

# Evaluating Coursework and GPA Trends of High School Graduates



## Executive Summary

This report presents information about the types of courses that high school graduates in the class of 2009 took during high school, how many credits they earned, and the grades they received. Information on the relationships between high school coursetaking records and performance in mathematics and science on the National Assessment of Educational Progress (NAEP) is also included. Transcripts were collected from about 610 public schools and 130 private schools for the 2009 High School Transcript Study (HSTS). These transcripts constituted a nationally representative sample of 37,700 high school graduates, representing approximately 3 million 2009 high school graduates. The 2009 results are compared to the results of earlier transcript studies dating back to 1990, and differences among graduates by race/ethnicity, gender, and parent education are examined. Because the study is restricted to high school graduates, it contains no information about dropouts, who may differ from graduates. Graduates who receive a special education diploma or certificate of completion are also excluded from analyses in this report unless noted otherwise.

### *Graduates earn more credits and complete higher curriculum levels*

- In 2009, graduates earned over three credits more than their 1990 counterparts, or about 420 additional hours of instruction during their high school careers.
- A greater percentage of 2009 graduates completed more challenging curriculum levels than 1990 or 2005 graduates.
- Nearly two-thirds of graduates who attained a rigorous curriculum took algebra I before high school.

### *Defining curriculum levels*

Curriculum levels in this report are defined by the number of course credits earned by graduates in specified types of courses during high school, as follows:

**Standard:** At least four credits of English and three each in social studies, mathematics, and science.

**Midlevel:** In addition to standard requirements, geometry and algebra I or II; at least two courses in biology, chemistry, and physics; and at least one credit of a foreign language.

**Rigorous:** In addition to midlevel requirements, an additional credit in mathematics including pre-calculus or higher; biology, chemistry, and physics; and at least three foreign language credits.

### *Graduates with stronger academic records earn higher NAEP scores*

- Graduates who completed an Advanced Placement (AP) or International Baccalaureate (IB) mathematics or science course, a higher level mathematics or science course in ninth grade, or a rigorous curriculum had average NAEP scores at the *Proficient* level in both mathematics and science.
- Graduates who completed a midlevel or a standard curriculum had average NAEP scores at the *Basic* level.

### *Comparisons by gender*

- Since 2005, male graduates have narrowed the gap with female graduates in credits earned in mathematics and science.
- A larger percentage of female graduates compared to male graduates completed a midlevel or rigorous curriculum in 2009.
- In 2009, male graduates generally had higher NAEP mathematics and science scores than female graduates completing the same curriculum level.

### *Comparisons by race/ethnicity*

- Since 1990 more graduates from each racial/ethnic group completed a rigorous curriculum. The percentage of Asian/Pacific Islander graduates completing a rigorous curriculum in 2009, 29 percent, was greater than that of White, Black, or Hispanic graduates (14 percent, 6 percent, and 8 percent respectively).
- All four racial/ethnic groups on average earned more credits and higher grade point averages (GPAs) in 2009 than they did in 1990. The GPAs of White and Asian/Pacific Islander graduates increased between 2005 and 2009.

### *Other Topics*

This report also takes a closer look at:

- Finding time to earn more credits, through summer learning, classes taken for high school credits in middle school, and online learning;
- Science, Technology, Engineering, and Mathematics (STEM) coursetaking; and
- Credits earned, GPAs, and curriculum levels of students with disabilities and English language learners.

# Understanding The Results

## *Overview of the High School Transcript Study*

This report presents information about the types of courses that graduates took during their years in high school, how many credits they earned, and the grades they received. Information on the relationships between high school records and performance in mathematics and science on the National Assessment of Educational Progress (NAEP) is also included. Transcripts were collected from approximately 610 public schools and 130 private schools for the 2009 High School Transcript Study (HSTS). These transcripts constituted a nationally representative sample of 37,700 public and private high school graduates, representing approximately 3 million 2009 high school graduates. The 2009 results are compared to the results of the 1990, 1994, 1998, 2000, and 2005 NAEP high school transcript studies, and differences among graduates by gender, race/ethnicity, and parent education are examined. However, the sample size was insufficient to permit reliable estimates for American Indian/Alaska Native graduates in 2009.

### Grade Point Average

in a standard four point scale...	
A	4 points
B	3 points
C	2 points
D	1 point
F	0 points

## *Standardizing transcript information*

Not all high schools have the same standards for course titles, assigning credits, and grade scales. To allow comparisons, HSTS standardizes the transcript information. To control for the variation in course titles, a coding

system called the Classification of Secondary School Courses (CSSC) is used for classifying courses on the basis of information available in school catalogs and other information sources. (For more information, see <http://nces.ed.gov/surveys/hst/courses.asp>.)

Course credits are converted to standardized Carnegie units of credit (or Carnegie credits), in which a single unit is equal to 120 hours of classroom time over the course of a year. Schools provided information on how many course credits represent a Carnegie credit at their school. The course credits recorded on the transcript were then converted (standardized) into Carnegie credits for the data analysis for this report.

Points are assigned to each letter grade as shown in the table to the left. The points are adjusted by the number of Carnegie credits earned, so that a course with 60 hours of instruction counts half as much as one with 120 hours. The average of the points earned for all the courses taken is the grade point average (GPA). Courses in which a graduate did not receive a grade, such as pass/fail and audited courses, do not factor into the GPA calculation. GPAs were not adjusted for Advanced Placement, International Baccalaureate, or other honors classes. This process does not standardize for differences in grading practices among schools and teachers.

### *The NAEP connection*

Approximately 30,100 of the graduates included in the transcript study also participated in the NAEP twelfth-grade mathematics or science assessments in 2009. Thus, findings of the HSTS can be linked with NAEP results, allowing a comparison of coursetaking patterns and educational achievement as measured by NAEP.

This report presents information on the 2005 and 2009 NAEP mathematics scores and on the 2009 NAEP science scores.

Each NAEP assessment is built around an organizing framework, which is the blueprint that guides the development of the assessment instrument and determines the content to be assessed. The National Assessment Governing Board develops the NAEP frameworks (<http://nces.ed.gov/nationsreportcard/frameworks.asp>).

For 2005, the Governing Board adopted a new mathematics framework for grade 12 to reflect changes in high school standards and coursework. This framework, which was also used in 2009, allows comparisons of 2005 and 2009 mathematics scores.

The 2005 and 2009 NAEP science scores cannot be compared because of the implementation of a new science framework in 2009.

### *Caution in interpreting results*

The results presented in this report describe information from the collected transcripts. In reading the report, readers may find themselves asking questions about the causes for changes, whether increases or decreases, in the results. However, the HSTS cannot be used to determine the reasons behind these findings.”

The National Center for Education Statistics (NCES) uses widely accepted statistical standards in analyzing data. Unless otherwise noted, the text of this report discusses only findings that are significant at the .05 level. In the tables and charts of this report, the symbol (\*) is used to indicate findings that are significantly different from one another. When statements about differences are made in the text, the differences are based on unrounded numbers and not the rounded numbers presented in the figures and tables. The results in this report are estimates based on samples of students and schools and are therefore subject to sampling and measurement errors.

## Credits Earned Continue to Rise

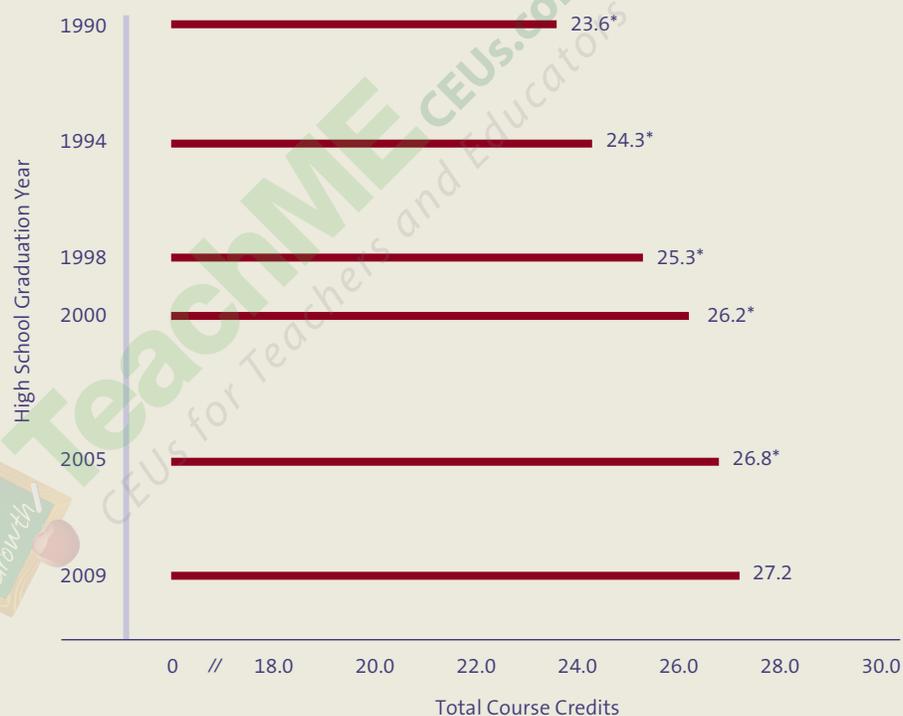
Average credits earned by high school graduates increased from 26.8 credits in 2005 to 27.2 credits in 2009 (figure 1). Over the last 19 years, average credits earned by graduates increased by more than three credits, from 23.6 credits in 1990 to 27.2 in 2009. Each Carnegie credit

represents 120 hours of classroom instruction. Thus, 2009 graduates received over 400 hours more of instructional time during their high school years compared to 1990 graduates. This increase in credits over time is consistent with earlier NCES transcript studies.

