National Assessment of Educational Progress

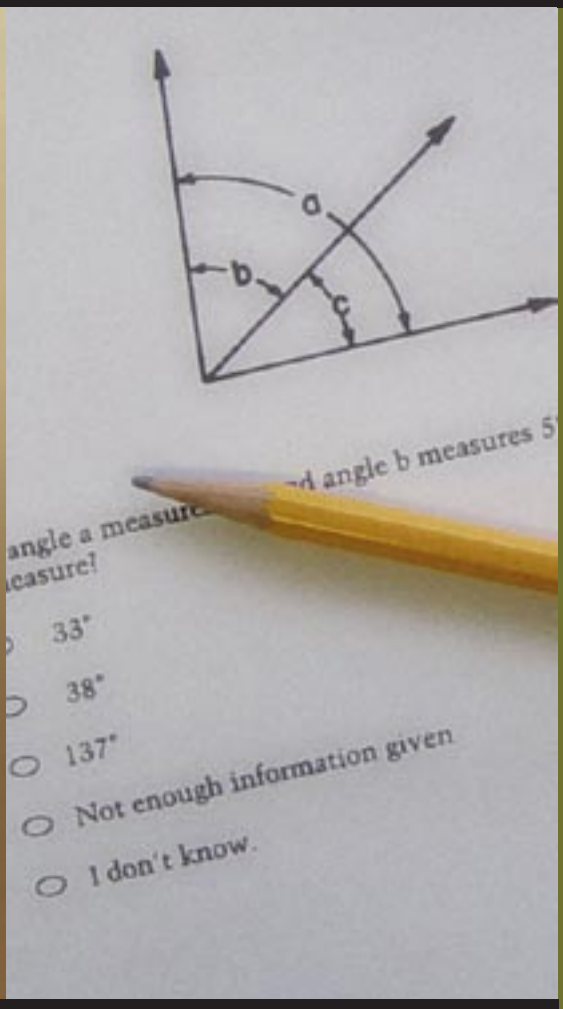
The Nation's Report Card™

NAEP 2004 Trends in Academic Progress

Three Decades of Student Performance in Reading and Mathematics

FINDINGS IN BRIEF

READING, 1971–2004



MATHEMATICS, 1973–2004

INSIDE:

- Nine-year-olds scored higher in reading and mathematics on average in 2004 than in any previous assessment year.
- Thirteen-year-olds scored higher in mathematics on average in 2004 than in any previous assessment year.
- Seventeen-year-olds overall scored about the same in reading in 2004 as they did in 1971, but average scores for Black students increased since 1971, and average scores for Hispanic students increased since 1975.
- The White-Black score gap was smaller in 2004 than in the first assessment year for all three ages, in both subjects.

U.S. Department of Education
Institute of Education Sciences
NCES 2005–463

The Nation's Report Card NAEP ™

NCES National Center for Education Statistics

What is **The Nation's Report Card™?**

The Nation's Report Card™, the National Assessment of Educational Progress (NAEP), is a nationally representative and continuing assessment of what America's students know and can do in various subject areas. Since 1969, assessments have been conducted periodically in reading, mathematics, science, writing, history, geography, and other subjects.

NAEP is a congressionally mandated project of the National Center for Education Statistics within the Institute of Education Sciences of the U.S. Department of Education. The Commissioner of Education Statistics is responsible, by law, for carrying out the NAEP project through competitive awards to qualified organizations.

By making objective information on student performance available to policymakers at the national, state, and local levels, NAEP is an integral part of our nation's evaluation of the condition and progress of education. Only information related to academic achievement and relevant variables is collected under this program. The privacy of individual students and their families is protected, and the identities of participating schools are not released.

In 1988, Congress established the National Assessment Governing Board (NAGB) to oversee and set policy for NAEP. The Board is responsible for selecting the subject areas to be assessed; setting appropriate student achievement levels; developing assessment objectives and test specifications; developing a process for the review of the assessment; designing the assessment methodology; developing guidelines for reporting and disseminating NAEP results; developing standards and procedures for interstate, regional, and national comparisons; determining the appropriateness of all assessment items and ensuring the assessment items are free from bias and are secular, neutral, and nonideological; taking actions to improve the form, content, use, and reporting of results of the National Assessment; and planning and executing the initial public release of NAEP reports.

What Is the Long-Term Trend Assessment?

NAEP includes two components: the long-term trend assessments and the main assessments. The long-term trend component uses assessments that remain substantially unchanged each time a subject is assessed, allowing students' progress in a subject to be measured over a long period of time. The main assessment, on the other hand, is periodically updated to reflect contemporary changes in education policies, methods, and institutions, resulting in shorter trend lines.

This report describes long-term trends in 9-, 13- and 17-year-olds' achievement in reading and mathematics during the last three decades. In 2004, a representative sample of more than 11,000 students in public and private schools at each of the three ages participated in the long-term trend assessment in each subject area. These findings provide a look at the performance of America's students over a period of 33 years, beginning in 1971 for reading and 1973 for mathematics.

