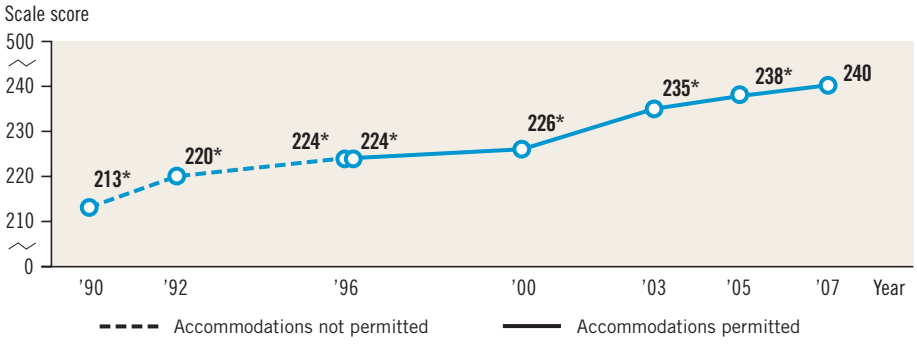
4th Grade

Score higher than in all previous assessments

Results from the 2007 NAEP mathematics assessment revealed that fourth-graders' mathematical skills have improved over the last 17 years. Fourth-graders in 2007 scored 2 points higher than in 2005 and 27 points higher than in 1990 (figure 1).

Although not shown here, gains were also made in each of the mathematics content areas for which comparisons could be made back to 1990. Score point increases from 1990 to 2007 ranged from a 20-point gain in the measurement content area to a 30-point gain in algebra.

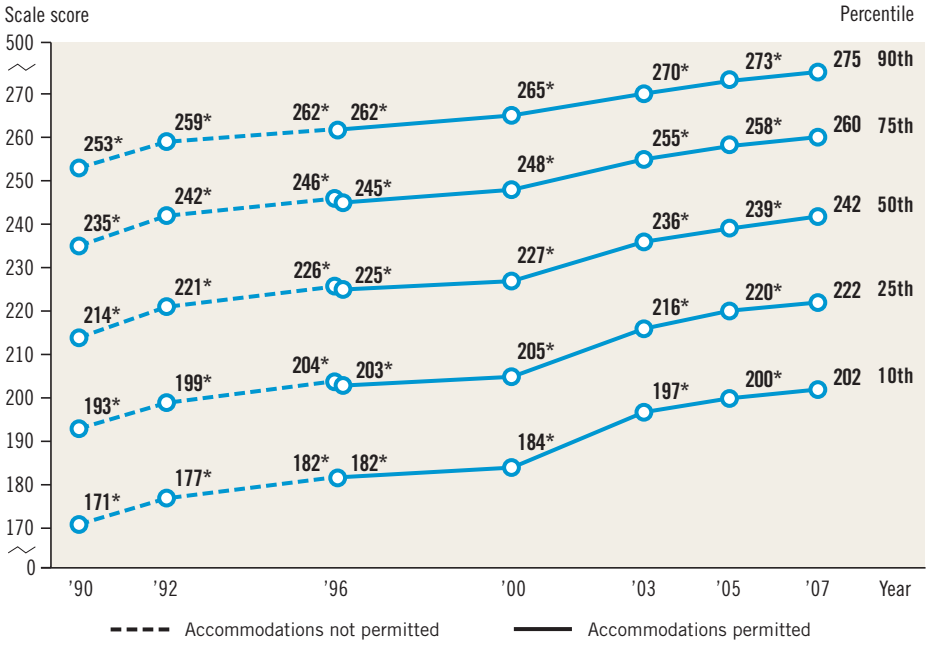
Figure 1. **Trend in fourth-grade NAEP mathematics average scores**



* Significantly different ($p < .05$) from 2007.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), various years, 1990–2007 Mathematics Assessments.

Improvement across all performance levels

Figure 2. Trend in fourth-grade NAEP mathematics percentile scores

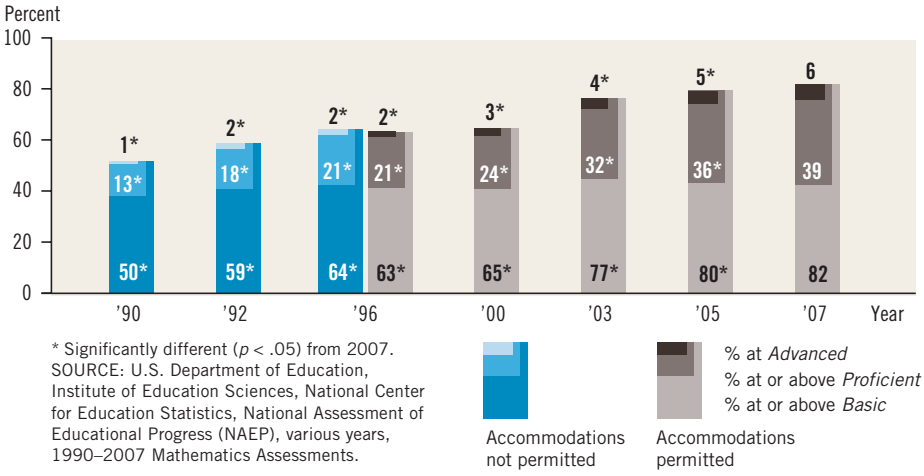


* Significantly different ($p < .05$) from 2007.

The overall increase was seen at all levels of student performance. Lower-performing students (at the 10th and 25th percentiles), middle-performing students (at the 50th percentile), and higher-performing students (at the 75th and 90th percentiles) all scored higher in 2007 than in any previous assessment (figure 2). Lower-performing students made greater gains than higher-performing students over the last 17 years.

Score increases across all performance levels were also reflected in the achievement-level results. The percentages of students at or above *Basic*, at or above *Proficient*, and at *Advanced* were higher in 2007 compared to the percentages for all previous assessment years (figure 3). The percentage of students at or above *Proficient* tripled from 13 percent in 1990 to 39 percent in 2007.

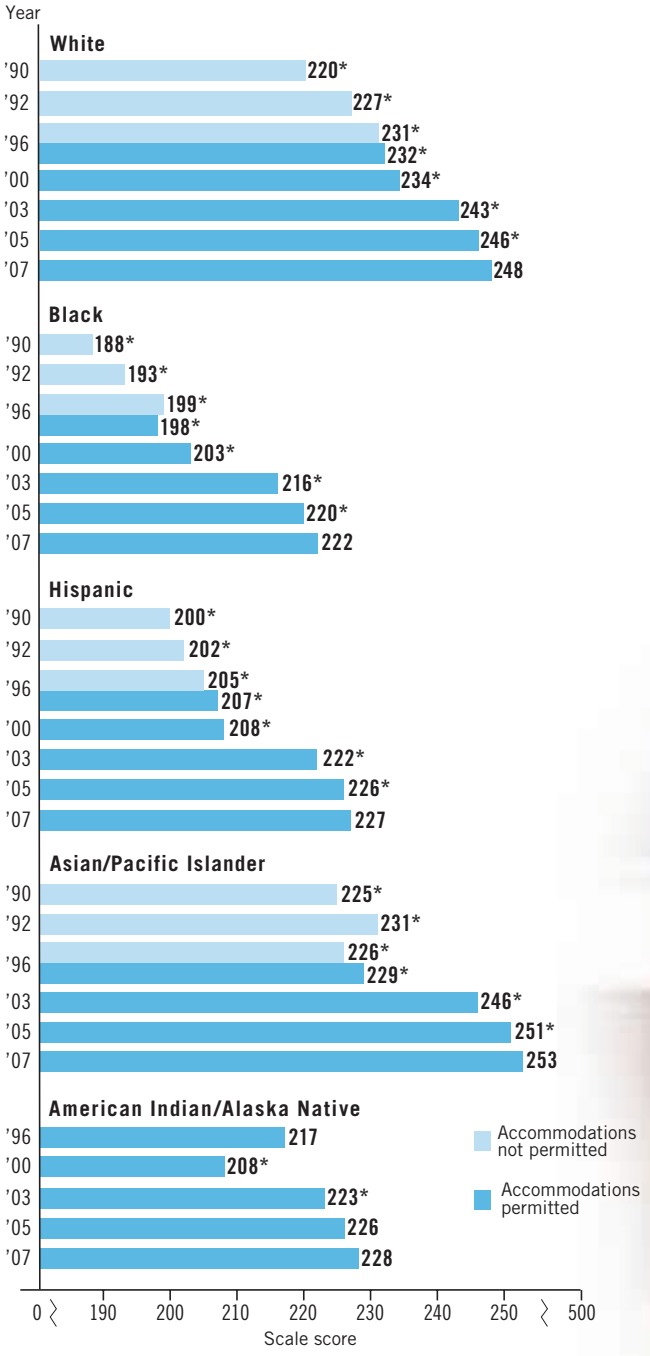
Figure 3. Trend in fourth-grade NAEP mathematics achievement-level performance



