



NAEP

scores are highest for those graduates completing a more challenging curriculum and higher level mathematics and science courses.

Graduates with a mathematics GPA in the top 25 percent or completing a calculus course reached the *Proficient* level on the NAEP mathematics assessment on average. Graduates with mathematics GPAs in the bottom 25 percent or who completed geometry or below as their highest level mathematics course scored, on average, below the *Basic* level.

UNDERSTANDING NAEP SCORES

National Assessment of Educational Progress achievement levels are performance standards showing what students should know and be able to do. Results are reported as scale scores and percentages of students performing at or above three achievement levels:

- **BASIC:** Denotes partial mastery of the knowledge and skills that are fundamental for proficient work at a given grade.
- **PROFICIENT:** Represents solid academic performance. Students reaching this level have demonstrated competency over challenging subject matter.
- **ADVANCED:** Signifies superior performance.

The National Assessment Governing Board sets specific achievement levels for each subject area and grade, based on recommendations from panels of educators and members of the public, to provide a context for interpreting student performance on NAEP. As provided by law, NCES, upon review of congressionally mandated evaluations of NAEP, has determined that achievement levels are to be used on a trial basis and should be interpreted with caution. NAEP achievement levels have been widely used by national and state officials. Many consider *Proficient* to be the desired level for all students. Additional information about NAEP achievement levels can be found at <http://www.nagb.org/pubs/pubs.html>.

The NAEP twelfth-grade mathematics and science results are reported on a 0–300 scale. The ranges of scores that fall within each of the achievement levels are shown in figure 11. Because NAEP scales are developed independently for each subject, scores cannot be used to make comparisons across subjects.

Cautions in interpreting results

There can be many explanations of an association between NAEP scores and other variables (e.g., curriculum level, average GPA, and highest course taken). HSTS data do not support conclusions about cause and effect between variables. For example, graduates who take a more challenging curriculum score higher on NAEP assessments. This could be because taking a more challenging curriculum provided them with the information they needed to do well on NAEP, or it could be that the best prepared and most motivated students did better on NAEP and chose to take more challenging curricula, or it could be a mixture of these influences and others.

GRADUATES COMPLETING A RIGOROUS CURRICULUM HAVE HIGHER NAEP SCORES

Figure 12 shows that the scores on the science NAEP assessments were higher for those graduates who completed a rigorous curriculum than for those who completed a lower level curriculum.

FIGURE 11
Range of NAEP mathematics and science scores for each NAEP achievement level

ACHIEVEMENT LEVEL	MATHEMATICS SCORES
ADVANCED	216 OR HIGHER
PROFICIENT	176–215
BASIC	141–175

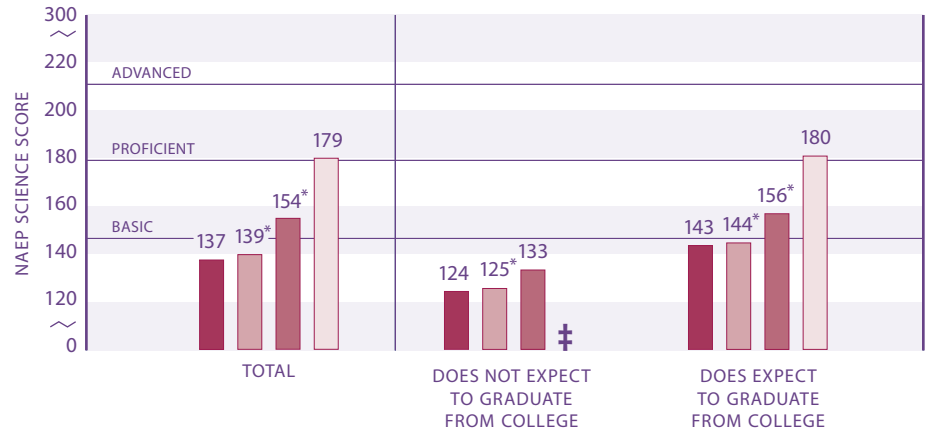
ACHIEVEMENT LEVEL	SCIENCE SCORES
ADVANCED	210 OR HIGHER
PROFICIENT	178–209
BASIC	146–177

High school graduates who expected to graduate from college scored higher on the NAEP science assessment than those who did not expect to graduate. Those who completed a less than standard curriculum and expected to graduate from college scored higher on the assessment than graduates who took a midlevel curriculum but did not expect to graduate.