The report summarizes trends in average scale scores for all students and for groups of students defined by gender and race/ethnicity. One additional variable for each age is also presented. For age 9, scores are broken out by percentiles; for age 13, scores are shown for students whose parents attained various levels of education; and for age 17, course-taking patterns are highlighted. These different presentations are meant to provide a snapshot of the data available in the full report.

Results from the long-term trend and main assessment programs are not comparable because they use different questions and different samples. Students are sampled by age for the long-term trend assessments and by grade for the main assessments. There are no achievement levels in the long-term trend as there are in the main assessment, and long-term trend results are available only at the national level, while main NAEP produces results at the state and large-district level in some subjects.

A word of caution: The results presented here are meant to describe some aspects of the condition and progress of education. They are best viewed as starting points for further examination, not as final statements on the quality or effectiveness of America's educational system. Differences in student performance between groups or assessment years may reflect a range of socioeconomic and educational factors not discussed in this report; causal inferences should not be made from these cross-sectional data. Data on sample size, significance tests, and other variables are available in the full report.

Contents

On the Web

For the complete long-term trend data, visit the NAEP website http://nces.ed.gov/nationsreportcard

For More Information...

This report presents a summary of findings from the full report (Perie, M., and Moran, R. [2005]. *NAEP 2004 Trends in Academic Progress: Three Decades of Student Performance* [NCES 2005–464]. U.S. Department of Education, National Center for Education Statistics. Washington, DC: U.S. Government Printing Office.), which is a document of over 100 pages containing a full analysis of all data collected through the long-term trend assessment. The NAEP website (http://nces.ed.gov/nationsreportcard) provides an array of information from all NAEP assessments, including PDF versions of all NAEP reports, a data tool for exploring the summary results and calculating the statistical significance of differences, and a tool for examining released questions.

National Reading Scores

Trends in national average reading scores are based on 11 administrations of the assessment of the reading performance of 9-, 13-, and 17-year-old students, beginning in 1971. The reading assessment contains a range of reading materials, from simple narrative passages to complex articles on specialized topics. Students' comprehension of these materials is assessed with both multiple-choice questions, for which students choose a response from the list, and constructed-response questions, for which students are asked to write a response. The average scale score represents the performance of 9-, 13-, and 17-year-olds averaged across the nation. Results are reported on a 0–500 scale that is different from the 0–500 scale for mathematics, meaning that an average scale score of 240 in reading is not equivalent to an average scale score of 240 in mathematics.

The differences described in this report have been determined to be statistically significant at the .05 level with appropriate adjustments for multiple comparisons.

As shown in figure 1, the average reading score at age 9 was higher in 2004 than in any previous assessment year. The average reading score at age 13 was not significantly different in 2004 from the average score in 1999 (the most recent previous assessment year), although it was higher than the average score in 1971. At age 17, there was no statistically significant difference between the average score in 2004 and the average score in 1971 or 1999.

In interpreting these results, it is important to consider the changes in student population over the past 33 years.

National Mathematics Scores

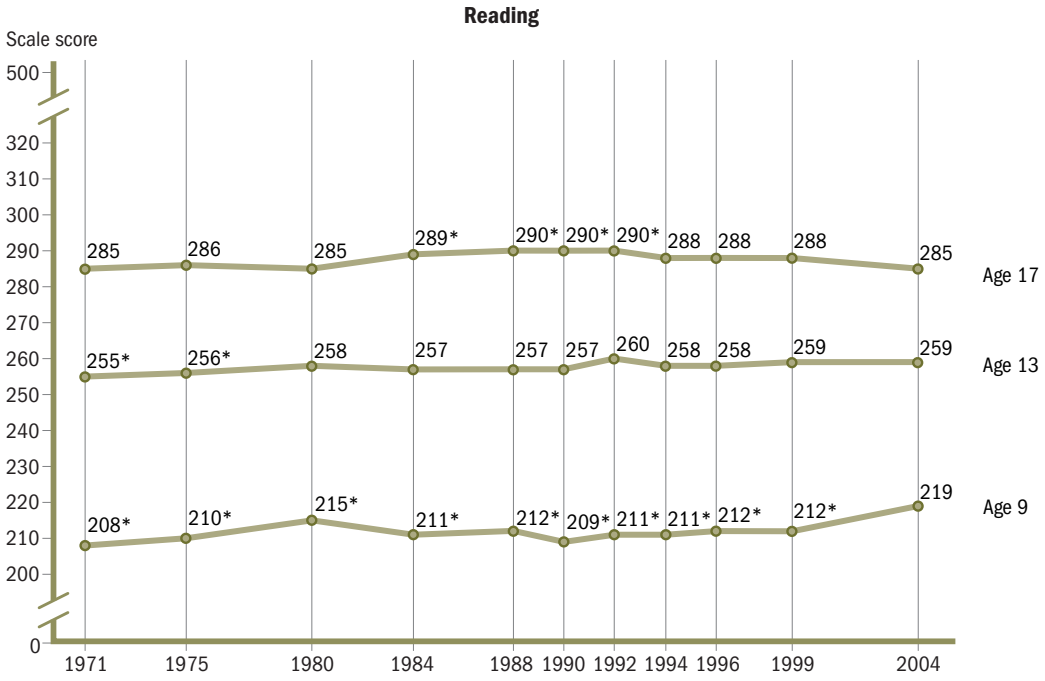
Trends in national average mathematics scores are based on 10 administrations of the assessment of the mathematics performance of 9-, 13-, and 17-year-old students, beginning in 1973. The mathematics assessment measures students' knowledge of basic facts, their ability to carry out numerical operations using paper and pencil, their knowledge of basic measurement formulas as they are applied in geometric settings, and their ability to apply mathematics to daily-living skills (such as those related to time and money). The average scale score represents the performance of 9-, 13-, and 17-year-olds averaged across the nation. Results are reported on a 0–500 scale that is different from the 0–500 scale for reading, meaning an average scale score of 240 in mathematics is not equivalent to an average scale score of 240 in reading.