* Significantly different ($p < .05$) from 2007.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), various years, 1990–2007 Mathematics Assessments.

Most racial/ethnic groups show gains

Figure 4. **Trend in fourth-grade NAEP mathematics average scores, by race/ethnicity**



* Significantly different ($p < .05$) from 2007.
NOTE: Special analysis raised concerns about the accuracy and precision of national grade 4 Asian/Pacific Islander results in 2000. As a result, they are omitted from this figure. Sample sizes were insufficient to permit reliable estimates for American Indian/Alaska Native fourth-graders in 1990, 1992, and 1996 (accommodations not permitted sample). Black includes African American, Hispanic includes Latino, and Pacific Islander includes Native Hawaiian. Race categories exclude Hispanic origin.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), various years, 1990–2007 Mathematics Assessments.

White, Black, Hispanic, and Asian/Pacific Islander students all showed higher average mathematics scores in 2007 than in any of the previous assessments (figure 4). The 35-point[1] gain for Black students from 1990 to 2007 was greater than the gains for White (28 points) and Hispanic students (27 points).

American Indian/Alaska Native students showed no significant score change since 2005. However, although not shown here, the percentage of this group of students performing at or above *Proficient* increased from 21 percent in 2005 to 25 percent in 2007.

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

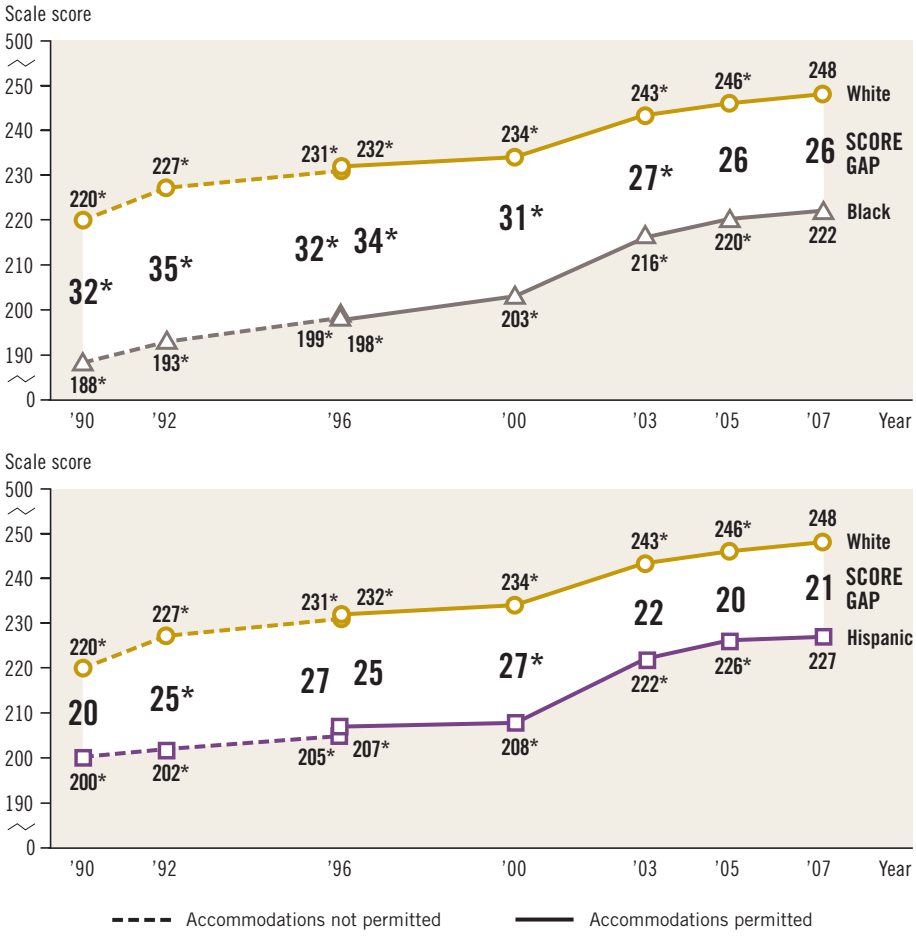
ACHIEVEMENT-LEVEL RESULTS...

Information is available on achievement-level results for racial/ethnic groups and other reporting categories at http://nationsreportcard.gov/math_2007/data.asp.

White – Black gap narrowing over time

Score increases did not consistently result in a significant closing of performance gaps between minority students and White students. There was no significant change in the White – Black score gap over the last two years (figure 5). Greater gains made by Black students resulted in a smaller performance gap in 2007 compared to 17 years ago. The White – Hispanic gap was not significantly different from the gaps in either 2005 or 1990.

Figure 5. Trend in fourth-grade NAEP mathematics average scores and score gaps, by selected racial/ethnic groups



* Significantly different ($p < .05$) from 2007.
NOTE: Black includes African American, and Hispanic includes Latino. Race categories exclude Hispanic origin. Score gaps are calculated based on differences between unrounded average scores.

Table 3. Percentage of students assessed in fourth-grade NAEP mathematics, by race/ethnicity: Various years, 1990–2007

Race/ethnicity	1990	1992	1996	2000	2003	2005	2007
White	75*	73*	66*	64*	60*	58*	57
Black	18*	17*	16	16	17	16	16
Hispanic	6*	6*	11*	15*	18*	19*	20
Asian/Pacific Islander	1*	2*	5	—	4*	4	5
American Indian/ Alaska Native	1*	1	1	1	1	1	1

— Not available. Special analysis raised concerns about the accuracy and precision of national grade 4 Asian/Pacific Islander results in 2000. As a result, they are omitted from this table.
* Significantly different ($p < .05$) from 2007.
NOTE: Black includes African American, Hispanic includes Latino, and Pacific Islander includes Native Hawaiian. Race categories exclude Hispanic origin. Detail may not sum to totals because results are not shown for the "unclassified" race/ethnicity category.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), various years, 1990–2007 Mathematics Assessments.