FIGURE 12
NAEP science scores, by curriculum level completed and college expectations: 2005

Rigorous █
Midlevel █
Standard █
Less than standard █

‡ Reporting standards not met.
*Significantly different ($p < .05$) from next highest level completed.

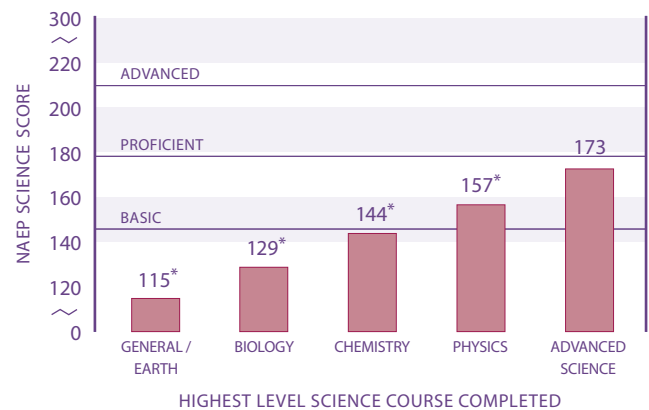
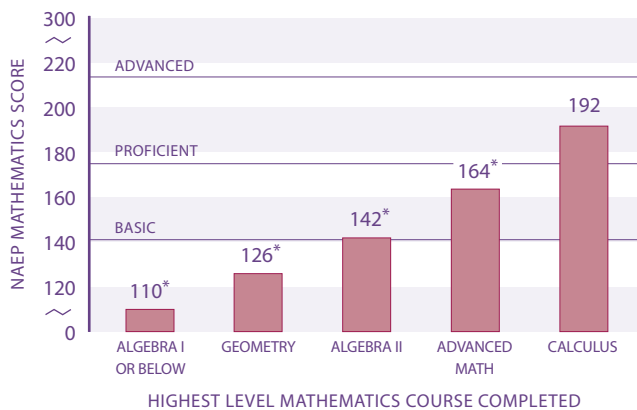


SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (2005) and National Assessment of Educational Progress (NAEP) Student Questionnaire (2005).

Graduates completing higher level mathematics and science courses have higher NAEP scores

As seen in figure 13, NAEP scores are higher for those graduates who completed the most challenging mathematics and science courses. For example, the average NAEP mathematics score among graduates whose highest course was geometry or below fell below the *Basic* achievement

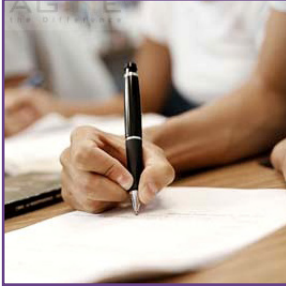
FIGURE 13 NAEP mathematics and science scores, by highest level course taken: 2005



*Significantly different ($p < .05$) from next highest level course completed.

NOTE: Advanced mathematics includes courses, other than calculus, that are generally taken after algebra II (e.g., AP statistics and precalculus). Advanced science courses are courses that contain advanced content (like AP biology, IB chemistry, AP physics, etc.) or are considered second-year courses (chemistry II, advanced biology, etc.).

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (HSTS), 2005.