The differences described in this report have been determined to be statistically significant at the .05 level with appropriate adjustments for multiple comparisons.

As shown in figure 2, the average mathematics scores for 9- and 13-year-olds were higher in 2004 than in any previous assessment year. For 9-year-olds, the 2004 average score was 22 points higher than the score in the 1973 mathematics assessment, and for 13-year-olds, it was 15 points higher. For 17-year-olds, the apparent differences between the average score in 2004 and the average scores in 1973 and 1999 were not statistically significant.

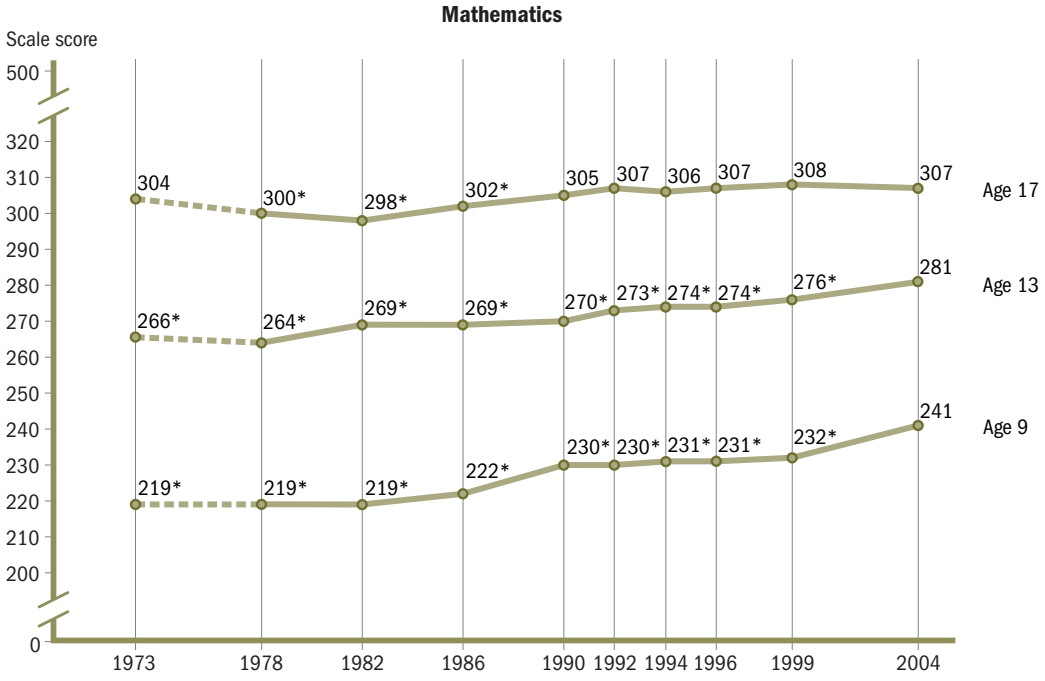
In interpreting these results, it is important to consider the changes in student population over the past 31 years.

Figure 1
Trends in average reading scale scores for students ages 9, 13, and 17: 1971–2004



* Significantly different from 2004.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), selected years, 1971–2004 Long-Term Trend Reading Assessments.

Figure 2
Trends in average mathematics scale scores for students ages 9, 13, and 17: 1973–2004



* Significantly different from 2004.
NOTE: Dashed lines represent extrapolated data. See appendix A of the full report for further explanation.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), selected years, 1973–2004 Long-Term Trend Mathematics Assessments.