\* Significantly different ( $p < .05$ ) from 2009.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (HSTS), various years, 1990–2009.

**FIGURE 1. Trend in average credits earned: 1990–2009**



## Defining Curriculum Levels

In this report, three curriculum levels are discussed: standard, midlevel, and rigorous. Information is also shown for students who do not attain at least a standard curriculum level (below standard). The curriculum levels were developed for the NAEP HSTS studies and are based on the number of credits and types of courses graduates complete.

As shown in table 1, to attain a standard curriculum, a high school graduate must earn four credits in English, and three credits each in social studies, mathematics, and science. Graduates who do not meet these requirements complete a below standard curriculum.

To attain a midlevel curriculum, a high school graduate with a

standard curriculum must meet three additional requirements. Mathematics credits earned must include algebra and geometry, science courses completed must cover two subjects among biology, chemistry, and physics, and one credit must be earned in foreign language courses.

To attain a rigorous curriculum, a high school graduate with a midlevel curriculum must meet three additional requirements. Four credits in mathematics must be earned, of which one course must be pre-calculus or a higher level. Science courses completed must cover all three subjects of biology, chemistry, and physics, and three credits must be earned in foreign language courses.

**TABLE 1. Course credit requirements to attain specified curriculum levels**

	Standard	Midlevel	Rigorous
English	4	4	4
Social Studies	3	3	3
Mathematics	3	3 (including geometry and algebra I or II)	4 (including pre-calculus or higher)
Science	3	3 (including at least two of biology, chemistry, and physics)	3 (including biology, chemistry, and physics)
Foreign Language	0	1	3

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

NOTE: This is a modified version of curriculum levels used by Laura Horn and Lawrence K. Kojaku (2001). The standard curriculum level is equivalent to what Horn and Kojaku refer to as a core curriculum; the nomenclature used in this report is different to avoid confusion with core credits also discussed in this report. One difference between this report and the classification by Horn and Kojaku is that to be considered as having completed a rigorous curriculum, this report does not require graduates to have taken an AP or honors course. This modification was made to ensure that HSTS data for earlier years are consistent with data for 2009.

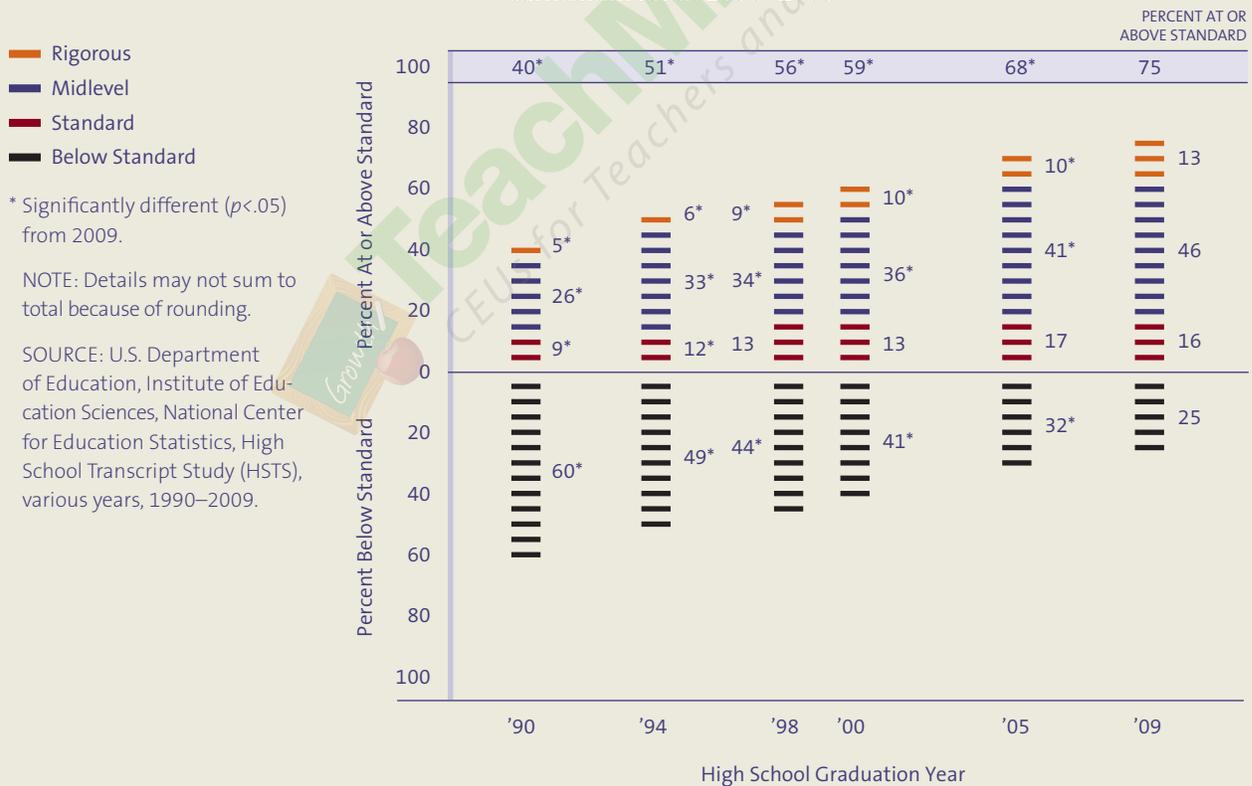
# More Graduates Complete Challenging Curriculum Levels

The rigor of graduates' curriculum levels is associated with graduates' entry and success in postsecondary education (Horn and Nuñez 2000; Horn and Kojaku 2001). Compared to 1990 graduates, a greater percentage of 2009 graduates completed midlevel or rigorous curriculum levels (figure 2). The percentage of graduates completing a midlevel curriculum increased

from 26 percent in 1990 to 46 percent in 2009. The percentage completing a rigorous curriculum increased from 5 percent in 1990 to 13 percent in 2009.

During this same period, the percentage of graduates completing a below standard curriculum declined from 60 percent in 1990 to 25 percent in 2009.

**FIGURE 2. Trend in percentage of graduates completing each curriculum level: 1990–2009**



## Some Graduates Do Not Reach at Least a Standard Curriculum Level

Even with the overall increase in curriculum levels completed, a quarter of 2009 graduates completed a curriculum level that is below standard (table 2).

Thirty-four percent of graduates with a parent who did not finish high school completed a below standard curriculum compared to

20 percent of graduates with a parent who graduated from college.

Sixty-three percent of English language learners (ELL) and 45 percent of students with disabilities (SD) completed a below standard curriculum compared with approximately 25 percent of non-ELL and non-SD graduates.

**TABLE 2. Percentage of graduates at each curriculum level, by selected characteristics: 2009**

Selected characteristics	Curriculum level			
	Below standard	Standard	Midlevel	Rigorous
	Percent			
All graduates	25	16	46	13
<b>Parental education</b>				
Did not finish high school	34*	17*	43*	6*
Graduated high school	28*	19*	45*	7*
Some education after high school	25*	17*	50	9*
Graduated college	20	12	48	20
<b>Students with disabilities (SD)</b>				
Yes	45*	30*	21*	3*
No	24	14	48	14
<b>English language learners (ELL)</b>				
Yes	63*	12	21*	4*
No	25	16	47	13

\* Significantly different ( $p < .05$ ) from contrast group (at least one parent graduated college, non-SD graduate, non-ELL graduates) within the same column.

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

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (HSTS), 2009.



## Science Courses Key to Achieving Standard and Midlevel Curriculum Levels

Based on the HSTS 2009 results, many graduates lacked only the required science courses to reach the next highest curriculum level. For those graduates who did not complete a standard curriculum (25 percent), 39 percent lacked only the required three credits in science to attain a standard curriculum level (figure 3). Similarly, of the 16 percent of graduates who completed a standard curriculum, 35 percent lacked only the science coursework in two of the three major science subjects (biology, chemistry, and physics) required to attain a midlevel curriculum level (figure 4).

Other graduates were missing only the four credits in English required to reach a standard curriculum level (figure 3). One quarter of graduates who did not attain a standard curriculum level were missing multiple requirements.

Many graduates who completed a standard curriculum level did not meet the course requirements in a single subject area needed to earn a midlevel curriculum. In addition to the 35 percent who lacked only the science requirements, 19 percent lacked only the required mathematics coursework, and 17 percent were only missing the required one credit in foreign language courses (figure 4).



**FIGURE 3.** Percentage of graduates who did not attain a standard curriculum, by missing requirement: 2009



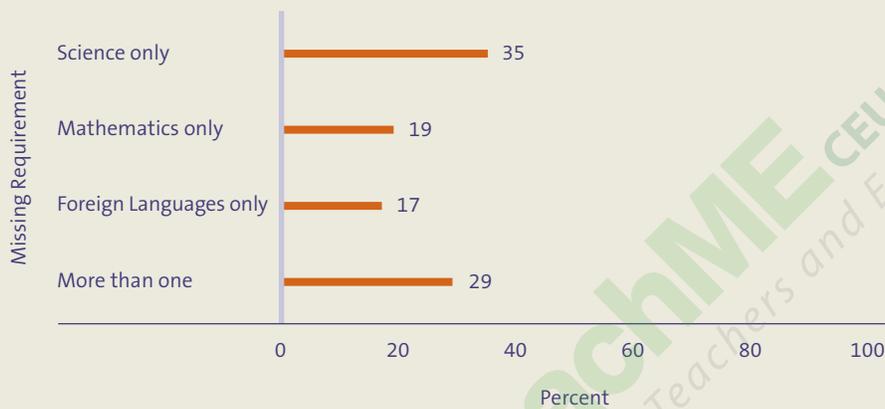
NOTE: For definitions of curriculum levels, see table 1. Details may not sum to total because of rounding.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (HSTS), 2009.

