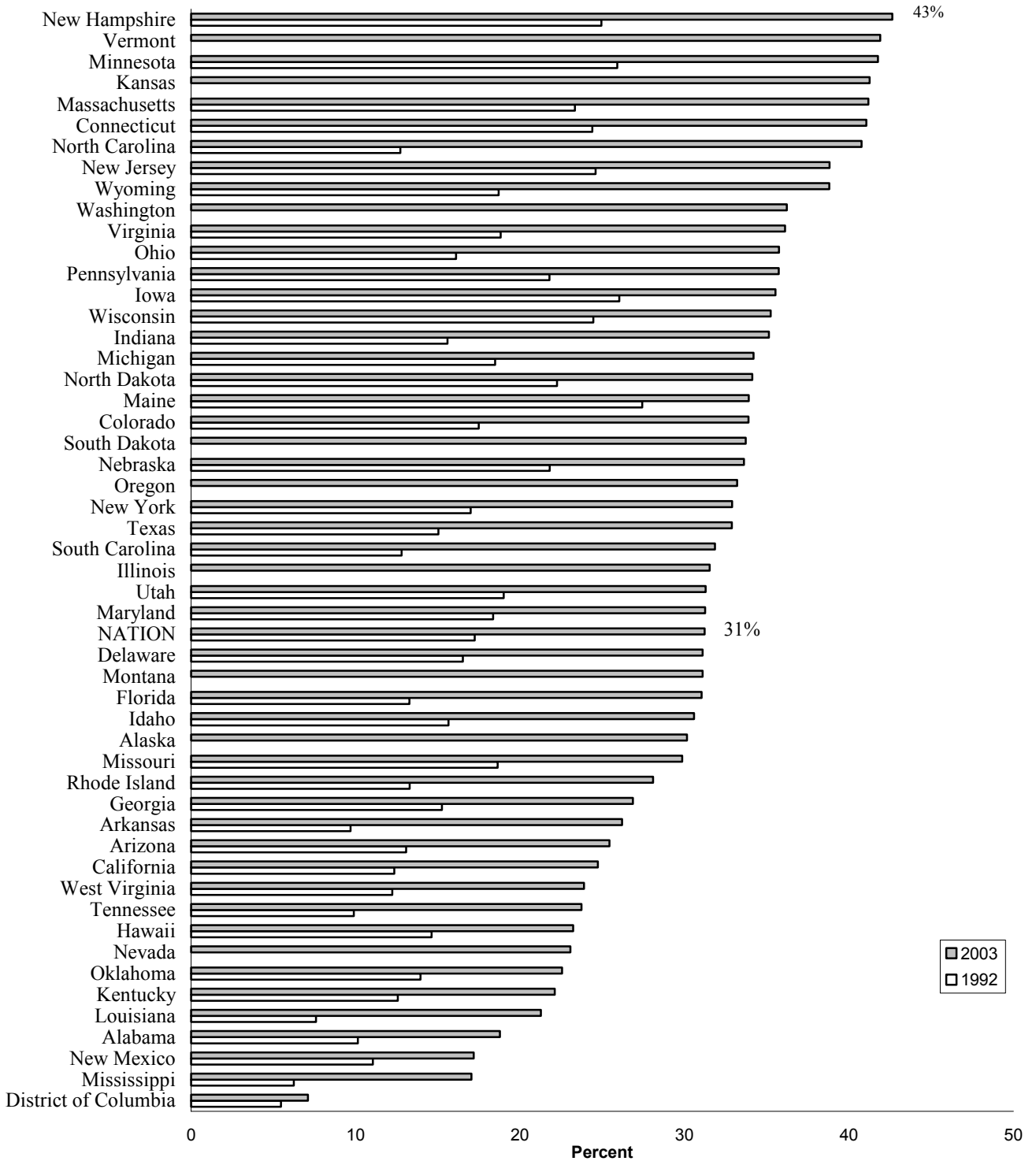
All differences from 1990 to 2003 are significant.