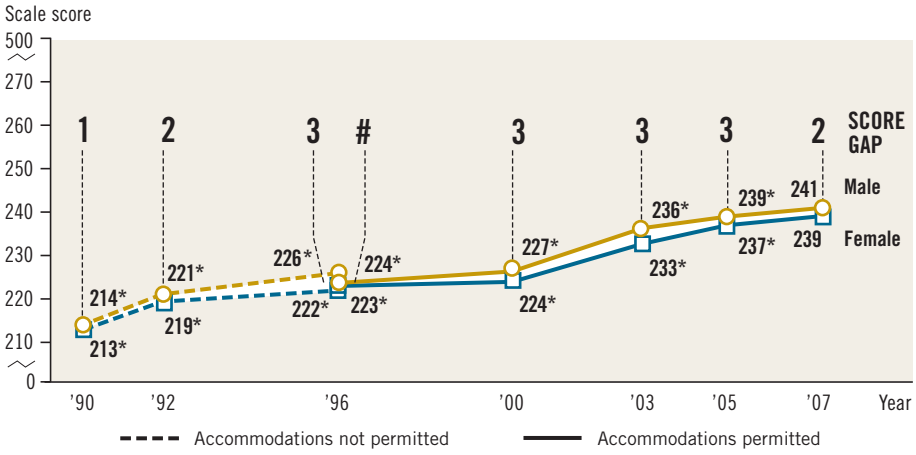
In each assessment year, NAEP collects information on student demographics. As shown in table 3, the percentage of White fourth-graders in the population was lower in 2007 than in previous assessment years, while the percentage of Hispanic students was higher. The percentage of Asian/Pacific Islander students was higher in 2007 than in 1990, and the percentage of Black students was lower.

Males score 2 points higher than females in 2007

Both male and female fourth-graders showed improved mathematical skills, with higher scores in 2007 than in any of the previous assessment years (figure 6). Although both groups showed increases in 2007, male students scored 2 points higher on average than their female counterparts. The gap between the two groups in 2007 was not significantly different from the gaps in 2005 or 1990.

Differences in performance between male and female students in 2007 varied somewhat when examined by content area. Male students scored higher on average than female students in all the mathematics content areas with the exception of geometry in which female students scored higher (table 4).

Figure 6. **Trend in fourth-grade NAEP mathematics average scores and score gaps, by gender**



Rounds to zero.
* Significantly different ($p < .05$) from 2007.
NOTE: Score gaps are calculated based on differences between unrounded average scores.

Table 4. **Average scores in fourth-grade NAEP mathematics, by content area and gender: 2007**

Gender	Number properties and operations	Measurement	Geometry	Data analysis and probability	Algebra
Male	239*	241*	238*	244*	245*
Female	237	237	239	243	243

* Significantly different ($p < .05$) from female students in 2007.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), various years, 1990–2007 Mathematics Assessments.

Public school students score lower than private school students

Ninety-one percent of fourth-graders attended public schools in 2007, and 9 percent attended private schools. The average mathematics score for fourth-graders in public schools (239) was lower than for students in private schools overall (246) and in Catholic schools specifically (246).

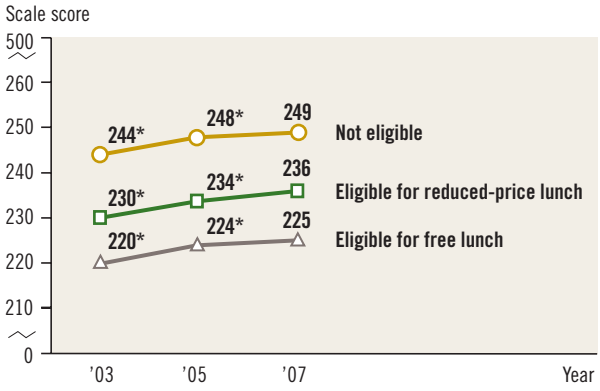
Sample sizes for private schools as a whole were not always large enough to produce reliable estimates of student performance in some of the previous assessments, limiting the comparisons that can be made in performance over time (see the section on School and Student Participation Rates in the Technical Notes for more information). Trend results for public and Catholic school students, and for private school students in those years in which sample sizes were sufficient, are available at: http://nationsreportcard.gov/math_2007/m0038.asp.

Both higher- and lower-income level students make gains

A student's eligibility for free or reduced-price school lunch is used as an indicator of socioeconomic status; students from low-income families are typically eligible (eligibility criteria are described in the Technical Notes), while students from higher-income families typically are not.

Students who were not eligible continued to score higher on average than students who were eligible for free or reduced-price lunch; however, average mathematics scores were higher in 2007 than in 2005 for all three groups (figure 7). In 2007, those students eligible for reduced-price lunch had an average score 11 points higher than students eligible for free lunch.

Figure 7. **Trend in fourth-grade NAEP mathematics average scores, by eligibility for free or reduced-price school lunch**



* Significantly different ($p < .05$) from 2007.

Table 5. **Percentage of students assessed in fourth-grade NAEP mathematics, by eligibility for free or reduced-price school lunch: 2003, 2005, and 2007**

Eligibility status	2003	2005	2007
Eligible for free lunch	33*	35	36
Eligible for reduced-price lunch	8*	7*	6
Not eligible	50*	50*	52
Information not available	10*	8*	7

* Significantly different ($p < .05$) from 2007.
NOTE: Detail may not sum to totals because of rounding.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2003, 2005, and 2007 Mathematics Assessments.

More than one-third of fourth-graders assessed were eligible for free lunch in 2007 (table 5).

Changes in these percentages may reflect not only a shift in the population but also changes in the National School Lunch Program and improvements in data quality. See the Technical Notes for more information.

State Performance at Grade 4

State results for public school students make it possible to compare each state's performance to other states and to the nation. All 50 states and 2 jurisdictions (i.e., the District of Columbia and Department of Defense schools) participated in the 2007 mathematics assessment. These 52 states and jurisdictions are all referred to as "states" in the following summary of state results. All states also participated in 2005, and 42 participated in the 1992 assessment, allowing for comparisons over time.

Twenty-three states show score increases

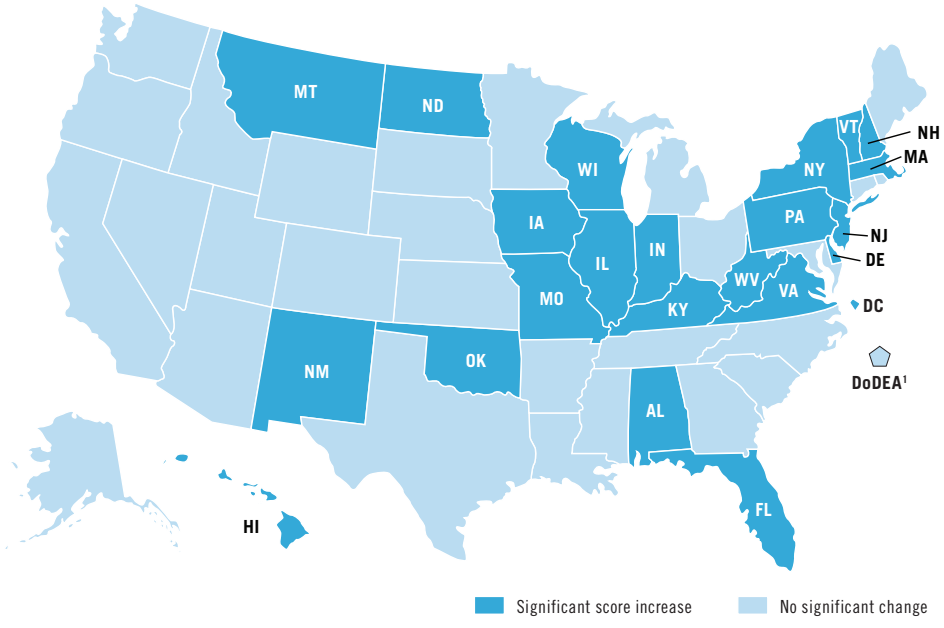
The map on the right highlights the 23 states in which overall average mathematics scores increased from 2005 to 2007 (figure 8). Of these 23 states, scores were also higher for White students in 14 states; Black students in Delaware and New Jersey; Hispanic students in Delaware, Florida, Missouri, and New Mexico; Asian/Pacific Islander students in Hawaii; and American Indian/Alaska Native students in Oklahoma.