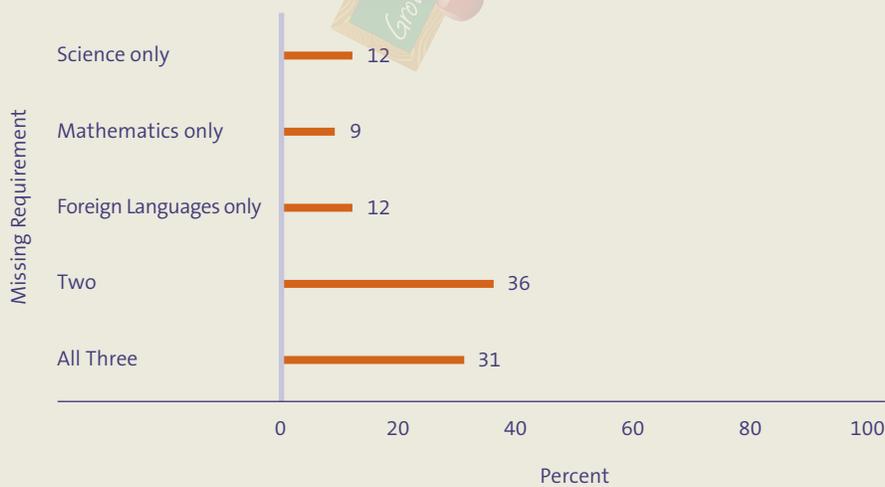
A majority of graduates who completed a midlevel curriculum lacked two or more requirements to earn a rigorous curriculum. Approximately 36 percent lacked requirements in two of the three subject areas (science, mathematics, and foreign language), while 31

percent lacked requirements in all three subjects (figure 5). One-third of graduates who completed a midlevel curriculum lacked the requirements in just one of three subjects (science, mathematics, and foreign language) needed to complete a rigorous curriculum.

**FIGURE 4. Percentage of graduates who attained a standard curriculum but not a midlevel curriculum, by missing requirement: 2009**



**FIGURE 5. Percentage of graduates who attained a midlevel curriculum but not a rigorous curriculum, by missing requirement: 2009**



NOTE: For definitions of curriculum levels, see table 1. Details may not sum to total because of rounding.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (HSTS), 2009.

## Graduates Earn More Credits in Academic Courses

Credits earned in core academic courses (English, mathematics, science, and social studies) and other academic courses (fine arts, foreign languages, and computer-related studies) have increased since 1990. In 1990, graduates earned 13.7 credits in core academic courses and 3.6 credits in other academic courses (figure 6). In 2009, graduates earned 16.0 credits in core academic courses and 5.3 credits in other academic courses. Credits earned in other courses decreased from 6.4 credits in 1990 to 6.0 credits in 2009.

Since 1990, graduates have increased average credits earned in each of the four core academic courses (figure 7). From 1990 to 2009, average credits earned in social studies, mathematics, and science increased more than average credits in English. Average credits earned in these three core academic courses increased by approximately 0.7 credits each from 1990 to 2009 compared with approximately 0.2 credits for English. Still, 2009 graduates earned almost a full credit more in English than they earned in science and a half credit more than in mathematics.

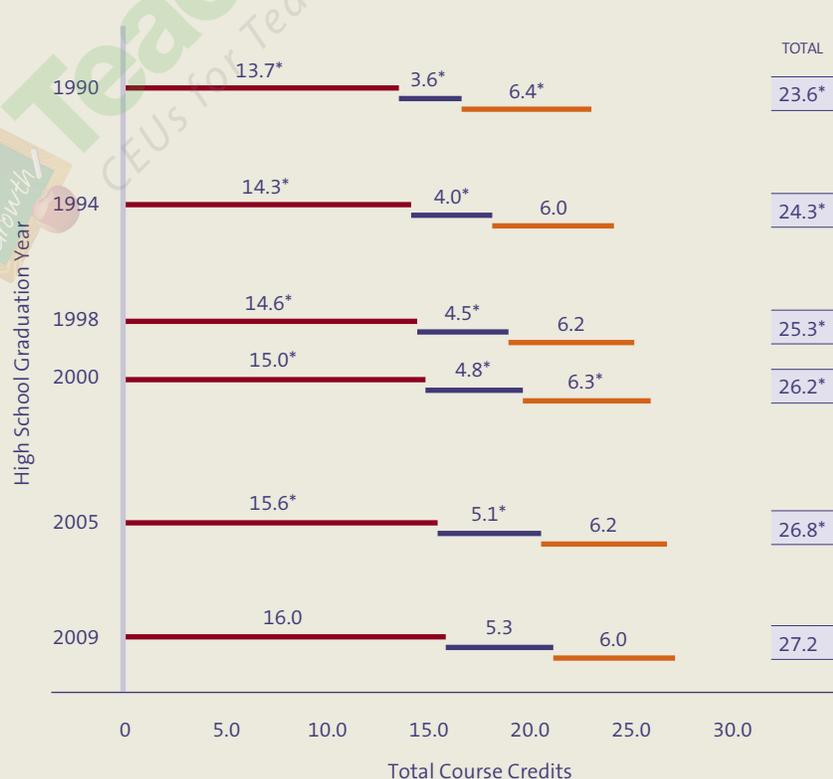
- Core Academic
- Other Academic
- Other

\* Significantly different ( $p < .05$ ) from 2009.

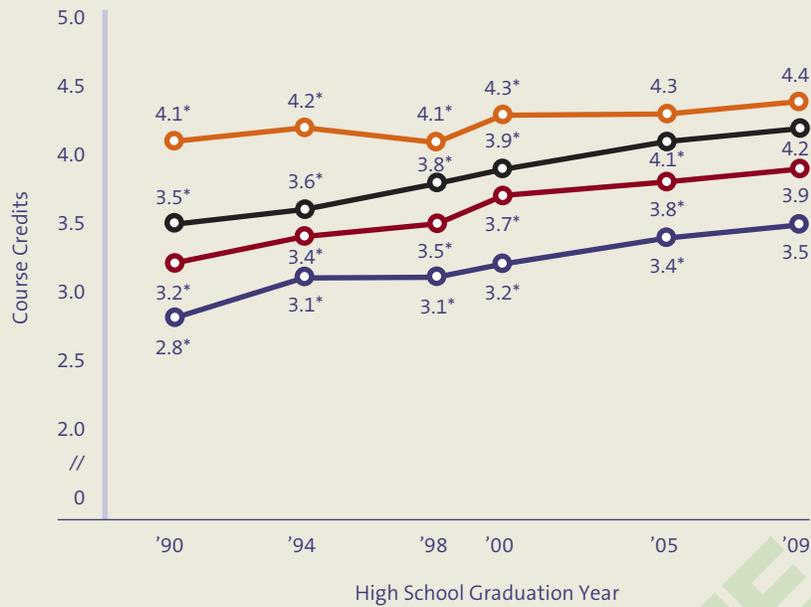
NOTE: Numbers at end of bars represent total credits. Core academic courses are English, mathematics, science, and social studies. Other academic courses are fine arts, foreign languages, and computer-related studies. Other courses include courses such as vocational education, personal health, and physical education. Details may not sum to total because of rounding.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (HSTS), various years, 1990–2009.

FIGURE 6. Trend in average credits earned, by course type: 1990–2009



**FIGURE 7. Trend in average credits earned in core academic courses: 1990–2009**



English  
Mathematics  
Science  
Social Studies

\* Significantly different ( $p < .05$ ) from 2009.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (HSTS), various years, 1990–2009.



## Graduates' Overall GPAs Unchanged From 2005 to 2009

**TABLE 3. Grade Point Average**

in a standard four point scale...	
A	4 points
B	3 points
C	2 points
D	1 point
F	0 points

Overall GPAs increased from 2.68 in 1990 to 3.00 in 2009 but did not increase from 2005 to 2009 (figure 8). Similarly, GPAs by course type were higher for core academic and other academic courses in 2009 than in 1990, but did not change significantly from 2005 to 2009. There was an increase in GPA for other courses from 2005 to 2009. On average, graduates earned the lowest overall GPAs in core academic courses and higher overall GPAs in both other academic and other courses.

Among the individual core academic courses, the only significant increase in graduates' GPAs from 2005 to 2009 was in English, which increased from an average of 2.82 in 2005 to 2.85 in 2009 (figure 9). On average, graduates earned lower GPAs in mathematics and science than in English and social studies.