— Data not available.

Source: The Nation's Report Card, Mathematics 2003 (see for standard errors of estimates).

*Council of Chief State School Officers, State Services and Technical Assistance, Washington, DC, 2003.*

**Figure 1.2 Percent of Grade 4 Students at or above Proficient Mathematics Level, 1992 to 2003 NAEP**



Source: The Nation's Report Card, Mathematics 2003, U.S. Department of Education.  
 Council of Chief State School Officers, State Services and Technical Assistance, Washington, DC, 2003.

## Student Achievement

### ***Science Proficiency of Grade 8 Students***

The most recent NAEP science assessment was in 2000 at grade 8, the results of which appear in the 2001 CCSSO report available online at [http://www.ccsso.org/projects/Science\\_and\\_Mathematics\\_Education\\_Indicators/](http://www.ccsso.org/projects/Science_and_Mathematics_Education_Indicators/). The science assessment results and background questionnaire data by state can be viewed on the NCES/NAEP website. The next NAEP science assessment will be conducted in 2005.

## NAEP Mathematics Achievement by Student Race/Ethnicity

A high priority for CCSSO's science and mathematics indicators program is reporting on trends of equity in educational opportunity, conditions, and outcomes. One approach to indicators of equity in math and science education is disaggregating state averages according to differences in student race/ethnicity and gender.

- **Thirteen states reduce gap.** The NAEP results for 2003 indicate that 13 states reduced the difference in mathematics scores between white students and the largest minority student group by two or more percentage points from 1992 to 2003 (often called “closing the achievement gap”).
- **Gap reduced slightly for nation.** The difference between white and Hispanic students scoring at or above the basic level was reduced by 4 percentage points from 1992 to 2003 (from 36 to 32 points difference), and the disparity between white and African American scores was reduced by 7 points (from 47 to 40 points difference).

Table 1.3 illustrates the disparity in each state between the percent of white students at or above the basic level on NAEP mathematics at grade 8 and the percent of the largest minority group. For example, the disparity in 2003 for Oklahoma was 17 percentage points—the difference between 73 percent of white students at or above the basic level and 56 percent of American Indian students. Table 1.3 presents data on minority performance for five groups in each state.

The minority-white disparity measure for analyzing race/ethnicity differences in student achievement is based on the percent of students at or above the basic level on NAEP, because the state percentages for each race/ethnicity group are often too small for useful comparisons. Student performance at the basic level does **not** mean students are meeting a minimum level of expectations for the subject (as in the “minimum competency” tests used by states in the 1970s).

The definition of the basic level is established by NAGB, as stated in the 2003 NAEP mathematics assessment framework:

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

**As you study** table 1.3, consider the following questions:

- What is the achievement gap for your state at the NAEP basic level?
- Does this difference agree with other data from your state? If not, why would the NAEP results show a different result for groups in your state?
- What do you know about any of the states that have reduced the disparity in scores? What accounts for change? Are there policy, curriculum, or instructional changes that can be highlighted?
- Do you have evidence of progress in closing the gap within your state through educational change in specific districts or schools? Have the lessons from these changes been documented and disseminated for others?