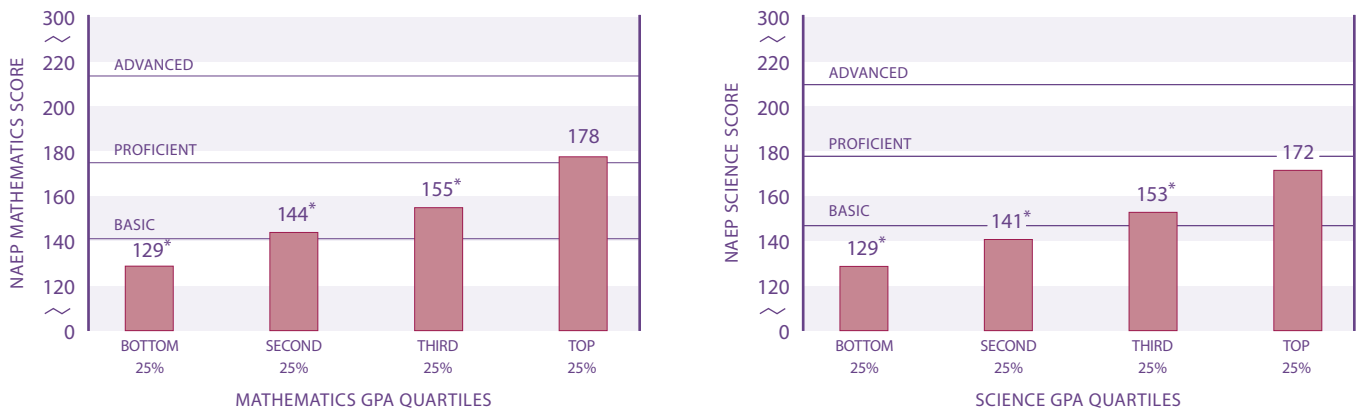


level. On the other hand, the average score of graduates who had taken calculus was at the *Proficient* level. Graduates whose highest science class was chemistry or below had an average NAEP science score that placed them below *Basic*. Graduates who completed physics and other advanced science courses had average scores placing them at *Basic*. With each additional course level completed in mathematics or science, the graduate's average score increased.

IN MATHEMATICS AND SCIENCE, HIGHER GPAs ARE ASSOCIATED WITH HIGHER NAEP SCORES

As shown in figure 14, on average, graduates who earned higher GPAs in mathematics courses scored higher on the NAEP mathematics assessment and those earning high GPAs in science had higher NAEP science scores. Scores ranged from an average of 129 for graduates in the bottom 25 percent of mathematics GPAs to 178 for graduates in the top 25 percent. For science, the average scores ranged from 129 for those in the bottom science GPA quartile to 172 for those in the top quartile.

FIGURE 14 NAEP mathematics and science scores, by GPA quartiles: 2005



*Significantly different ($p < .05$) from next highest quartile.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (HSTS), 2005.

ACADEMIC PROFILES AND NAEP SCORES

Academic profiles of 2005 graduates are presented below and average NAEP scores are presented in figure 15. The profiles show the academic characteristics of graduates at a given achievement level. For example, of the graduates who reached the *Advanced* level in mathematics, 88 percent had completed calculus as their highest course. Figure 15 shows the average NAEP scores of graduates with particular academic characteristics. For example, it shows that the average NAEP mathematics score of graduates who took calculus was 192. This average score is at the *Proficient* level, even though some graduates had scores that placed them at a higher or a lower achievement level.

Academic profiles of graduates who scored at the *Advanced* and below the *Basic* achievement levels on NAEP assessments

Mathematics— *Advanced*

- 89 percent had calculus as highest course completed
 - 11 percent had advanced mathematics as highest course completed
 - <1 percent had algebra II as highest course completed
 - <1 percent completed less than algebra II
- 85 percent top 25% mathematics GPA (3.20–4.00)
 - 11 percent 2nd highest 25% mathematics GPA (2.62–3.19)
 - 4 percent 3rd highest 25% mathematics GPA (2.00–2.61)
 - <1 percent bottom 25% mathematics GPA (0.00–1.99)
- 86 percent took AP/IB mathematics course
 - 14 percent did not take AP/IB mathematics course

Mathematics – below *Basic*

- 1 percent had calculus as highest course completed
 - 13 percent had advanced mathematics as highest course completed
 - 43 percent had algebra II as highest course completed
 - 26 percent had geometry as highest course completed
 - 17 percent had algebra I or below as highest course completed
- 7 percent top 25% mathematics GPA (3.20–4.00)
 - 20 percent 2nd highest 25% mathematics GPA (2.62–3.19)
 - 29 percent 3rd highest 25% mathematics GPA (2.00–2.61)
 - 44 percent bottom 25% mathematics GPA (0.00–1.99)
- 1 percent took AP/IB mathematics course
 - 99 percent did not take AP/IB mathematics course

Science— *Advanced*

- 72 percent had advanced science as highest science course completed
 - 23 percent had physics as highest science course completed
 - 4 percent had chemistry as highest science course completed
 - 1 percent had biology as highest science course completed
 - <1 percent completed less than biology
- 81 percent top 25% science GPA (3.27–4.00)
 - 13 percent 2nd highest 25% science GPA (2.67–3.26)
 - 4 percent 3rd highest 25% science GPA (2.00–2.66)
 - 1 percent bottom 25% science GPA (0.00–1.99)
- 61 percent took AP/IB science course
 - 39 percent did not take AP/IB science course