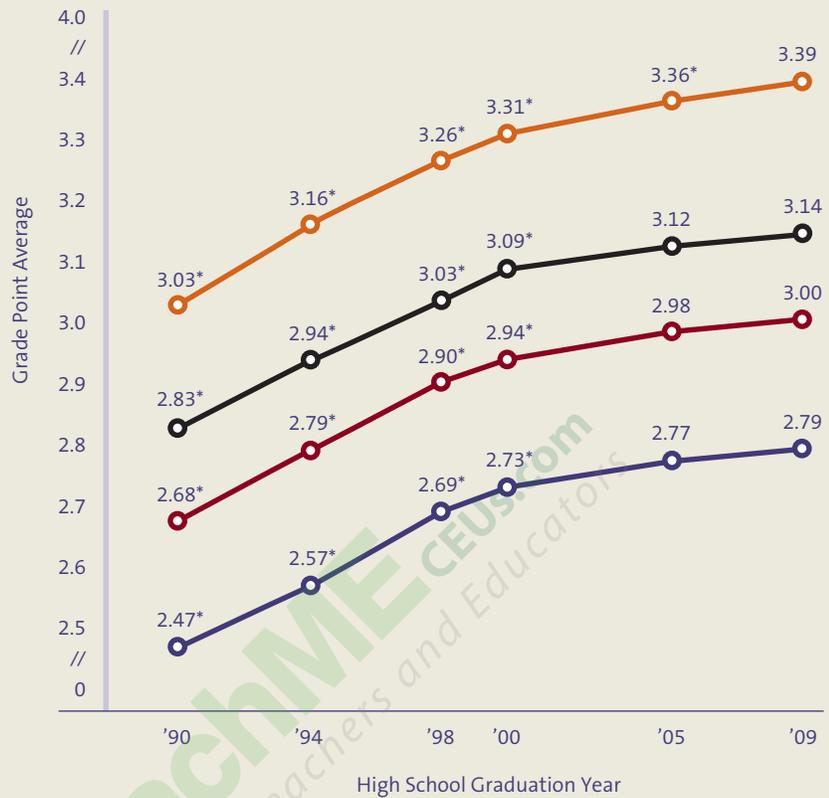
- Other
- Other Academic
- Overall
- Core Academic

\* Significantly different ( $p < .05$ ) from 2009.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (HSTS), various years, 1990–2009.

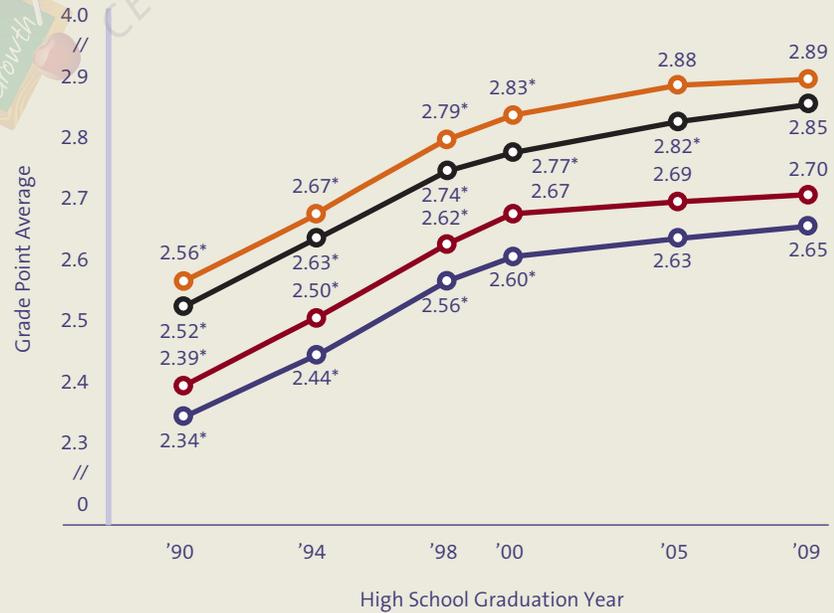


FIGURE 8. Trend in average GPA, overall and by course type: 1990–2009



- Social Studies
- English
- Science
- Mathematics

FIGURE 9. Trend in average GPAs for core academic courses: 1990–2009



# Understanding NAEP Scores

National Assessment of Educational Progress (NAEP) 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 achievement.

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. Even though they are still considered trial, the NAEP achievement levels have been widely used by national and state officials. Additional information about NAEP achievement levels can be found at <http://www.nagb.org/publications/achievement.htm>.

In 2009, twelfth-grade students participating in NAEP were given assessments in mathematics and science. 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 table 4. Because NAEP scales are developed independently for each subject, scores cannot be used to make comparisons across subjects.

TABLE 4. Grade 12 NAEP achievement levels

	Mathematics	Science
<i>Advanced</i>	216 or higher	222 or higher
<i>Proficient</i>	176–215	179–221
<i>Basic</i>	141–175	142–178

SOURCE: <http://nces.ed.gov/nationsreportcard/mathematics/achieveall.asp>; and <http://nces.ed.gov/nationsreportcard/science/achieveall.asp>.

## Cautions in Interpreting Results

There can be many explanations for 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 completed a rigorous curriculum, on average, earned higher scores on

NAEP assessments. This could be because taking a rigorous 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 performed better on NAEP and chose to take more challenging curricula, or it could be a mixture of these and other influences.

## Graduates Completing Higher Curriculum Levels Have Higher Average Grade 12 NAEP Scores

Graduates completing a rigorous curriculum earned the highest NAEP mathematics and science scores (figures 10 and 11). Graduates completing rigorous and midlevel curricula outperformed graduates who completed less challenging curricula. However, there were no significant differences in scores between graduates completing standard and below standard curricula.

The 2009 NAEP mathematics scores by curriculum level were not significantly higher than the 2005 scores. However, the average NAEP score for graduates completing a below standard curriculum moved from below the *Basic* achievement level in 2005 to *Basic* in 2009.



■ 2005  
■ 2009

\* Significantly different ( $p < .05$ ) from next highest curriculum level.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (HSTS), 2005 and 2009; National Assessment of Educational Progress (NAEP), 2005 and 2009 Mathematics Assessments and 2009 Science Assessment.

FIGURE 10. Average NAEP mathematics scores, by curriculum level: 2005 and 2009

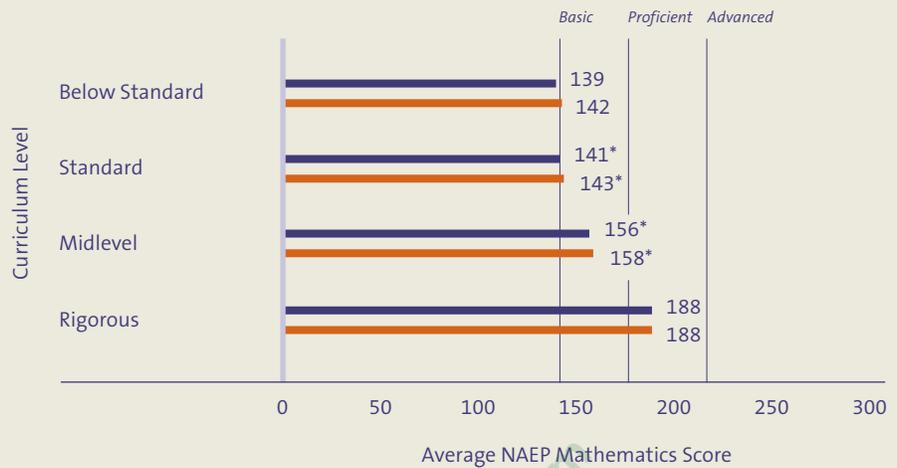
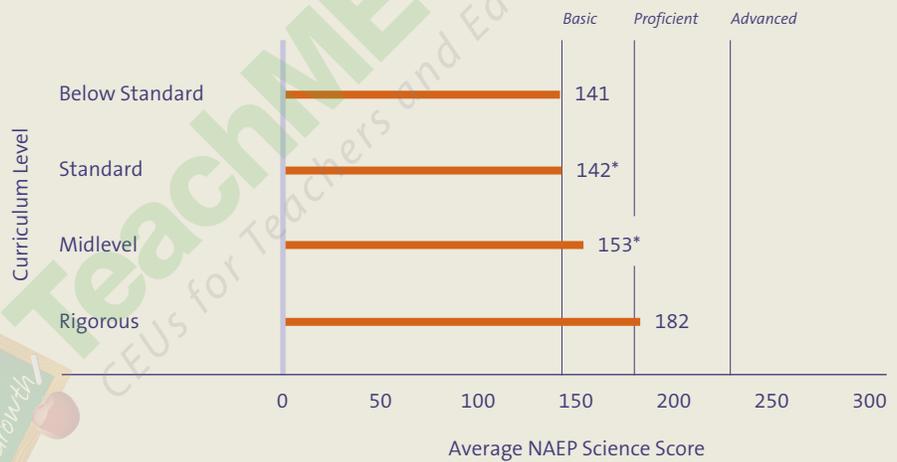


FIGURE 11. Average NAEP science scores, by curriculum level: 2009



## Higher Grade 12 NAEP Scores Associated with More Advanced Ninth-Grade Coursework

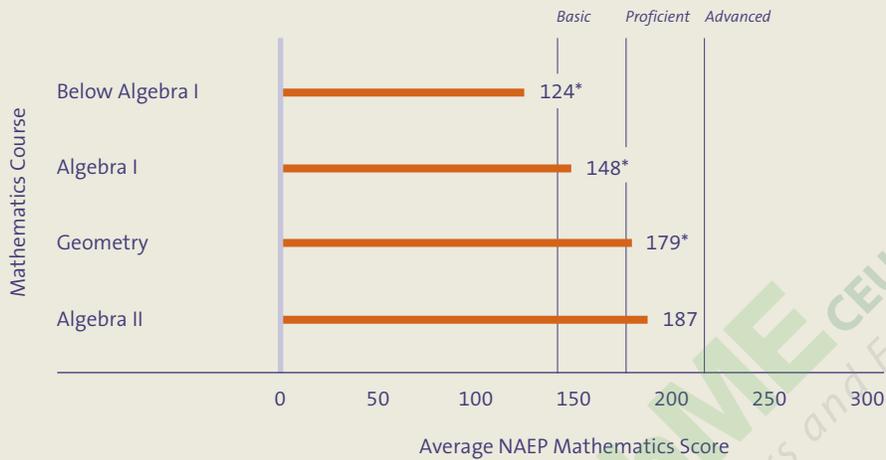
Average NAEP scores are higher for graduates who completed more advanced mathematics and science courses in the ninth grade (figures 12 and 13). For example, graduates

whose first high school mathematics course was geometry scored 55 points higher on the NAEP mathematics assessment than graduates who took a class below algebra I.