## Student Achievement

**Table 1.3 Race/Ethnicity Differences in Basic Mathematics Level for Grade 8 Students, 2003 NAEP**

	% at or Above Basic					Disparity	Change
	White	African American	Hispanic	Asian/ Pacific Islander	American Indian	White-Minority 2003	in Disparity 1992 to '03
<b>NATION</b>	<b>79</b>	<b>39</b>	<b>47 &amp;</b>	<b>77</b>	<b>54</b>	<b>40</b>	<b>-7</b>
Alabama	68	27 &	*	*	*	41	+3
Alaska	81	56	51	70	49 &	32	—
Arizona	78	45	45 &	*	39	33	-2
Arkansas	69	26 &	37	*	*	43	+3
California	74	35	37 &	74	*	37	-4
Colorado	84	40	48 &	80	*	36	+3
Connecticut	83	42 &	48	79	*	41	-9
Delaware	81	48 &	47	*	*	33	-4
District of Columbia	*	26 &	33	*	*	—	—
DDESS	90	61 &	72	*	*	29	—
DoDDS	86	63 &	72	82	*	23	—
Florida	78	36 &	53	75	*	42	0
Georgia	77	36 &	49	73	*	41	+1
Hawaii	64	*	48	54 &	*	10	+3
Idaho	77	*	39 &	*	*	38	+9
Illinois	80	34 &	48	89	*	46	—
Indiana	79	40 &	49	*	*	39	+2
Iowa	80	42 &	44	*	*	38	—
Kansas	83	35	49 &	79	*	34	—
Kentucky	68	38 &	*	*	*	30	-1
Louisiana	75	36 &	*	*	*	39	+3
Maine	75	* &	*	*	*	—	—
Maryland	79	44 &	49	90	*	35	-10
Massachusetts	83	48	41 &	88	*	42	-4
Michigan	79	32 &	57	*	*	47	-4
Minnesota	87	43 &	48	75	*	44	—
Mississippi	67	27 &	*	*	*	40	+2
Missouri	77	35 &	*	*	*	42	-1
Montana	83	*	*	*	48 &	35	—
Nebraska	80	35	40 &	*	*	40	-15
Nevada	71	35	37 &	73	*	34	—
New Hampshire	80	*	* &	*	*	—	—
New Jersey	84	41 &	50	90	*	43	-7
New Mexico	76	40	41 &	*	30	35	+2
New York	86	43 &	50	79	*	43	-7
North Carolina	85	49 &	55	87	48	36	+3
North Dakota	85	*	*	*	50 &	35	+3
Ohio	80	45 &	58	*	*	35	-12
Oklahoma	73	37	47	*	56 &	17	+4
Oregon	75	53	42 &	78	50	33	—
Pennsylvania	76	32 &	42	*	*	44	-1
Rhode Island	72	29	29 &	54	*	43	-4
South Carolina	84	46 &	*	*	*	38	-2
South Dakota	82	*	*	*	43 &	39	—
Tennessee	69	28 &	*	*	*	41	+1
Texas	84	47	58 &	91	*	26	-11
Utah	77	*	35 &	66	*	42	+14
Vermont	78	*	*	* &	*	—	—
Virginia	82	49 &	59	86	*	33	-3
Washington	76	54	50 &	72	56	26	—
West Virginia	63	39 &	*	*	*	24	+1
Wisconsin	82	24 &	50	67	*	58	+14
Wyoming	80	*	54 &	*	48	26	+5

— Not available.

& Race/ethnic minority group with largest enrollment.

\* Sample size is insufficient to permit a reliable estimate.

For change in disparity: "-" means *decline* in disparity; "+" means *increase* in disparity.

Source: The Nation's Report Card, Mathematics 2003 (see for standard errors of estimates).

Council of Chief State School Officers, State Services and Technical Assistance, Washington, DC, 2003.

***National Trends on NAEP by Race/Ethnicity and Gender***

NCES reports and analyzes two national trends for NAEP mathematics and science scores due to the change in the NAEP assessment frameworks and change in the methods of assessment beginning in 1990.

- **Long-term NAEP trends on mathematics and science.** The original NAEP trend analysis, going back to its inception in 1969, is based on a core set of multiple-choice test items and the initial assessment framework that tracks the degree of change in students' mathematics and science knowledge over nearly 30 years. CCSSO has chosen to analyze NAEP trends from 1982 to present to track change in student performance following the education reforms and policy initiatives developed at state and national levels in response to *A Nation at Risk*, the highly influential report by the National Commission on Excellence in Education (1983).
- **Main NAEP Assessment in mathematics.** In 1990, a new NAEP mathematics framework was applied in developing the assessment, and open-ended questions were introduced to the assessment. In 1992, extended constructed-response questions were added to the math assessment. NCES and NAGB established a new trend line in 1990 for mathematics. In the 2003 NAEP report card for mathematics, national trends are analyzed for the new main NAEP from 1990 to 2003.