In no state did scores decline since 2005 for students overall or for any of the racial/ethnic groups.

Scores increased since 1992 for all 42 states that participated in both 1992 and 2007. All of these states showed increases in the percentages of students both at or above *Basic* and at or above *Proficient*. These, and other state results for grade 4, are provided in figure 10, tables 6 and 7, and appendix tables A-7 through A-13.

When making state comparisons, it is important to remember that performance results may be affected by differences in demographic makeup and exclusion and accommodation rates for students with disabilities and English language learners. Differences in performance could be affected if exclusion rates are comparatively high or vary widely over time. See appendix tables A-3 through A-5 for state exclusion and accommodation rates.

Figure 8. **Changes in fourth-grade NAEP mathematics average scores between 2005 and 2007**



[1] Department of Defense Education Activity (overseas and domestic schools).
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2005 and 2007 Mathematics Assessments.

States' progress varies by mathematics content areas

While scores for the mathematics content areas cannot be directly compared to one another, examining patterns in differences over time shows that changes in overall results for a state may not always be consistent with changes for any particular content area.

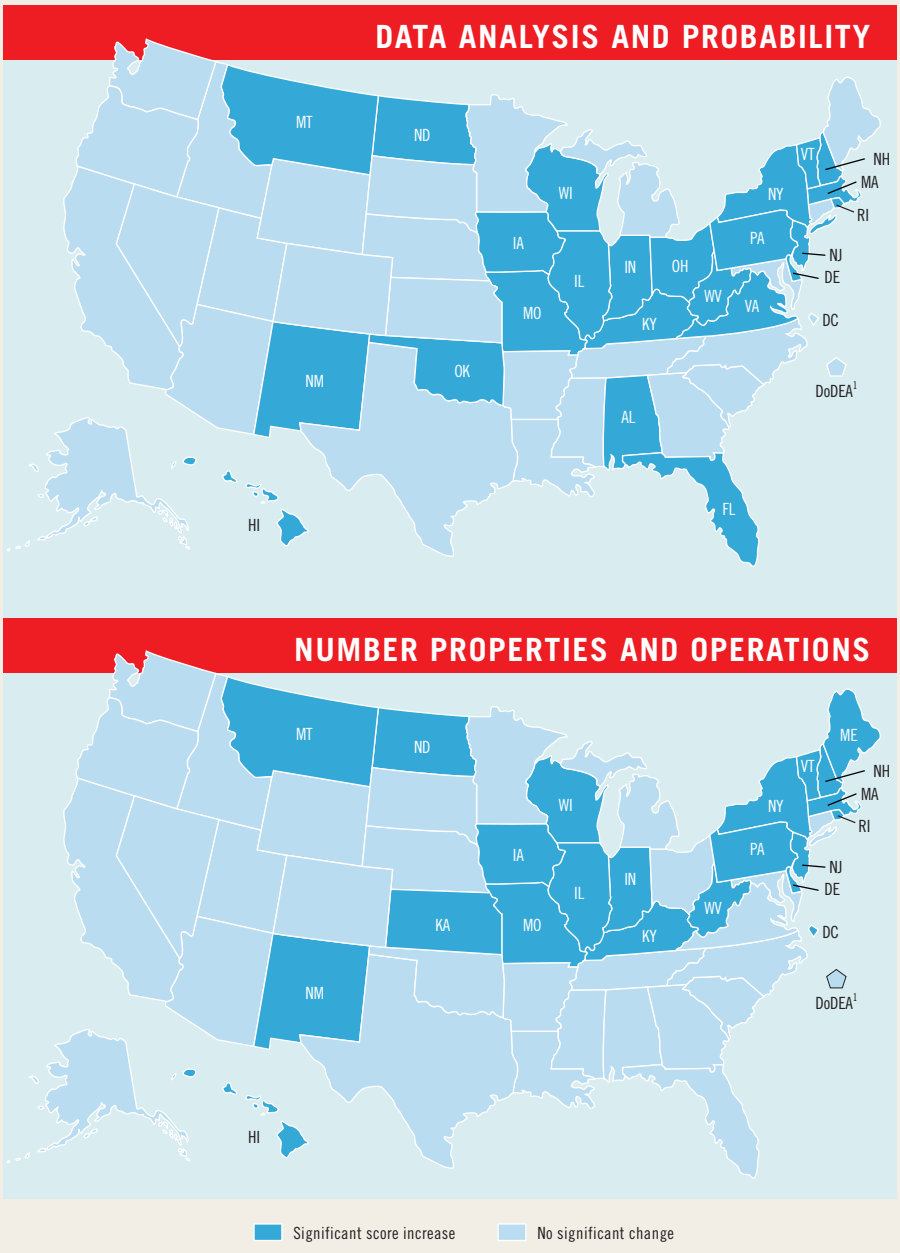
Among the 23 states posting overall gains between 2005 and 2007, 6 states—Indiana, Kentucky, Massachusetts, Missouri, New York, and West Virginia—scored higher in all five of the mathematics content areas.

Among the 29 states with no overall change, Kansas, Maine, Maryland, Nevada, Ohio, Texas, and the Department of Defense schools showed increases in one content area; Rhode Island and Wyoming increased in two content areas; and Oregon decreased in two content areas.

The two maps presented on the right show changes from 2005 to 2007 in states' scores for two of the five mathematics content areas: data analysis and probability and number properties and operations (figure 9).

The data analysis and probability content area had the most score increases, with 24 states making gains. In the number properties and operations content area, which accounts for the largest percentage of assessment questions, 22 states showed increases.

Figure 9. **Changes in fourth-grade NAEP mathematics average scores between 2005 and 2007, by selected content areas**



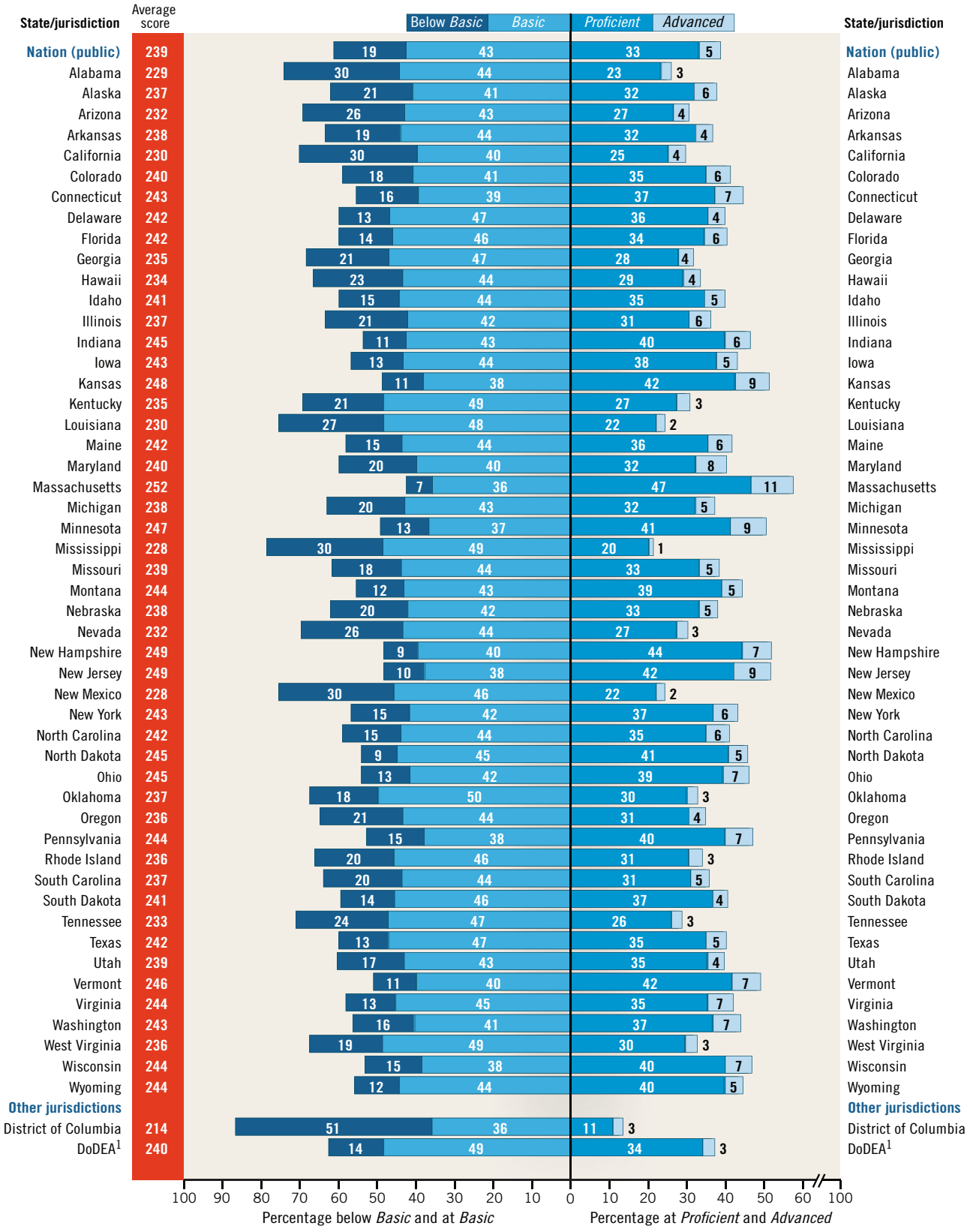
[1] Department of Defense Education Activity (overseas and domestic schools).
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2005 and 2007 Mathematics Assessments.