Graduates who completed chemistry in ninth grade scored 27 points higher on NAEP science than graduates who took earth science. Graduates

who completed geometry or algebra II as ninth graders earned an average NAEP mathematics score at the *Proficient* level.

**FIGURE 12. Average NAEP mathematics scores, by highest level mathematics course completed in ninth grade: 2009**

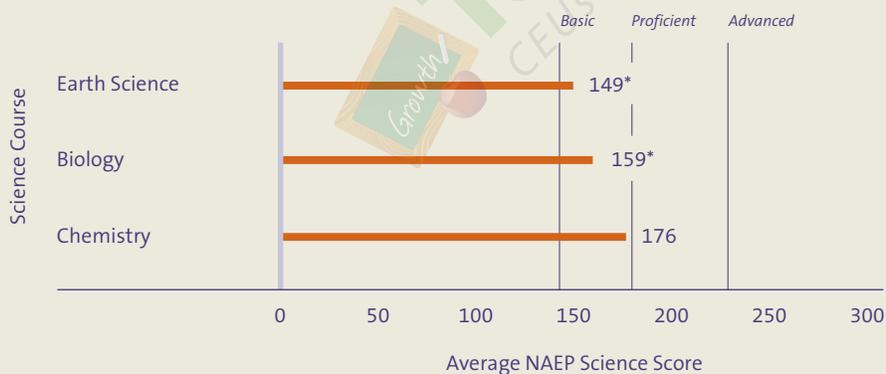


\* Significantly different ( $p < .05$ ) from next highest level course.

NOTE: The mathematics and science courses listed in figures 12 and 13 are not exhaustive.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (HSTS), 2009; National Assessment of Educational Progress (NAEP), 2009 Mathematics and Science Assessments.

**FIGURE 13. Average NAEP science scores, by highest level science course completed in ninth grade: 2009**



## Graduates with Higher GPAs Earn Higher NAEP Scores

Graduates earning higher GPAs in mathematics (2005 and 2009) and science (2009) attained higher average NAEP scores (figures 14 and 15).

Graduates in the top, second-to-top, and second-to-bottom GPA quarters earned higher average scores than graduates in the lowest GPA quarters in both mathematics and science. Graduates in the top math

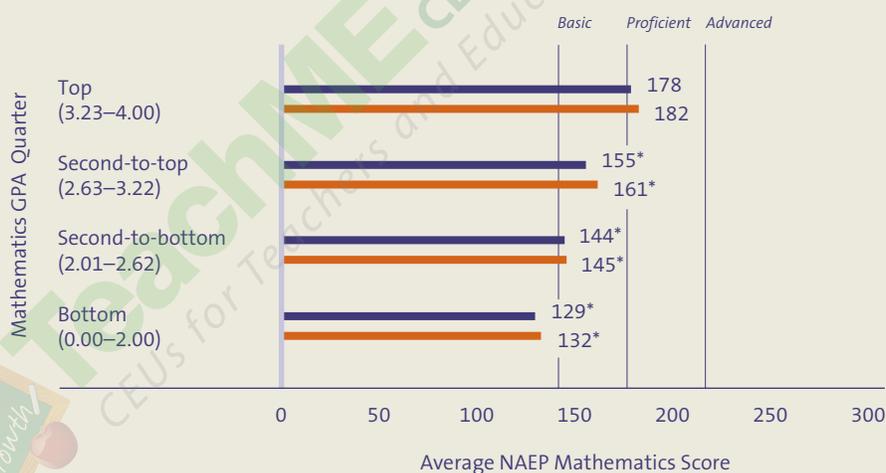
quarter earned an average NAEP mathematics score at the *Proficient* achievement level, while those in the top science quarter performed at the *Basic* level.

From 2005 to 2009, NAEP mathematics scores increased for graduates in the bottom, second-to-top, and in the top quarters.



■ 2005  
■ 2009

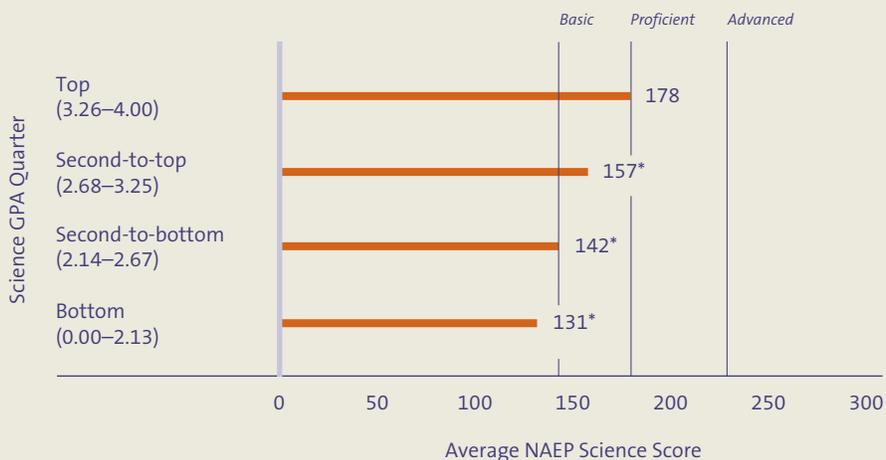
**FIGURE 14. Average NAEP mathematics scores, by GPA quarter: 2005 and 2009**



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

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (HSTS), 2005 and 2009; National Assessment of Educational Progress (NAEP), 2005 and 2009 Mathematics Assessments and 2009 Science Assessment.

**FIGURE 15. Average NAEP science scores, by GPA quarter: 2009**



## Average Grade 12 NAEP Performance

Average NAEP scores for graduates with different academic characteristics are presented in table 5. For example, the average NAEP mathematics score for graduates with a 4.0 GPA in calculus is 201, which is in the

*Proficient* range. No scores are shown in the *Advanced* achievement ranges for mathematics or science because, on average, graduates did not score in these ranges, though individual students did.

TABLE 5. Average mathematics and science NAEP scores, by academic characteristics: 2009

Mathematics		Science	
<b>Advanced</b> 216-300		<b>Advanced</b> 222-300	
<b>Proficient</b> 176-215	<ul style="list-style-type: none"> <li>201 GPA in calculus is 4.0</li> <li>194 Took AP/IB mathematics course</li> <li>193 Calculus: highest mathematics course</li> <li>188 Rigorous curriculum completed</li> <li>182 Top mathematics GPA quarter (3.23–4.00)</li> </ul>	<b>Proficient</b> 179-221	<ul style="list-style-type: none"> <li>193 GPA in advanced science is 4.0</li> <li>187 Took AP/IB science course</li> <li>182 Rigorous curriculum completed</li> <li>182 Advanced science: highest science course</li> </ul>
<b>Basic</b> 141-175	<ul style="list-style-type: none"> <li>164 Advanced mathematics: highest mathematics course completed</li> <li>161 Second-to-top mathematics GPA quarter (2.63–3.22)</li> <li>158 Midlevel curriculum completed</li> <li>149 Did not take AP/IB mathematics course</li> <li>145 Second-to-bottom mathematics GPA quarter (2.01–2.62)</li> <li>143 Standard curriculum completed</li> <li>142 Algebra II: highest mathematics course</li> <li>142 Below standard curriculum completed</li> </ul>	<b>Basic</b> 142-178	<ul style="list-style-type: none"> <li>178 Top science GPA quarter (3.26–4.00)</li> <li>157 Physics: highest science course</li> <li>157 Second-to-top science GPA quarter (2.68–3.25)</li> <li>153 Midlevel curriculum completed</li> <li>147 Did not take AP/IB science course</li> <li>144 Chemistry: highest science course</li> <li>142 Second-to-bottom science GPA quarter (2.14–2.67)</li> <li>142 Standard curriculum completed</li> </ul>
<b>Below Basic</b> 0-140	<ul style="list-style-type: none"> <li>132 Bottom mathematics GPA quarter (0.00–2.00)</li> <li>127 Geometry: highest mathematics course</li> <li>114 Algebra I or below: highest mathematics course</li> </ul>	<b>Below Basic</b> 0-141	<ul style="list-style-type: none"> <li>141 Below standard curriculum completed</li> <li>131 Biology: highest science course</li> <li>131 Bottom science GPA quarter (0.00–2.13)</li> <li>128 General or earth science: highest science course</li> </ul>

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (HSTS), 2009.