To examine NAEP math and science trends by student race/ethnicity and gender, go to the NAEP trends report (<http://nces.ed.gov/nationsreportcard/about/trend.asp>) and the NAEP report card (<http://nces.ed.gov/nationsreportcard/>).

### Students Taking Advanced Placement Examinations

- **National rates increase.** For the nation, seven percent of grade 12 students took advanced placement (AP) mathematics examinations in 2002, and eight percent took AP science examinations. This compares to four percent in mathematics in 1992 and five percent in science in 1994.
- **Seven states with high increases.** Participation in AP math exams increased by five or more percentage points in seven states from 1992 to 2002. In science, seven states increased the percent of students taking AP science (biology, chemistry, or physics) exams by five or more percentage points from 1994 to 2002.<sup>2</sup>

Each year the College Board offers AP examinations in a range of academic subjects for students at public and private schools in each state. The percentages of students taking AP science and math exams are reported by state in tables 1.4 and 1.5. Students achieving a composite score of 3, 4, or 5 on the AP exams, can receive college credit for the subject. In many states, high school students enroll in AP courses that follow the AP curriculum, but they opt to not take the AP exam (see course enrollment data in chapter 2). The number of high school students in a state taking AP examinations and the proportion who receive a qualifying (passing) score provide an indicator of high-level student achievement. Caution should be used in interpreting this indicator because AP exams represent a voluntary group of students, and states and districts may differ significantly in how students are enrolled in AP courses and whether they apply to take the exams.

**As you study** data on AP participation, consider the following questions:

- What percentage of grade 12 students took AP exams in math and science in 2002 in your state, and what is the amount of change since 1992?
- What factors account for the change in your state?
- How does the rate of change since 1992 in your state compare to the other states in your region (e.g., AP exams appear more prevalent in mid-Atlantic states: Maryland, New Jersey, New York, District of Columbia)?
- What is a benchmark or goal for your state on this indicator?
- How much improvement in AP participation has been made among female and minority students in your state?

Nationally, seven percent of grade 12 students took AP calculus in 2002, which represents a total of 143,000 students; eight percent took an AP science exam in 2002, which represents a total of 156,000 (figures based on state enrollment data).

Scores of 3 or higher on AP exams may qualify students for college credit. Seventy percent of students were awarded credit nationally in AP mathematics (calculus), and 62 percent of students taking AP science exams (biology, chemistry, or physics) were awarded credit.

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<sup>2</sup> These totals include both public and private schools. Nationally, 80 percent of AP exams in all subjects are taken by public school students. Please note that the percentage of grade 12 students is used for statistical comparison across states—AP exams are not limited to grade 12 students.

**Table 1.4 Grade 12 Students Taking Advanced Placement Examinations in Mathematics and Science, 2002; Trends 1992 to 2002**