FOR MORE INFORMATION...

State Comparison Tool orders states by students' performance overall and for student groups both within an assessment year and based on changes across years (http://nces.ed.gov/nationsreportcard/nde/statecomp).

State Profiles provide information on each state's school and student population and a summary of its NAEP results (http://nces.ed.gov/nationsreportcard/states).

Figure 10. **Average scores and achievement-level results in NAEP mathematics for fourth-grade public school students, by state: 2007**



[1] Department of Defense Education Activity (overseas and domestic schools).
NOTE: The shaded bars are graphed using unrounded numbers. Detail may not sum to totals because of rounding.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2007 Mathematics Assessment.

Table 6. **Average scores in NAEP mathematics for fourth-grade public school students, by state: Various years, 1992–2007**

State/jurisdiction	Accommodations not permitted			Accommodations permitted			
	1992	1996	2000	2000	2003	2005	2007
Nation (public)[1]	**219***	**222***	**226***	**224***	**234***	**237***	**239**
Alabama	208*	212*	218*	217*	223*	225*	229
Alaska	—	224*	—	—	233*	236	237
Arizona	215*	218*	219*	219*	229*	230	232
Arkansas	210*	216*	217*	216*	229*	236	238
California	208*	209*	214*	213*	227*	230	230
Colorado	221*	226*	—	—	235*	239	240
Connecticut	227*	232*	234*	234*	241	242	243
Delaware	218*	215*	—	—	236*	240*	242
Florida	214*	216*	—	—	234*	239*	242
Georgia	216*	215*	220*	219*	230*	234	235
Hawaii	214*	215*	216*	216*	227*	230*	234
Idaho	222*	—	227*	224*	235*	242	241
Illinois	—	—	225*	223*	233*	233*	237
Indiana	221*	229*	234*	233*	238*	240*	245
Iowa	230*	229*	233*	231*	238*	240*	243
Kansas	—	—	232*	232*	242*	246	248
Kentucky	215*	220*	221*	219*	229*	231*	235
Louisiana	204*	209*	218*	218*	226*	230	230
Maine	232*	232*	231*	230*	238*	241	242
Maryland	217*	221*	222*	222*	233*	238	240
Massachusetts	227*	229*	235*	233*	242*	247*	252
Michigan	220*	226*	231*	229*	236	238	238
Minnesota	228*	232*	235*	234*	242*	246	247
Mississippi	202*	208*	211*	211*	223*	227	228
Missouri	222*	225*	229*	228*	235*	235*	239
Montana	—	228*	230*	228*	236*	241*	244
Nebraska	225*	228*	226*	225*	236	238	238
Nevada	—	218*	220*	220*	228*	230	232
New Hampshire	230*	—	—	—	243*	246*	249
New Jersey	227*	227*	—	—	239*	244*	249
New Mexico	213*	214*	214*	213*	223*	224*	228
New York	218*	223*	227*	225*	236*	238*	243
North Carolina	213*	224*	232*	230*	242	241	242
North Dakota	229*	231*	231*	230*	238*	243*	245
Ohio	219*	—	231*	230*	238*	242	245
Oklahoma	220*	—	225*	224*	229*	234*	237
Oregon	—	223*	227*	224*	236	238	236
Pennsylvania	224*	226*	—	—	236*	241*	244
Rhode Island	215*	220*	225*	224*	230*	233	236
South Carolina	212*	213*	220*	220*	236	238	237
South Dakota	—	—	—	—	237*	242	241
Tennessee	211*	219*	220*	220*	228*	232	233
Texas	218*	229*	233*	231*	237*	242	242
Utah	224*	227*	227*	227*	235*	239	239
Vermont	—	225*	232*	232*	242*	244*	246
Virginia	221*	223*	230*	230*	239*	240*	244
Washington	—	225*	—	—	238*	242	243
West Virginia	215*	223*	225*	223*	231*	231*	236
Wisconsin	229*	231*	—	—	237*	241*	244
Wyoming	225*	223*	229*	229*	241*	243	244
Other jurisdictions							
District of Columbia	193*	187*	193*	192*	205*	211*	214
DoDEA[2]	—	224*	228*	227*	237*	239	240

— Not available. The jurisdiction did not participate or did not meet the minimum participation guidelines for reporting.
* Significantly different ($p < .05$) from 2007 when only one jurisdiction or the nation is being examined.
[1] National results for assessments prior to 2003 are based on the national sample, not on aggregated state samples.
[2] Department of Defense Education Activity (overseas and domestic schools). Before 2005, DoDEA overseas and domestic schools were separate jurisdictions in NAEP. Pre-2005 data presented here were recalculated for comparability.
NOTE: State-level data were not collected in 1990.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), various years, 1992–2007 Mathematics Assessments.

Table 7. **Percentage of fourth-grade public school students and average scores in NAEP mathematics, by selected student groups and state: 2007**