## Both Males and Females Earn More Credits

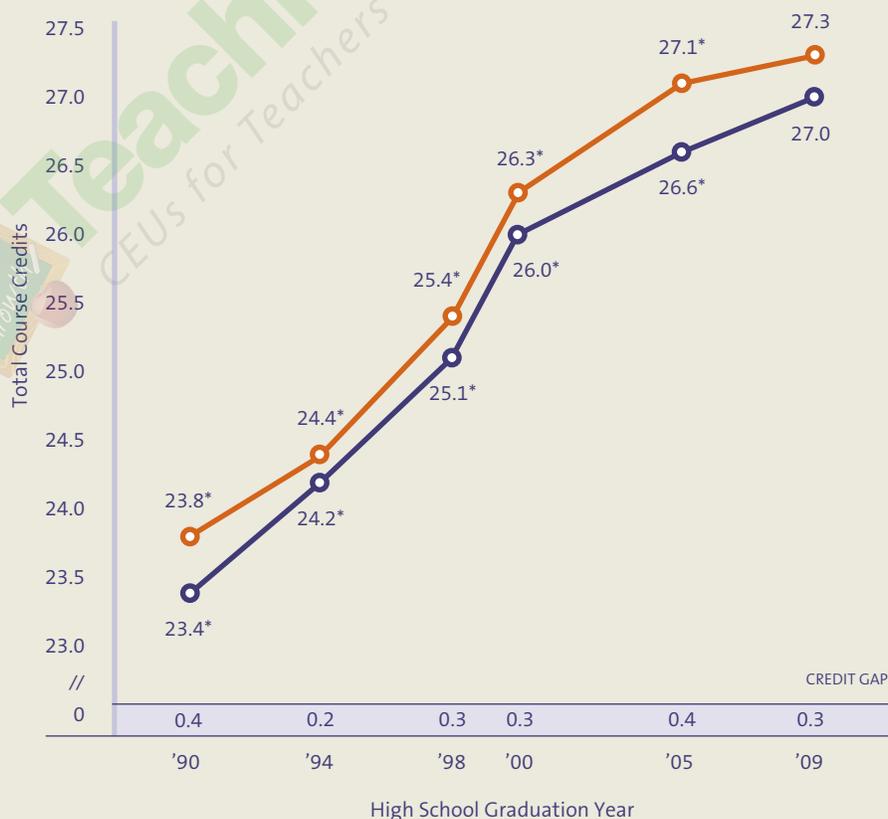
Both male and female graduates earned more credits in 2009 than in 2005. This continues the trend from 1990 (figure 16). The male-female gap in credits earned in 2009 is not significantly different from the gap in 1990. In 2009, females earned 27.3 credits compared to 27.0 credits earned by males. In 1990, females earned 23.8 credits and males earned 23.4 credits.

Both males and females also earned more mathematics and science credits

in 2009 than in earlier graduation years (figure 17). The size of the male-female gaps in mathematics and science has varied over time. In 1990, male graduates earned more mathematics and science credits than female graduates; however, from 1998 to 2005, females earned more credits in these subjects than males. In 2009, males narrowed the gap from 2005 in credits earned for mathematics and science, with both males and females completing 7.4 credits.



FIGURE 16. Trend in average overall credits earned and credit gaps, by gender: 1990–2009

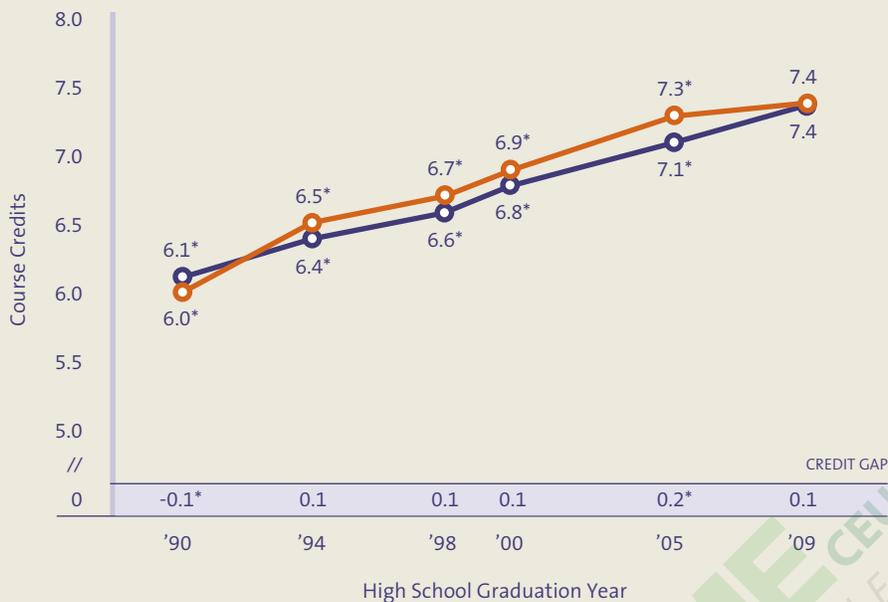


\* Significantly different ( $p < .05$ ) from 2009.

NOTE: Credit gaps are calculated based on differences between unrounded average credits. Male-female credit gaps were found to be statistically significant in all years.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (HSTS), various years, 1990–2009.

FIGURE 17. Trend in average credits earned in mathematics and science and credit gaps, by gender: 1990–2009



Male  
Female

\* Significantly different ( $p < .05$ ) from 2009.

NOTE: Credit gaps are calculated based on differences between unrounded average credits. Male-female credit gaps were found to be statistically significant in 1990, 1998, 2000, 2005, and 2009.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (HSTS), various years, 1990–2009.

## Males and Females Both Complete More Challenging Curricula

Although both male and female graduates completed more challenging curricula in 2009 than in 1990, a greater percentage of females than males completed a midlevel curriculum (figure 18). From 1990 to 2009, the percentage of females who completed a midlevel curriculum increased 22 percentage points, from 27 to 49 percent, while the percentage of males increased 19 percentage points, from 25 to 43

percent. The percentage of females who completed below a standard curriculum decreased 37 percentage points, from 61 percent in 1990 to 23 percent in 2009. The percentage of males who completed below a standard curriculum decreased 32 percentage points, from 60 percent in 1990 to 28 percent in 2009. (Differences in percentages are calculated based on unrounded numbers.)

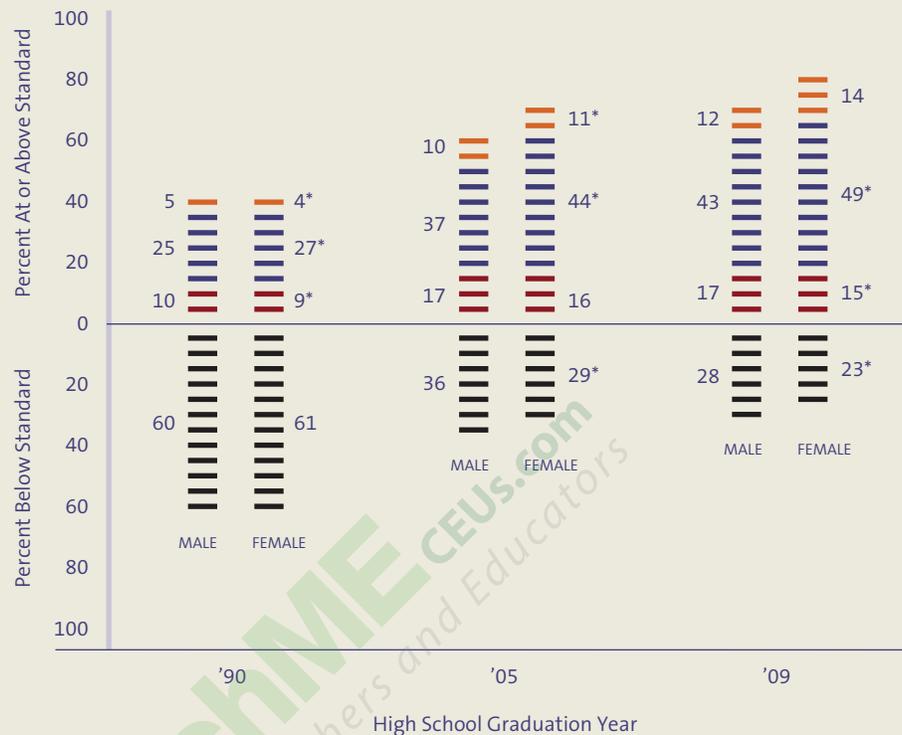
- Rigorous
- Midlevel
- Standard
- Below Standard

\* Significantly different ( $p < .05$ ) from males.

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

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (HSTS), 1990, 2005, 2009.

**FIGURE 18.** Trend in percentage of graduates completing each curriculum level, by gender: 1990, 2005, 2009



## More Females are Missing Science Requirements to Complete Midlevel or Rigorous Curricula

Among graduates who did not attain a standard curriculum, 9 percent of females compared to 7 percent of males were missing only the mathematics requirement (figure 19). There were no measurable differences between males and females in the percentage who lacked requirements in only science, English, or social studies, or who lacked more than one requirement. The requirement that both males and females most often lacked was science (39 percent of males and 40 percent of females).

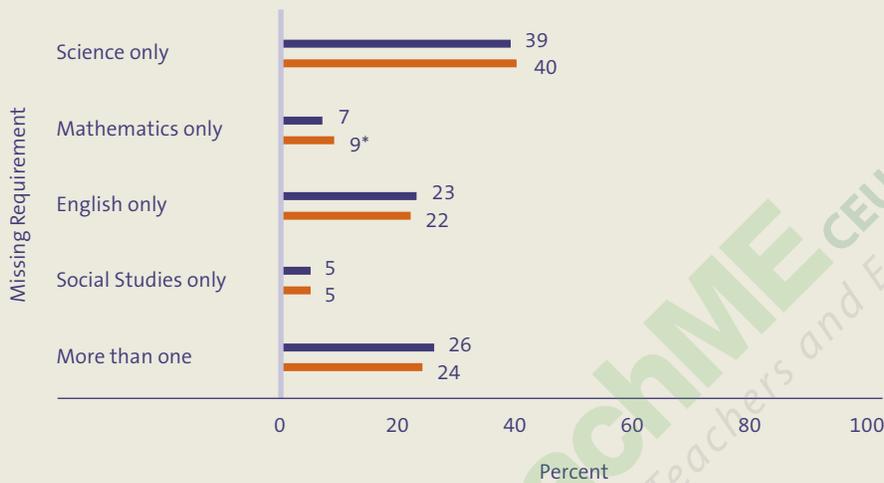
Among graduates who completed a standard or midlevel curriculum, a greater percentage of females compared to males were missing only the science requirement to reach the next higher curriculum level. Forty-one percent of females, compared to 30 percent of males, completing a standard curriculum did not have the required science courses to attain a midlevel curriculum (figure 20). Fifteen percent of females, compared to 9 percent of males, completing a midlevel

curriculum were missing only the required science courses to attain a rigorous curriculum (figure 21).