State	AP CALCULUS			AP SCIENCE*		
	% of Grade 12 Students Taking Exam, 2002	% Receiving Qualified Score	Change 1992 to 2002 % of Grade 12	% of Grade 12 Students Taking Exam, 2002	% Receiving Qualified Score	Change 1994 to 2002 % of Grade 12
District of Columbia	18	74	+10	27	70	+14
New York	12	70	+4	16	67	+6
Delaware	11	77	+5	12	70	+4
Maryland	11	78	+5	12	67	+5
Massachusetts	10	80	+4	12	69	+5
Virginia	10	70	+4	10	60	+4
New Jersey	10	74	+4	13	71	+4
Connecticut	10	80	+5	13	73	+6
Hawaii	9	74	+3	14	66	+7
North Carolina	9	67	+5	10	59	+4
Utah	9	78	+3	8	66	-1
California	9	69	+4	11	58	+5
South Carolina	8	70	+2	8	57	+2
New Hampshire	8	77	+3	6	74	+2
Florida	8	68	+3	10	51	+4
Georgia	8	63	+5	8	56	+2
Maine	7	64	+4	7	62	+4
Illinois	7	78	+2	8	73	+2
Vermont	7	70	+3	8	71	+3
Colorado	7	73	+3	7	66	+3
<b>NATION</b>	<b>7</b>	<b>70</b>	<b>+3</b>	<b>8</b>	<b>62</b>	<b>+3</b>
Indiana	7	55	+3	6	51	0
Minnesota	7	68	+5	4	59	+3
Michigan	6	75	+3	8	66	+4
Texas	6	59	+4	6	52	+4
Wisconsin	6	78	+4	6	68	+4
Rhode Island	6	72	+2	7	65	+3
Pennsylvania	6	75	+3	7	65	+3
Ohio	6	71	+3	6	65	+3
Washington	6	72	+4	5	67	+3
Alaska	5	79	+2	5	67	+2
Kentucky	5	60	+3	5	47	+2
New Mexico	5	59	+2	5	38	+2
Tennessee	5	72	+2	6	64	+3
Arizona	4	65	+1	4	54	0
South Dakota	4	72	+4	4	54	+3
Nevada	4	74	+2	5	62	+2
Oklahoma	4	56	+2	5	45	+3
Wyoming	4	49	+2	4	43	+3
Oregon	4	73	+2	3	71	+1
Missouri	3	75	+2	4	68	+2
Montana	3	76	+2	3	68	+2
Idaho	3	76	+1	4	70	+2
West Virginia	3	57	+1	3	44	+1
Arkansas	3	54	+2	3	50	+2
Alabama	3	63	+1	4	60	+1
Iowa	3	77	+2	2	74	+1
Kansas	2	77	+1	2	68	+1
Nebraska	2	62	+1	2	61	+1
Louisiana	2	62	+1	2	57	+1
Mississippi	2	58	+1	2	46	+1
North Dakota	2	86	+1	2	74	+1

Example: Eight percent of grade 12 students in Florida took the AP calculus exam in 2002, 68 percent of those students received a 3, 4, or 5 score; in 1992, five percent of grade 12 students took the exam.

\*AP Science: Students taking AP biology, chemistry, or physics.

Note: State totals include public and private schools.

Source: The College Board, Advanced Placement Program, National and 50 States Summary Reports, New York, 2002. Council of Chief State School Officers, State Services and Technical Assistance, Washington, DC, 2003.

## Student Achievement

### ***AP Exams by Race/Ethnicity and Gender***

An important feature of this indicator is measuring progress in minority and female participation in AP exams, as shown in table 1.5.

- Nationally, in 2002, 26 percent of students who took AP calculus exams were minority students, and 28 percent of students who took AP science exams were minority students.
- In 2002, 45 percent of students who took AP calculus exams were female, and 46 percent students who took AP science exams were female.

The minority AP exam rates of 26 and 28 percent compare to 40 percent of all public school students who are African American, Asian, Hispanic, or American Indian. Nationwide, the rates for taking AP science and math exams have increased only slightly since 1992. However, four states increased their rates by more than 8 percentage points in AP math, and Texas increased its AP science rate by 19 points.

Female student participation on AP calculus exams increased from 45 to 46 percent as a national percentage from 1992 to 2002; participation on AP science exams increased from 44 to 47 percent from 1994 to 2002.

For further information on enrollment rates in AP courses by minority group and numbers by state, go to Appendix B.