Figure 3
Summary of trends in average reading and mathematics scale scores and score gaps for students age 9: 1971–2004

READING	Change from 1971*	Change from 1999
Overall	⬆	⬆
Male	⬆	⬆
Female	⬆	⬆
White	⬆	⬆
Black	⬆	⬆
Hispanic	⬆	⬆

MATHEMATICS	Change from 1973	Change from 1999
Overall	⬆	⬆
Male	⬆	⬆
Female	⬆	⬆
White	⬆	⬆
Black	⬆	⬆
Hispanic	⬆	⬆

RACIAL/ETHNIC GAPS: READING	Change from 1971*	Change from 1999
White-Black	⬇	⬇
White-Hispanic	⬇	⬌

RACIAL/ETHNIC GAPS: MATHEMATICS	Change from 1973	Change from 1999
White-Black	⬇	⬌
White-Hispanic	⬌	⬇

⬆ Average score or score gap increased.
⬇ Average score or score gap decreased.
⬌ Any change in average score or score gap was not statistically significant.
* Data for Hispanic students are included in the overall national results but not reported as a separate racial/ethnic category in 1971. Therefore, the results for Hispanic students are from 1975.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), selected years, 1971–2004 Long-Term Trend Reading and Mathematics Assessments.

Key findings at age 9

Figure 3 compares the average scores and score gaps between 2004 and the first assessment year (1971 for reading and 1973 for mathematics) and between 2004 and the most recent prior assessment year (1999). This chart highlights some of the findings in the full long-term trend report; the actual data can be found in the full report. Sample findings reflected in this chart include:

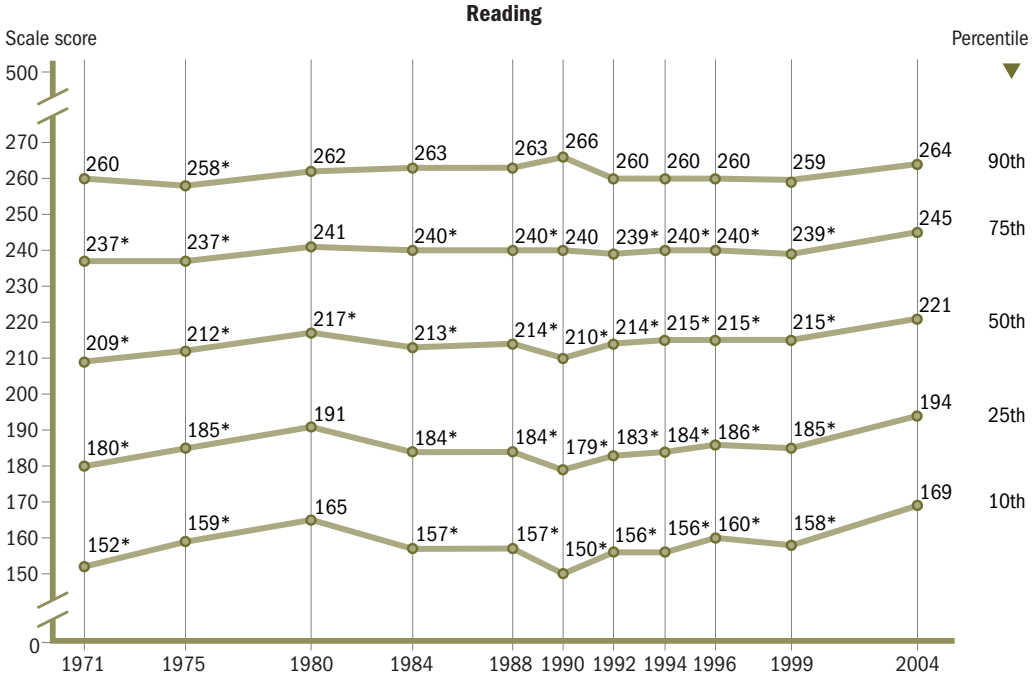
- **Nine-year-olds' average reading score in 2004 was higher than in any previous assessment year.**
- **White, Black, and Hispanic 9-year-olds' average reading scores increased between 1999 and 2004 by 5, 15, and 12 points, respectively.**
- **The average mathematics score of 9-year-olds was higher in 2004 than in any previous assessment year.**
- **White, Black, and Hispanic 9-year-olds' average mathematics scores increased between 1999 and 2004 by 9, 13, and 17 points, respectively.**
- **The White-Black score gaps for 9-year-olds in both reading and mathematics were smaller in 2004 than in the first assessment years, 1971 and 1973, by 18 and 12 points, respectively.**
- **The White-Hispanic score gap in mathematics for 9-year-olds narrowed from 26 points in 1999 to 18 points in 2004.**

Figures 4 and 5 show the trends in reading and mathematics scores at each of five selected percentiles. Both reading and mathematics are on a 0–500 scale, although different sections are shown in figures 4 and 5. Percentiles indicate the percentage of students whose scores fell below a particular point on the NAEP scale. Examining student performance at different percentiles indicates whether or not the changes seen in the overall national average score results are reflected in the performance of lower-, middle-, and higher-performing students. Some of the findings shown in these figures include:

- **In reading, the scores of 9-year-olds at the 10th, 25th, 50th, and 75th percentiles increased between 1999 and 2004 and between 1971 and 2004.**
- **In mathematics, 9-year-olds had higher scores at each of the five selected percentiles in 2004 than in any other assessment year since 1978.**
- **In 2004, the 25th percentile score in mathematics for 9-year-olds was 220, which was the 50th percentile score in 1978. Likewise, the score at the 75th percentile in 2004 was the score at the 90th percentile in 1978.**

Figure 4

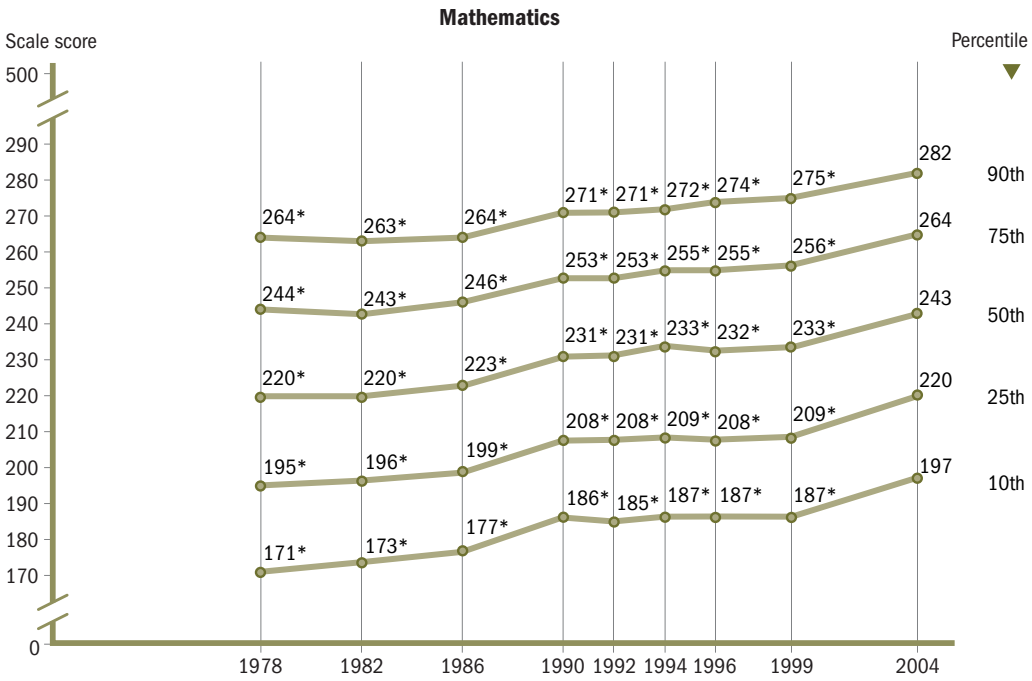
Trends in reading scale scores at selected percentiles for students age 9: 1971–2004



* Significantly different from 2004.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), selected years, 1971–2004 Long-Term Trend Reading Assessments.

Figure 5

Trends in mathematics scale scores at selected percentiles for students age 9: 1978–2004



* Significantly different from 2004.
NOTE: Mathematics scores at selected percentiles are not available in 1973 because only the overall average scores were extrapolated for this year.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), selected years, 1978–2004 Long-Term Trend Mathematics Assessments.

Figure 6
Summary of trends in average reading and mathematics scale scores and score gaps for students age 13: 1971–2004

READING	Change from 1971*	Change from 1999
Overall	⬆	⬌
Male	⬆	⬌
Female	⬆	⬌
White	⬆	⬌
Black	⬆	⬌
Hispanic	⬆	⬌

MATHEMATICS	Change from 1973	Change from 1999
Overall	⬆	⬆
Male	⬆	⬆
Female	⬆	⬆
White	⬆	⬆
Black	⬆	⬆
Hispanic	⬆	⬆

RACIAL/ETHNIC GAPS: READING	Change from 1971*	Change from 1999
White-Black	⬇	⬌
White-Hispanic	⬌	⬌

RACIAL/ETHNIC GAPS: MATHEMATICS	Change from 1973	Change from 1999
White-Black	⬇	⬌
White-Hispanic	⬇	⬌

⬆ Average score or score gap increased.
⬇ Average score or score gap decreased.
⬌ Any change in average score or score gap was not statistically significant.
* Data for Hispanic students are included in the overall national results but not reported as a separate racial/ethnic category in 1971. Therefore, the results for Hispanic students are from 1975.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), selected years, 1971–2004 Long-Term Trend Reading and Mathematics Assessments.