For graduates completing a standard or midlevel curriculum, a greater

percentage of males compared to females were missing only the foreign language requirement to reach the next higher curriculum level. Twenty percent of males completing a standard curriculum,

**FIGURE 19. Percentage of graduates who did not attain a standard curriculum, by missing requirement and gender: 2009**



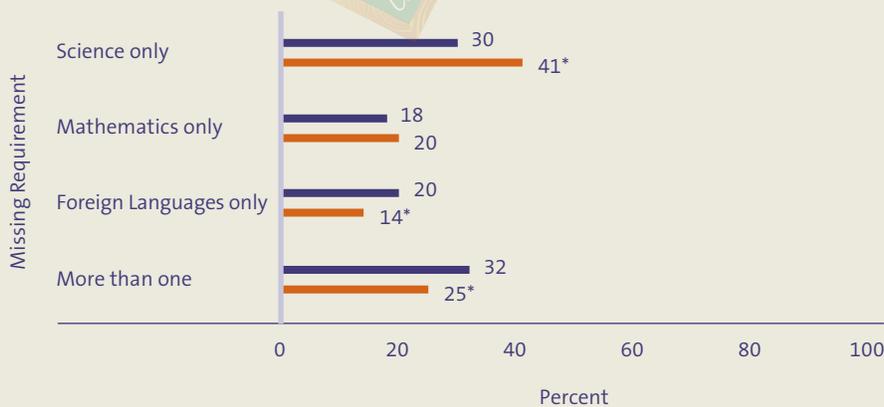
■ Male  
■ Female

\* Significantly different ( $p < .05$ ) from males.

NOTE: For definitions of curriculum levels, see table 1. Details may not sum to total because of rounding.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (HSTS), 2009.

**FIGURE 20. Percentage of graduates who attained a standard curriculum but did not attain a midlevel curriculum, by missing requirement and gender: 2009**



compared to 14 percent of females, were missing only the foreign language credit needed to attain a midlevel curriculum (figure 20). Fourteen percent of males

completing a rigorous curriculum, compared to 10 percent of females, were missing only the required foreign language credits to complete a rigorous curriculum (figure 21).

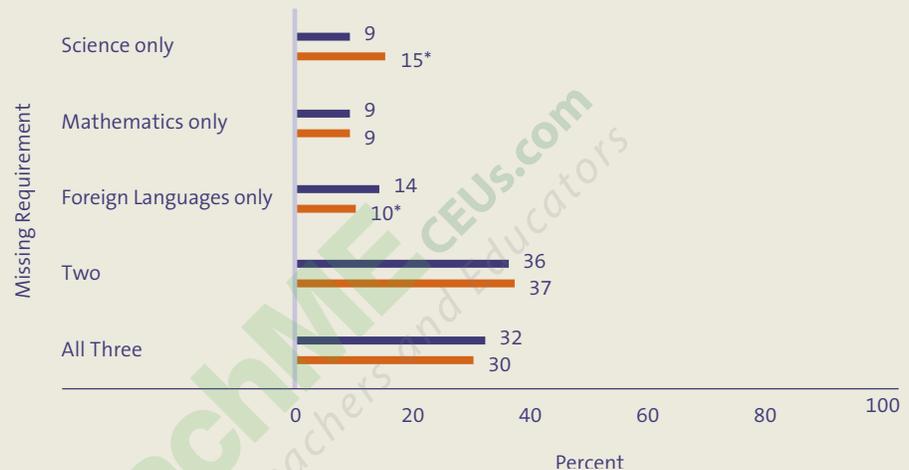
■ Male  
■ Female

\* Significantly different ( $p < .05$ ) from males.

NOTE: For definitions of curriculum levels, see table 1. Details may not sum to total because of rounding.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (HSTS), 2009.

**FIGURE 21. Percentage of graduates who attained a midlevel curriculum but did not attain a rigorous curriculum, by missing requirement and gender: 2009**



## Female Graduates Continue to Have Higher Grade Point Averages

Female graduates continue to earn higher GPAs than male graduates. In 2009, female graduates had a GPA of 3.10 compared to 2.90 for male graduates (figure 22).

The gap between female and male GPAs was significantly smaller in 2009 than in 2005. The 2009 gap did not differ significantly from the gaps in earlier graduation years.

FIGURE 22. Trend in average grade point average and GPA gaps, by gender: 1990–2009



Male  
Female

\* Significantly different ( $p < .05$ ) from 2009.

NOTE: GPA gaps are calculated based on differences between unrounded GPAs. Male-female GPA gaps were found to be statistically significant in all years.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (HSTS), various years, 1990–2009.



## Males Generally Earn Higher Average NAEP Mathematics and Science Scores than Females Completing the Same Curriculum Level

Male graduates completing rigorous, midlevel, or below standard curricula earned higher average 2009 NAEP mathematics scores than females (figure 23). There were no significant differences in NAEP mathematics scores between males and females completing a standard curriculum.

Males completing rigorous, midlevel, or standard curricula earned higher

average 2009 NAEP science scores than females. There were no measureable differences in NAEP science scores between males and females completing a below standard curriculum.

Male and female graduates completing a rigorous curriculum earned an average NAEP mathematics score at the *Proficient* achievement level, while males and females in midlevel,

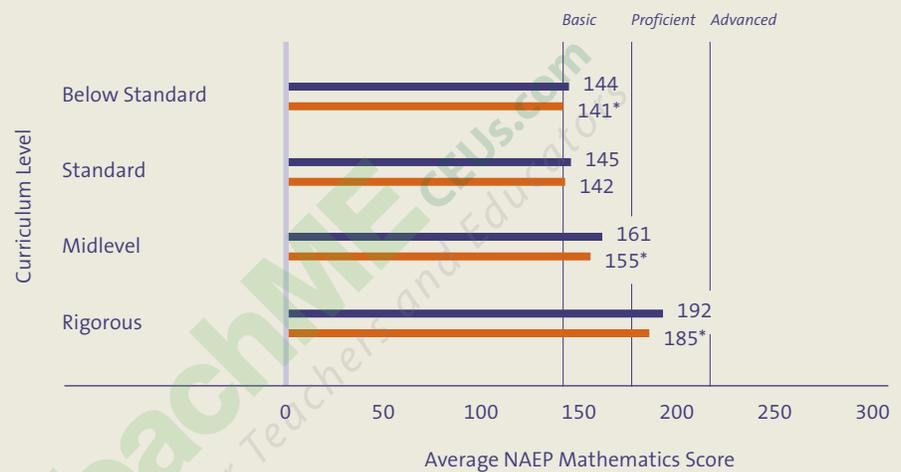
standard, and below standard curricula earned average scores at the *Basic* level.

At all curriculum levels, male graduates earned average scores at or above the *Basic* science

achievement level, with the average score for males who completed a rigorous curriculum reaching the *Proficient* level. Female graduates completing rigorous or midlevel curricula earned average science scores at the *Basic* level.



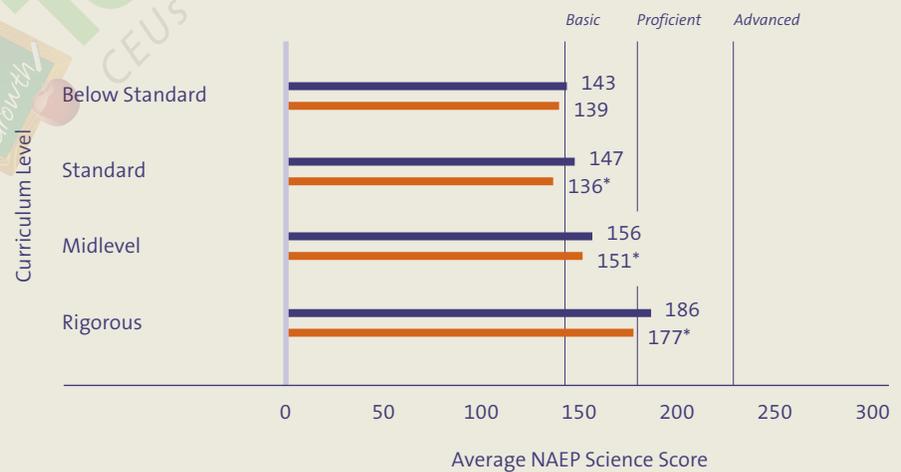
**FIGURE 23. Average NAEP mathematics and science scores, by curriculum level and gender: 2009**



■ Male  
■ Female

\* Significantly different ( $p < .05$ ) from males.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (HSTS), 2009; National Assessment of Educational Progress (NAEP), 2009 Mathematics and Science Assessments.