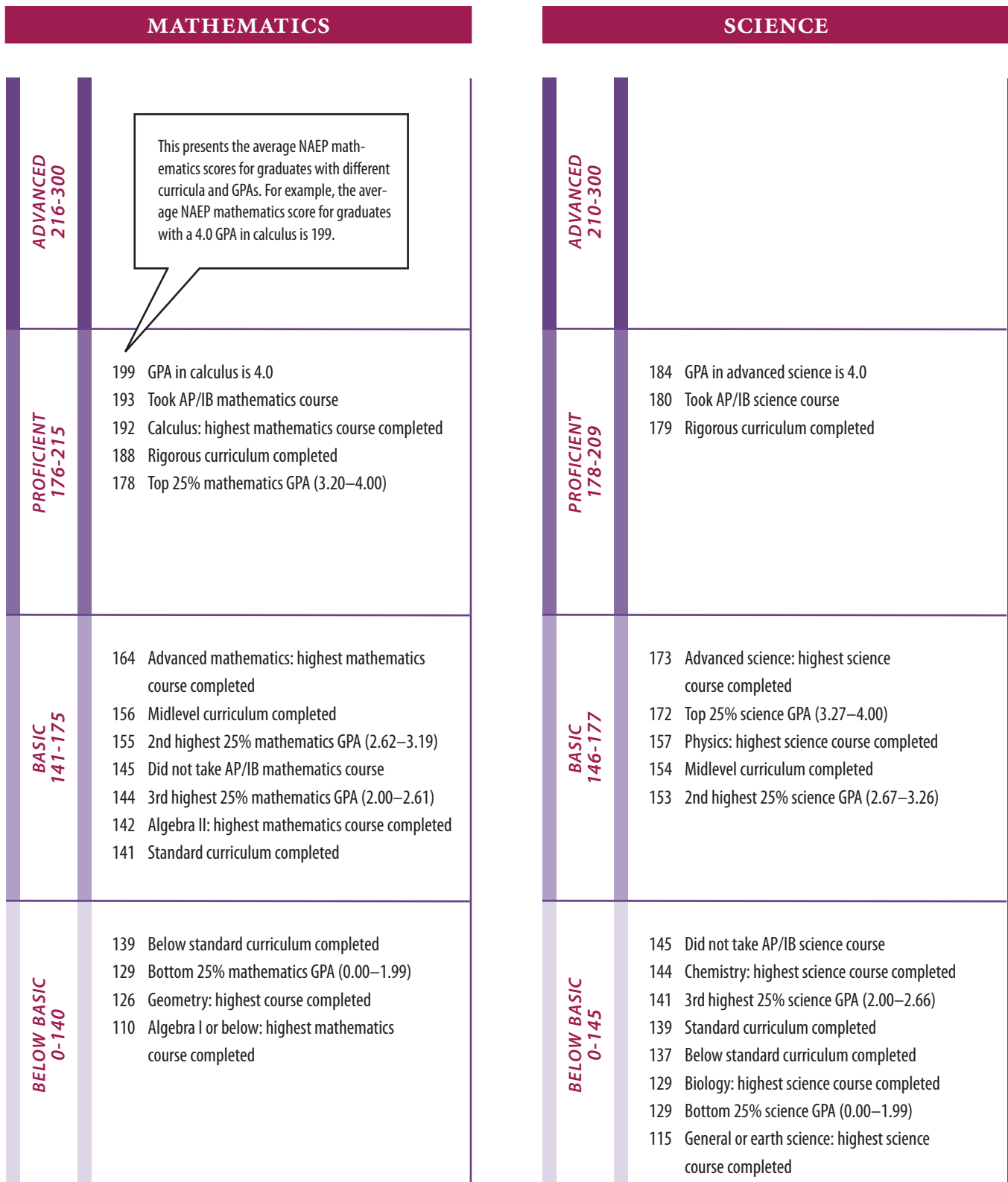
Science – below *Basic*

- 8 percent had advanced science as highest science course completed
 - 18 percent had physics as highest science course completed
 - 37 percent had chemistry as highest science course completed
 - 32 percent had biology as highest science course completed
 - 5 percent had general or earth science as highest science course completed
- 9 percent top 25% science GPA (3.27–4.00)
 - 20 percent 2nd highest 25% science GPA (2.67–3.26)
 - 32 percent 3rd highest 25% science GPA (2.00–2.66)
 - 39 percent bottom 25% science GPA (0.00–1.99)
- 3 percent took AP/IB science course
 - 97 percent did not take AP/IB science course

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

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (HSTS), 2005.

FIGURE 15 Average mathematics and science NAEP scores, by academic characteristics



SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (HSTS), 2005.