Key findings at age 13

Figure 6 shows the overall trends in average scores and score gaps between 2004 and the first assessment year (1971 for reading and 1973 for mathematics) and between 2004 and the most recent prior assessment year (1999). This chart highlights some of the findings in the full long-term trend report; the actual data can be found in the full report. Sample findings reflected in this chart include:

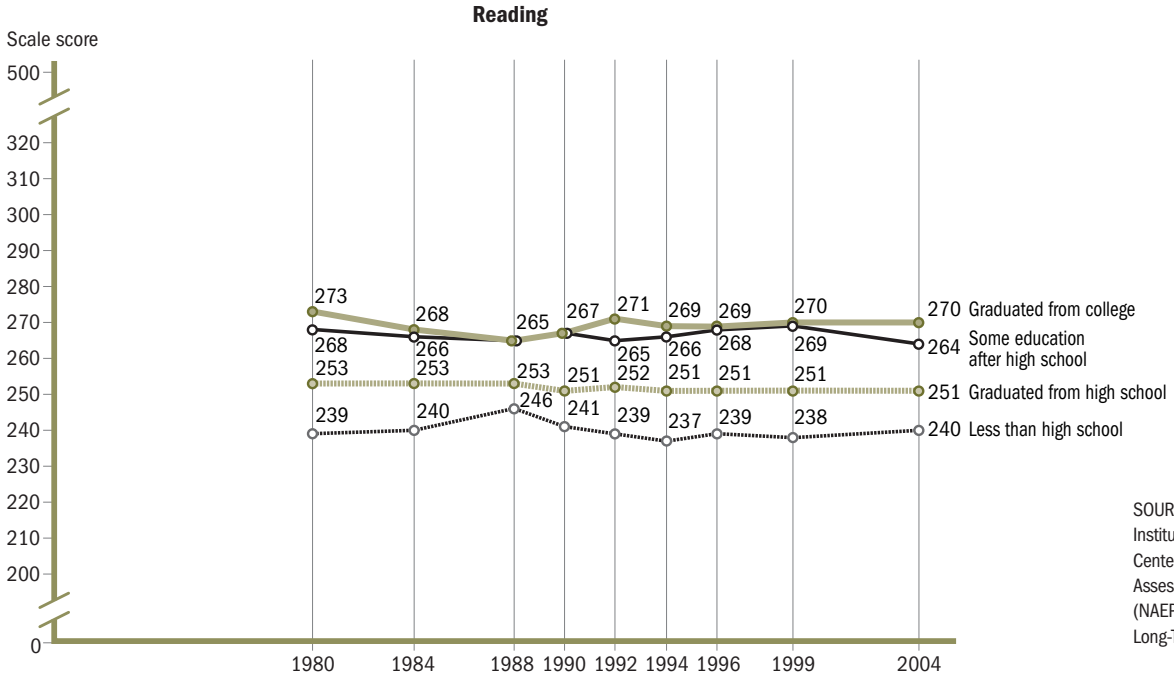
- **In 2004, the average reading score of 13-year-olds was higher than the average score in 1971, but the difference between 1999 and 2004 was not statistically significant.**
- **Between the first assessment year and 2004, White, Black, and Hispanic 13-year-olds' average reading scores increased by 5, 22, and 10 points, respectively.**
- **The average mathematics score for 13-year-olds was higher in 2004 than in any previous assessment year.**
- **In 2004, White, Black, and Hispanic 13-year-olds scored higher on average in mathematics than in 1999 by 5, 11, and 6 points, respectively.**
- **The White-Black score gap in mathematics for 13-year-olds decreased 19 points, and the White-Hispanic score gap decreased 12 points, between 2004 and the first assessments given.**

Figures 7 and 8 show the average reading and mathematics scores for students reporting different levels of parental education. Parental education is determined through the background questionnaire. Students are asked to report the highest level of education each parent attained, and the highest education level of either parent is used in the analyses. Specific findings about the trends include:

- **The percentage of 13-year-olds reporting that at least one parent graduated from college increased from 1980 in reading and 1978 in mathematics to 2004, while the percentage reporting that the highest level of education for their parents was a high school diploma or less decreased (data not shown).**
- **There have been no statistically significant changes in average reading scores of 13-year-olds for any level of parental education between 2004 and any previous assessment year. In contrast, the average mathematics scores in 2004 were higher than in 1978, at every student-reported level of parental education.**