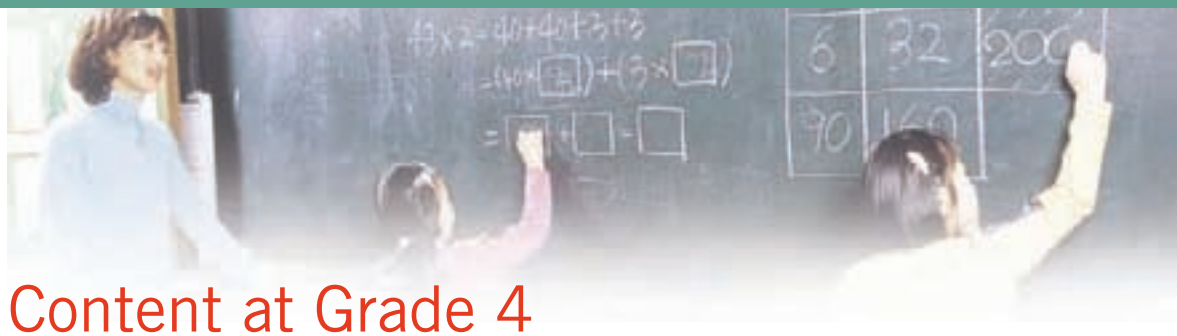
State/jurisdiction	Race/ethnicity									
	White		Black		Hispanic		Asian/Pacific Islander		American Indian/ Alaska Native	
	Percentage of students	Average scale score	Percentage of students	Average scale score	Percentage of students	Average scale score	Percentage of students	Average scale score	Percentage of students	Average scale score
Nation (public)	**55**	**248**	**17**	**222**	**21**	**227**	**5**	**254**	**1**	**229**
Alabama	58	238	37	213	3	218	1	‡	1	‡
Alaska	55	247	5	227	4	232	7	237	25	218
Arizona	43	246	5	219	44	220	3	253	5	216
Arkansas	67	245	22	217	9	230	2	236	1	‡
California	27	247	7	218	54	218	11	251	1	‡
Colorado	60	249	6	224	30	224	4	247	1	‡
Connecticut	64	252	13	220	18	223	5	255	#	‡
Delaware	54	249	33	230	10	234	3	261	#	‡
Florida	48	250	21	225	25	238	2	255	#	‡
Georgia	46	246	38	222	9	229	4	255	#	‡
Hawaii	17	244	3	230	4	224	63	233	1	‡
Idaho	81	245	1	‡	13	224	2	‡	3	215
Illinois	56	248	19	216	19	223	4	257	#	‡
Indiana	78	249	10	224	7	233	1	‡	#	‡
Iowa	86	245	5	224	6	230	2	‡	#	‡
Kansas	73	252	8	226	13	234	2	260	1	‡
Kentucky	84	238	11	219	2	221	1	‡	#	‡
Louisiana	47	240	49	219	2	234	1	‡	1	‡
Maine	95	243	2	221	1	‡	2	‡	#	‡
Maryland	50	251	35	223	8	233	6	261	#	‡
Massachusetts	75	257	7	232	11	231	6	259	#	‡
Michigan	71	244	21	216	3	230	3	261	1	‡
Minnesota	78	252	8	222	7	229	5	239	2	234
Mississippi	45	239	52	217	2	‡	1	‡	#	‡
Missouri	77	245	19	218	3	234	1	‡	#	‡
Montana	83	247	1	‡	3	241	1	‡	12	222
Nebraska	75	244	7	211	14	220	1	‡	2	‡
Nevada	43	243	8	219	40	221	7	242	1	‡
New Hampshire	91	250	2	226	4	232	3	258	#	‡
New Jersey	57	255	14	232	20	234	8	267	#	‡
New Mexico	29	242	3	220	58	222	2	‡	9	222
New York	53	251	19	225	20	230	8	260	#	‡
North Carolina	55	251	28	224	10	235	2	253	1	229
North Dakota	87	248	2	‡	2	‡	1	‡	9	224
Ohio	75	250	18	225	3	231	2	‡	#	‡
Oklahoma	58	242	11	220	9	227	2	247	20	234
Oregon	71	241	3	219	17	217	5	249	2	220
Pennsylvania	77	249	14	222	6	229	3	259	#	‡
Rhode Island	70	242	8	219	19	220	3	244	1	‡
South Carolina	57	248	36	221	4	227	1	‡	#	‡
South Dakota	83	245	2	221	2	228	1	‡	12	218
Tennessee	69	240	26	214	3	222	1	‡	#	‡
Texas	36	253	15	230	45	236	3	263	#	‡
Utah	80	244	1	‡	15	220	2	244	2	‡
Vermont	94	247	2	‡	1	‡	2	‡	1	‡
Virginia	58	251	26	228	8	235	5	256	#	‡
Washington	65	248	6	222	15	225	11	250	2	227
West Virginia	93	237	5	223	1	‡	1	‡	#	‡
Wisconsin	77	250	10	212	8	229	3	245	1	‡
Wyoming	84	246	2	‡	10	229	1	‡	3	227
Other jurisdictions										
District of Columbia	6	262	84	209	9	220	2	‡	#	‡
DoDEA[1]	51	246	17	227	14	233	7	239	1	‡

See notes at end of table.

Table 7. **Percentage of fourth-grade public school students and average scores in NAEP mathematics, by selected student groups and state: 2007—Continued**

State/jurisdiction	Eligibility for free/reduced-price school lunch				Gender			
	Eligible		Not eligible		Male		Female	
	Percentage of students	Average scale score	Percentage of students	Average scale score	Percentage of students	Average scale score	Percentage of students	Average scale score
Nation (public)	**46**	**227**	**53**	**249**	**51**	**240**	**49**	**238**
Alabama	55	217	45	242	51	229	49	228
Alaska	44	225	56	247	51	238	49	237
Arizona	52	219	45	245	51	233	49	230
Arkansas	57	229	43	249	51	238	49	237
California	53	219	44	243	50	231	50	229
Colorado	40	225	60	251	51	242	49	239
Connecticut	31	222	69	252	51	243	49	242
Delaware	39	232	61	248	50	242	50	241
Florida	48	233	51	251	51	243	49	241
Georgia	52	224	46	247	50	236	50	234
Hawaii	42	224	58	242	51	233	49	236
Idaho	44	232	55	248	51	242	49	240
Illinois	44	223	56	249	50	239	50	235
Indiana	41	235	58	253	53	246	47	244
Iowa	34	231	66	249	51	244	49	241
Kansas	41	237	59	255	51	249	49	247
Kentucky	53	226	47	245	50	237	50	234
Louisiana	70	225	30	243	50	230	50	230
Maine	36	232	64	248	50	244	50	241
Maryland	34	225	66	248	50	242	50	239
Massachusetts	27	237	72	258	51	254	49	251
Michigan	38	224	62	246	51	238	49	237
Minnesota	30	232	70	253	52	249	48	245
Mississippi	69	222	29	241	51	228	49	227
Missouri	42	228	58	247	51	240	49	238
Montana	38	234	60	250	51	245	49	242
Nebraska	39	225	61	246	52	240	48	236
Nevada	45	221	51	242	50	233	50	230
New Hampshire	19	236	79	251	53	250	47	247
New Jersey	29	233	69	255	50	250	50	247
New Mexico	67	221	33	242	52	229	48	227
New York	49	233	50	252	49	244	51	242
North Carolina	48	231	50	252	50	243	50	241
North Dakota	32	235	68	250	51	248	49	243
Ohio	37	230	63	253	51	246	49	243
Oklahoma	55	230	45	245	50	238	50	236
Oregon	44	226	53	245	51	238	49	234
Pennsylvania	35	227	64	253	50	245	50	243
Rhode Island	40	222	60	245	51	236	49	235
South Carolina	53	226	47	249	50	236	50	238
South Dakota	36	230	64	247	51	242	49	240
Tennessee	49	223	51	242	51	234	49	231
Texas	55	235	43	252	51	243	49	242
Utah	37	229	62	246	51	241	49	238
Vermont	31	234	69	252	51	248	49	245
Virginia	30	230	70	250	51	245	49	242
Washington	39	230	56	251	52	244	48	241
West Virginia	50	229	50	244	51	238	49	235
Wisconsin	34	228	66	252	51	245	49	243
Wyoming	36	236	64	248	51	244	49	243
Other jurisdictions								
District of Columbia	69	207	31	228	49	213	51	214
DoDEA[1]	#	‡	#	‡	52	241	48	239

Rounds to zero.
‡ Reporting standards not met. Sample size is insufficient to permit a reliable estimate.
[1] Department of Defense Education Activity (overseas and domestic schools).
NOTE: Black includes African American, Hispanic includes Latino, and Pacific Islander includes Native Hawaiian. Race categories exclude Hispanic origin. Results are not shown for students whose race/ethnicity was "unclassified" and for students whose eligibility for free/reduced-price school lunch was not available.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2007 Mathematics Assessment.