**Table 1.5 Minority and Female Students Taking Advanced Placement Examinations in Mathematics and Science, 2002; Change 1992 to 2002 in Minority Participation**

State	AP CALCULUS			AP SCIENCE		
	Minority Students Taking AP Calculus, '02	Change 1992 to '02 Minority	Female Students Taking Exam, '02	Minority Students Taking AP Science, '02	Change 1994 to '02 Minority	Female Students Taking Exam, '02
Hawaii	77%	+1%	50%	73%	-4%	51%
California	53%	0%	47%	51%	+2%	48%
Texas	39%	+8%	47%	39%	+19%	46%
New Mexico	36%	+11%	44%	35%	+5%	47%
Dist. of Columbia	32%	+3%	40%	32%	-3%	43%
New Jersey	31%	+4%	44%	31%	+2%	46%
Florida	30%	+1%	47%	32%	+4%	48%
Georgia	28%	+8%	47%	31%	+5%	47%
New York	28%	+1%	49%	25%	-8%	49%
Nevada	27%	+3%	41%	24%	+3%	40%
<b>NATION</b>	<b>27%</b>	<b>+1%</b>	<b>46%</b>	<b>28%</b>	<b>+2%</b>	<b>47%</b>
Maryland	25%	0%	45%	31%	0%	48%
Washington	24%	+4%	45%	21%	+3%	48%
Virginia	24%	+4%	47%	26%	+2%	49%
Illinois	24%	-3%	46%	29%	0%	44%
Arizona	23%	+1%	47%	23%	+1%	47%
Alabama	22%	+3%	47%	18%	-7%	46%
Delaware	21%	+3%	48%	21%	+2%	43%
Mississippi	21%	+8%	48%	27%	+9%	48%
Oklahoma	21%	+3%	44%	22%	0%	44%
Louisiana	20%	-4%	46%	23%	0%	45%
Massachusetts	18%	0%	46%	21%	+5%	47%
Tennessee	18%	0%	47%	19%	-1%	48%
Arkansas	17%	+2%	43%	17%	+4%	46%
South Carolina	16%	-3%	51%	18%	+2%	52%
Connecticut	16%	0%	44%	17%	-2%	46%
North Carolina	16%	+2%	49%	18%	-1%	51%
Oregon	16%	+3%	42%	17%	+1%	42%
Michigan	15%	-1%	44%	18%	-2%	46%
New Hampshire	14%	0%	43%	15%	+2%	42%
Colorado	13%	-9%	45%	15%	-1%	46%
Pennsylvania	13%	-2%	43%	13%	-1%	44%
Rhode Island	12%	-6%	43%	12%	+1%	46%
Missouri	12%	-4%	41%	13%	0%	43%
Ohio	11%	-4%	45%	14%	-3%	46%
Minnesota	10%	+1%	45%	11%	0%	46%
West Virginia	10%	-1%	42%	10%	+1%	53%
Indiana	10%	-1%	44%	12%	0%	47%
Kansas	9%	-6%	42%	18%	-7%	42%
Alaska	9%	-7%	46%	16%	+8%	48%
Iowa	9%	+2%	40%	13%	+3%	42%
Kentucky	9%	+3%	49%	9%	+3%	50%
Montana	8%	+1%	46%	9%	+6%	50%
Wyoming	7%	+3%	38%	9%	+6%	48%
Nebraska	7%	0%	44%	10%	+2%	39%
Utah	7%	+1%	42%	8%	+3%	40%
Wisconsin	7%	0%	45%	8%	-2%	46%
South Dakota	6%	+3%	49%	5%	-2%	44%
Maine	6%	+1%	41%	5%	+3%	50%
Vermont	6%	-1%	41%	5%	-4%	52%
Idaho	5%	0%	38%	7%	+1%	40%
North Dakota	2%	-7%	52%	7%	-1%	48%

Note: State totals include public and private schools. Minority students = sum of African-American, Hispanic, Asian/Pacific Islander, American Indian, etc.

% AP Science = Students taking AP Biology, Chemistry, or Physics.

Source: The College Board, Advanced Placement Program, National and 50 States Summary Reports, New York, 2002.

Council of Chief State School Officers, Division of State Services and Technical Assistance, Washington, DC, 2003.