Figure 7

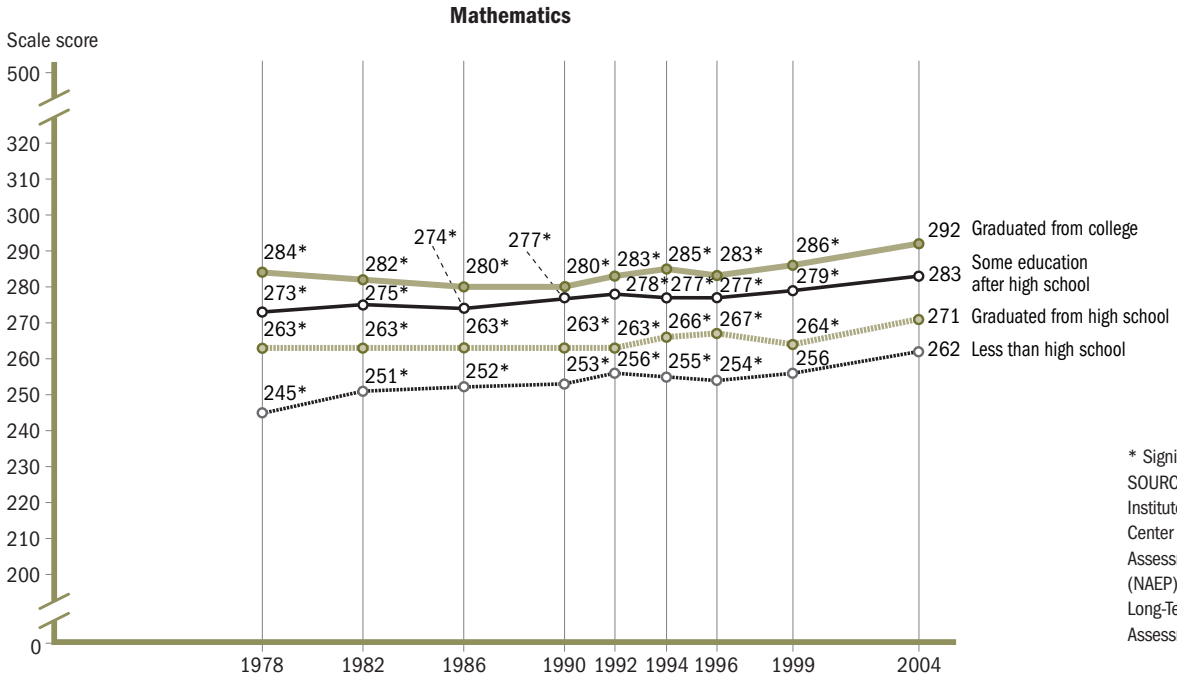
Trends in average reading scale scores for students age 13, by student–reported parents' highest level of education: 1980–2004



SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), selected years, 1980–2004 Long-Term Trend Reading Assessments.

Figure 8

Trends in average mathematics scale scores for students age 13, by student–reported parents' highest level of education: 1978–2004



* Significantly different from 2004.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), selected years, 1978–2004 Long-Term Trend Mathematics Assessments.

Figure 9
Summary of trends in average reading and mathematics scale scores and score gaps for students age 17: 1971–2004

READING	Change from 1971*	Change from 1999
Overall	⬌	⬌
Male	⬌	⬌
Female	⬌	⬌
White	⬌	⬌
Black	⬆	⬌
Hispanic	⬆	⬌

MATHEMATICS	Change from 1973	Change from 1999
Overall	⬌	⬌
Male	⬌	⬌
Female	⬆	⬌
White	⬆	⬌
Black	⬆	⬌
Hispanic	⬆	⬌

RACIAL/ETHNIC GAPS: READING	Change from 1971*	Change from 1999
White-Black	⬇	⬌
White-Hispanic	⬇	⬌

RACIAL/ETHNIC GAPS: MATHEMATICS	Change from 1973	Change from 1999
White-Black	⬇	⬌
White-Hispanic	⬇	⬌

⬆ Average score or score gap increased.
⬇ Average score or score gap decreased.
⬌ Any change in average score or score gap was not statistically significant.
* Data for Hispanic students are included in the overall national results but not reported as a separate racial/ethnic category in 1971. Therefore, the results for Hispanic students are from 1975.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), selected years, 1971–2004 Long-Term Trend Reading and Mathematics Assessments.

Key findings at age 17

Figure 9 shows the overall trends in average scores and score gaps between 2004 and the first assessment year (1971 for reading and 1973 for mathematics) and between 2004 and the most recent prior assessment year (1999). This chart highlights some of the findings in the full long-term trend report; the actual data can be found in the full report. Sample findings reflected in this chart include:

- **The national average score for 17-year-olds in reading showed no statistically significant difference between 2004 and 1999 or 1971.**
- **Black 17-year-olds' average reading score was higher in 2004 than in the first assessment year (1971). The reading score gap between White and Black 17-year-olds decreased by 24 points between 1971 and 2004.**
- **Hispanic 17-year-olds' average reading score was higher in 2004 than in 1975. The White-Hispanic score gap in reading at age 17 decreased by 11 points between 1975 and 2004.**
- **In mathematics, the national average score for 17-year-olds in 2004 was not statistically different from the score either in 1973 or in 1999.**
- **Average mathematics scores for White, Black, and Hispanic 17-year-olds increased from the first assessment year to 2004 by 3, 15, and 12 points, respectively. Likewise, in mathematics, both the White-Black and White-Hispanic score gaps at age 17 were smaller in 2004 than in 1973, by 12 and 9 points, respectively.**

Figures 10 and 11 show the percentage of 17-year-olds who reported taking various mathematics courses. The students indicated all the mathematics courses they had taken or were currently taking, and the chart shows the highest-level mathematics course they indicated.