Assessment Content at Grade 4

To interpret the results in meaningful ways, it is important to understand the content of the assessment. Content was varied to reflect differences in the skills students were expected to have at each grade. The proportion of the assessment devoted to each of the mathematics content areas in each grade can be found in the overview section of this report.

Of the 166 questions that made up the fourth-grade mathematics assessment, the largest percentage (40 percent) focused on number properties and operations. It was expected that fourth-graders should have a solid grasp of whole numbers and a beginning understanding of fractions.

In measurement, the emphasis was on length, including perimeter, distance, and height. Students were expected to demonstrate knowledge of common customary and metric units. In geometry, students were expected to be familiar with simple figures in 2- and 3-dimensions and their attributes. In data analysis and probability, students were expected to demonstrate understanding of how data are collected and organized and basic concepts of probability. In algebra at this grade, the emphasis was on recognizing, describing, and extending patterns and rules.

Mathematics Achievement Levels at Grade 4

The following descriptions are abbreviated versions of the full achievement-level descriptions for grade 4 mathematics. The cut score depicting the lowest score representative of that level is noted in parentheses.

Basic (214): Fourth-graders performing at the *Basic* level should be able to estimate and use basic facts to perform simple computations with whole numbers; show some understanding of fractions and decimals; and solve some simple real-world problems in all NAEP content areas. Students at this level should be able to use—though not always accurately—four-function calculators, rulers, and geometric shapes. Their written responses are often minimal and presented without supporting information.

Proficient (249): Fourth-graders performing at the *Proficient* level should be able to use whole numbers to estimate, compute, and determine whether results are reasonable. They should have a conceptual understanding of fractions and decimals; be able to solve real-world problems in all NAEP content areas; and use four-function calculators, rulers, and geometric shapes appropriately. Students performing at the *Proficient* level should employ problem-solving strategies such as identifying and using appropriate information. Their written solutions should be organized and presented both with supporting information and explanations of how they were achieved.

Advanced (282): Fourth-graders performing at the *Advanced* level should be able to solve complex nonroutine real-world problems in all NAEP content areas. They should display mastery in the use of four-function calculators, rulers, and geometric shapes. These students are expected to draw logical conclusions and justify answers and solution processes by explaining why, as well as how, they were achieved. They should go beyond the obvious in their interpretations and be able to communicate their thoughts clearly and concisely.

The full descriptions can be found at http://www.nagb.org/frameworks/math_07.pdf.

What Fourth-Graders Know and Can Do in Mathematics

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

For example, the map on this page shows that fourth-graders performing in the middle of the *Basic* range (students with an average score of 225) were likely to be able to identify a fraction modeled by a picture. Students performing in the middle of the *Proficient* range (with an average score of 267) were likely to be able to explain how to find the perimeter of a given shape.

GRADE 4 NAEP MATHEMATICS ITEM MAP

	Scale score	Content area	Question description
	500		
Advanced	330	**Data analysis and probability**	Label sections in a spinner to satisfy a given condition
	318	**Number properties and operations**	*Add three fractions with like denominators*
	296	**Algebra**	*Relate input to output from a table of values*
	294	**Number properties and operations**	*Solve a story problem involving addition and subtraction* (shown on page 22)
	290	**Measurement**	*Find area of a square with inscribed triangle*
	289	**Geometry**	*Recognize the result of folding a given shape*
	287	**Data analysis and probability**	Identify color with highest chance of being chosen (shown on page 23)
	282		
Proficient	279	**Number properties and operations**	Solve a story problem requiring multiple operations
	279	**Data analysis and probability**	*Identify picture representing greatest probability*
	267	**Measurement**	Explain how to find the perimeter of a given shape
	264	**Number properties and operations**	*Solve a story problem involving money*
	263	**Algebra**	*Identify number that would be in a pattern*
	262	**Geometry**	*Determine the number of blocks used to build a figure*
	255	**Number properties and operations**	*Use place value to determine the amount of increase*
	250	**Geometry**	*Identify the 3-D shape resulting from folding paper*
	249	**Data analysis and probability**	*Determine probability of a specific outcome*
	249		
Basic	245	**Number properties and operations**	Recognize property of odd numbers
	243	**Number properties and operations**	Multiply two decimal numbers
	232	**Measurement**	*Determine attribute being measured from a picture*
	230	**Number properties and operations**	*Subtract a three-digit number from a four-digit number*
	227	**Algebra**	*Identify number sentence that models a balanced scale*
	225	**Number properties and operations**	*Identify a fraction modeled by a picture*
	220	**Algebra**	*Identify an expression that represents a scenario*
	218	**Number properties and operations**	*Find a sum based on place value*
	217	**Geometry**	*Identify congruent triangles*
	214		
	211	**Data analysis and probability**	Complete a bar graph
	205	**Geometry**	*Use reason to identify figure based on description*
	202	**Measurement**	*Identify appropriate unit for measuring length*
	202	**Number properties and operations**	*Identify place value representation of a number*
	191	**Algebra**	*Find unknown in whole number sentence*
	0		

NOTE: Regular type denotes a constructed-response question. *Italic* type denotes a multiple-choice question. The position of a question on the scale represents the average scale score attained by students who had a 65 percent probability of successfully answering a constructed-response question, or a 74 percent probability of correctly answering a four-option multiple-choice question. For constructed-response questions, the question description represents students' performance rated as completely correct. Scale score ranges for mathematics achievement levels are referenced on the map.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2007 Mathematics Assessment.

Sample Question About Number Properties and Operations

This sample question measures fourth-graders' performance in the number properties and operations content area. In particular, it addresses the "Number operations" subtopic, which focuses on computation, the effects of operations on numbers, and the relationships between operations. The framework objective measured is "Solve application problems involving numbers and operations." Students were not permitted to use a calculator to solve this problem.

Thirty-six percent of fourth-graders selected the correct answer (choice B). One way to arrive at this answer is to first use subtraction to determine that the bridge was built in 1926, and then use addition to determine that it was 50 years old in 1976. The most common incorrect answer (choice A), which was selected by 39 percent of fourth-graders, can be obtained by subtracting 50 years from 2001. The other incorrect answer choices (C and D) represent computation errors.

Percentage of fourth-grade students in each response category in 2007

Choice A	Choice B	Choice C	Choice D	Omitted
39	36	10	14	1

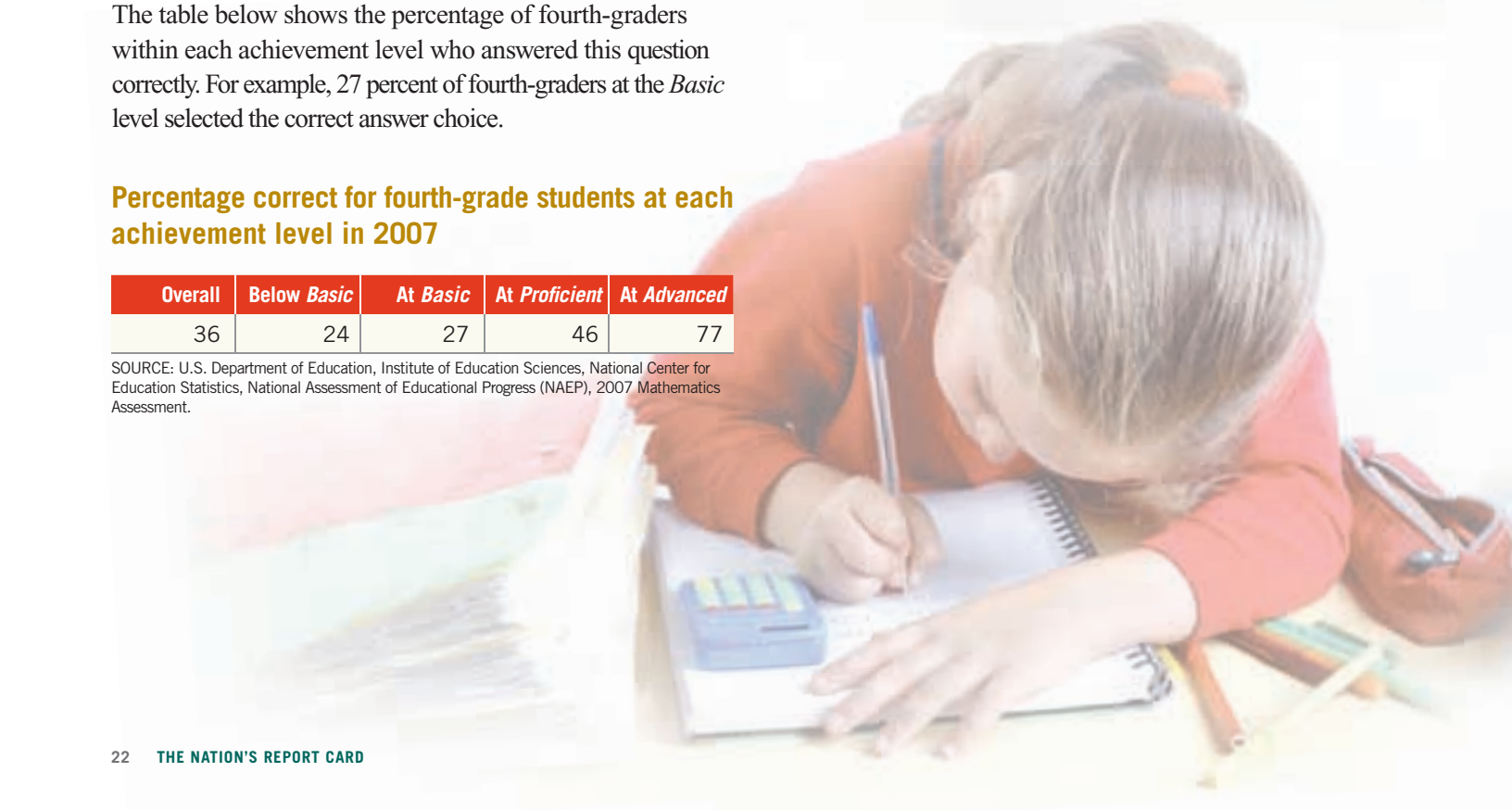
NOTE: Detail may not sum to totals because of rounding.

The table below shows the percentage of fourth-graders within each achievement level who answered this question correctly. For example, 27 percent of fourth-graders at the *Basic* level selected the correct answer choice.

Percentage correct for fourth-grade students at each achievement level in 2007

Overall	Below *Basic*	At *Basic*	At *Proficient*	At *Advanced*
36	24	27	46	77

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



Sample Question About Data Analysis and Probability

This sample question measures fourth-graders' performance in the data analysis and probability content area. It addresses the "Probability" subtopic, which focuses on simple probability and counting or representing the outcomes of a given event. The framework objective measured by this question is "Use informal probabilistic thinking to describe chance events." Students were not permitted to use a calculator to solve this problem.

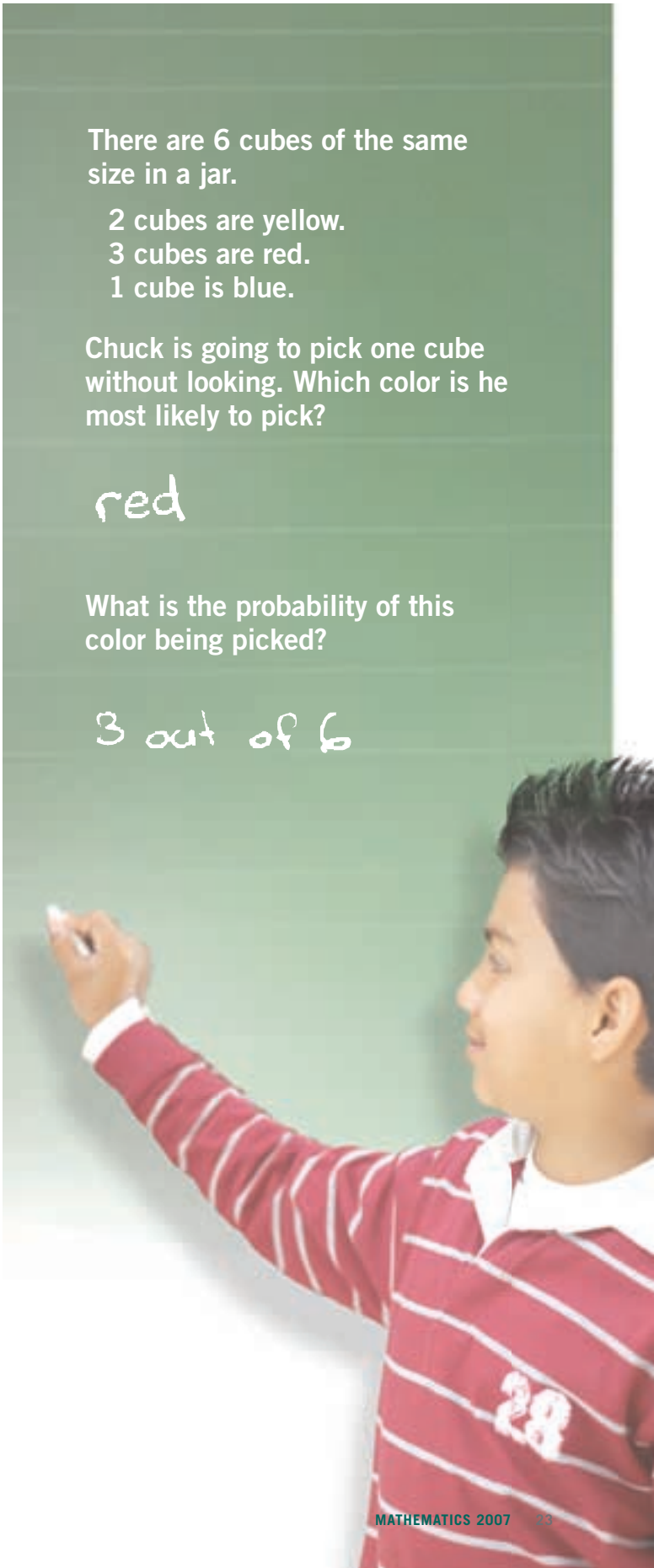
Student responses for this question were rated using the following three-level scoring guide:

Correct—Response indicates that a red cube is most likely to be picked and indicates that the probability is 3 out of 6 (or equivalent).

Partial—Response indicates that a red cube is most likely to be picked or indicates that the probability is 3 out of 6 (or equivalent).

Incorrect—All incorrect responses.

The student response on the right was rated as "Correct" because both parts of the question were answered correctly. Twenty-two percent of fourth-graders gave a response that was rated "Correct" for this question. Sixty-seven percent of fourth-graders provided a response rated as "Partial."



Percentage of fourth-grade students in each response category in 2007

Correct	Partial	Incorrect	Omitted
22	67	10	1

NOTE: Detail may not sum to totals because a small percentage of responses that did not address the assessment task are not shown.

The table below shows the percentage of fourth-graders within each achievement level whose answer to this question was rated as "Correct." For example, 10 percent of fourth-graders at the *Basic* level provided a response rated as "Correct."

Percentage rated as "Correct" for fourth-grade students at each achievement level in 2007

Overall	Below *Basic*	At *Basic*	At *Proficient*	At *Advanced*
22	1	10	38	75

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