- **The percentage of 17-year-olds who reported taking calculus nearly tripled between 1978 and 2004, and the percentage of students taking second-year algebra increased from 37 percent in 1978 to 53 percent in 2004.**
- **In 2004, the percentages of Black and Hispanic 17-year-olds who reported they had taken second-year algebra had doubled from the percentages reported in 1978.**
- **The percentage of Hispanic 17-year-olds taking calculus quadrupled between 1978 and 2004.**

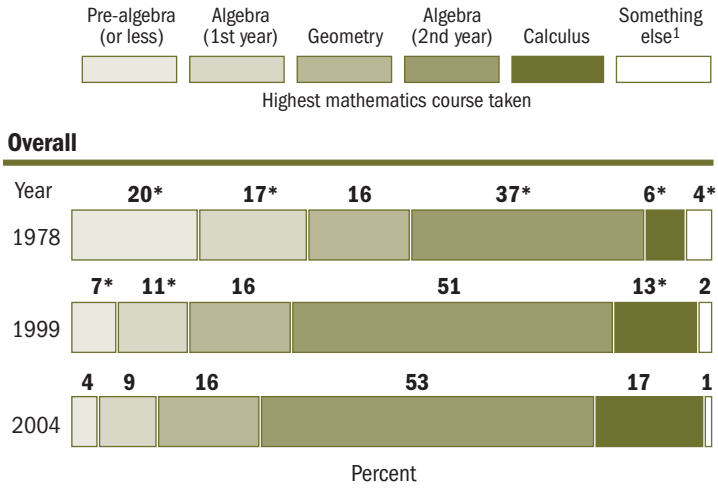


Figure 10

Percentage of students age 17, by highest mathematics course taken: 1978, 1999, and 2004

* Significantly different from 2004.
[1] "Something else" implies that students checked a series of courses that did not follow a logical coursetaking pattern.
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), 1978, 1999, and 2004 Long-Term Trend Mathematics Assessments.

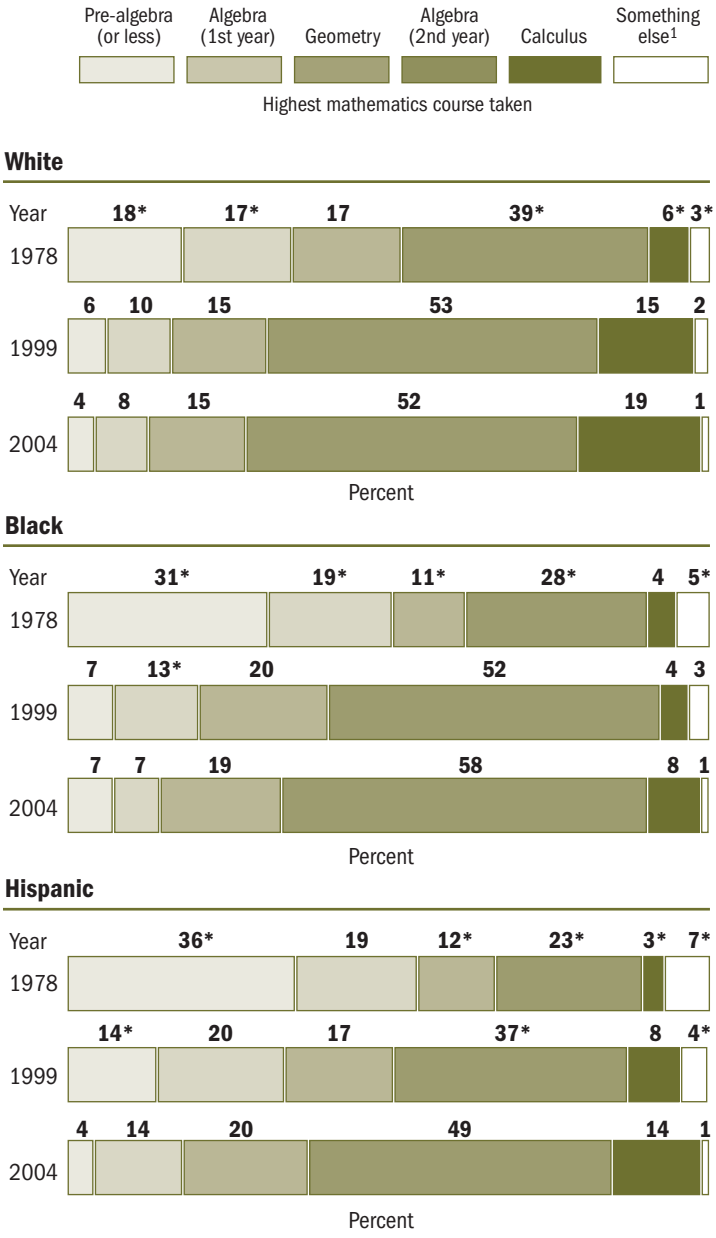


Figure 11

Percentage of students age 17, by race/ethnicity and highest mathematics course taken: 1978, 1999, and 2004

* Significantly different from 2004.
[1] "Something else" implies that students checked a series of courses that did not follow a logical coursetaking pattern.
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), 1978, 1999, and 2004 Long-Term Trend Mathematics Assessments.

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