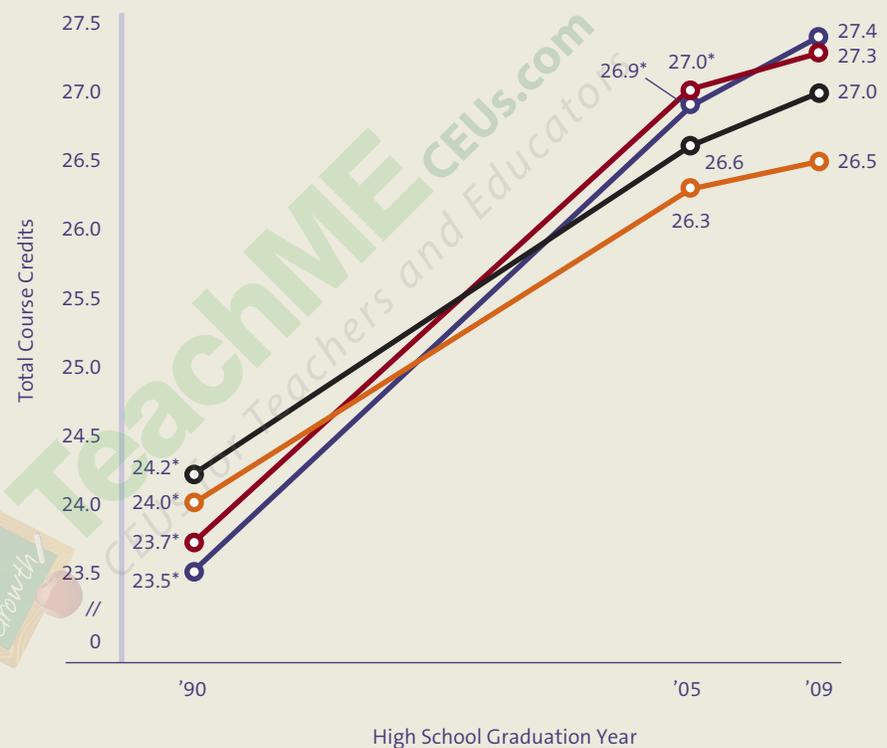
## Credits Increase for All Racial/Ethnic Groups

From 1990 to 2009, credits earned by graduates have increased across all racial/ethnic groups (figure 24). In 2009, Black graduates earned 3.9 more credits than in 1990. White graduates completed 3.7 credits

more in 2009 than in 1990, Asian/Pacific Islander graduates completed 2.9 more credits, and Hispanic graduates earned 2.6 credits more. (Differences in credits are calculated based on unrounded numbers.)



FIGURE 24. Trend in average course credits earned by graduates, by race/ethnicity: 1990, 2005, 2009

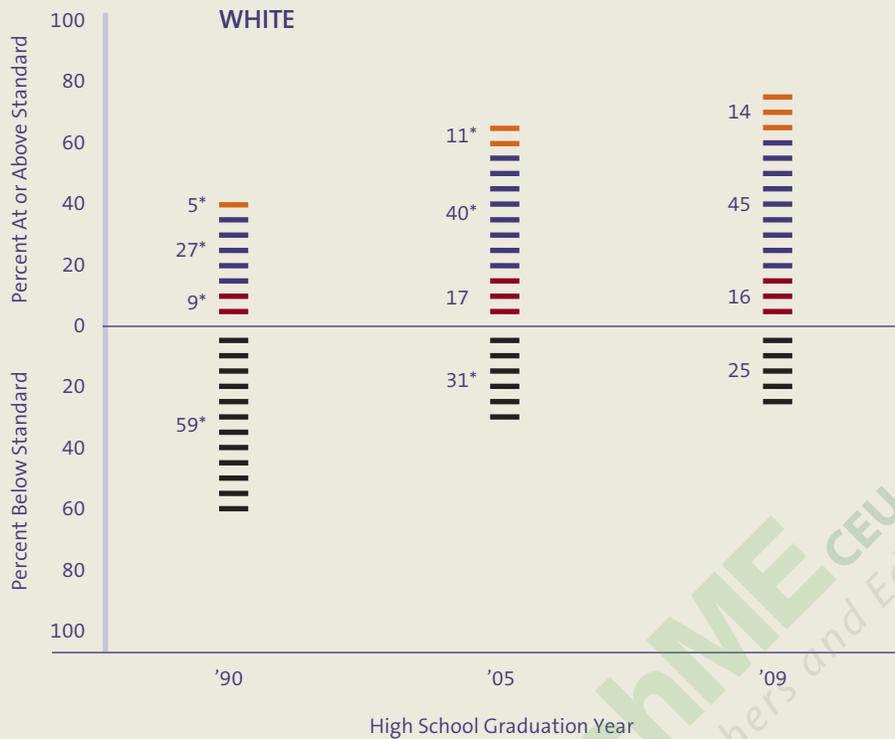


## Graduates of Each Racial/Ethnic Group Complete More Challenging Curricula

All racial/ethnic groups completed more challenging curriculum levels in 2009 than in 1990 (figure 25).

The percentage of Black graduates who completed a below standard curriculum decreased from 60

**FIGURE 25. Trend in percentage of graduates completing each curriculum level, by race/ethnicity: 1990, 2005, 2009**

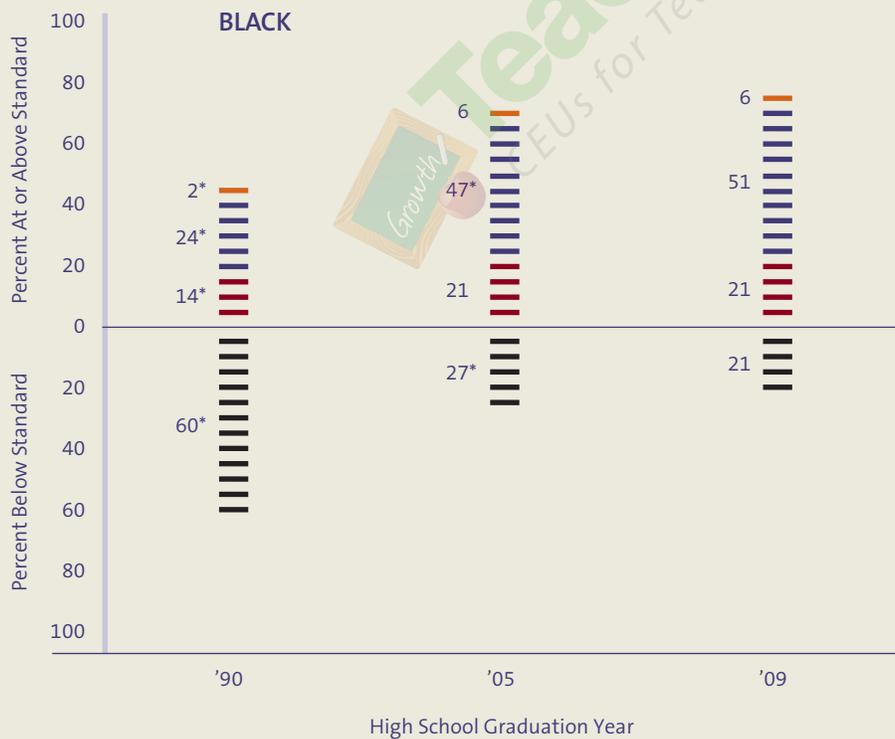


- █ Rigorous
- █ Midlevel
- █ Standard
- █ Below Standard

\*Significantly different ( $p < .05$ ) from 2009.

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

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (HSTS), various years, 1990, 2005, 2009.





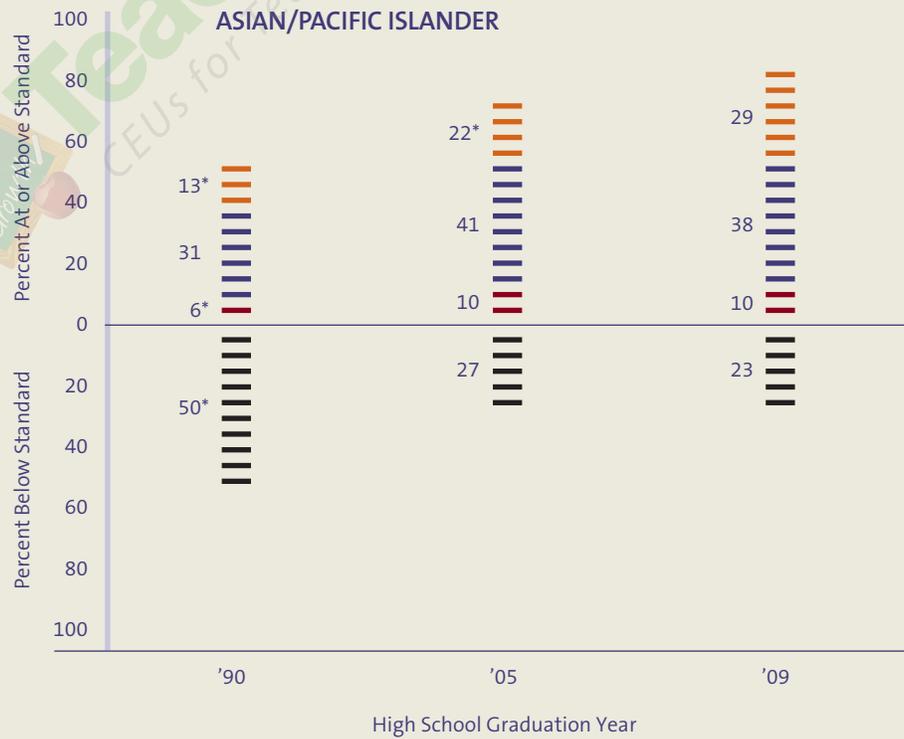
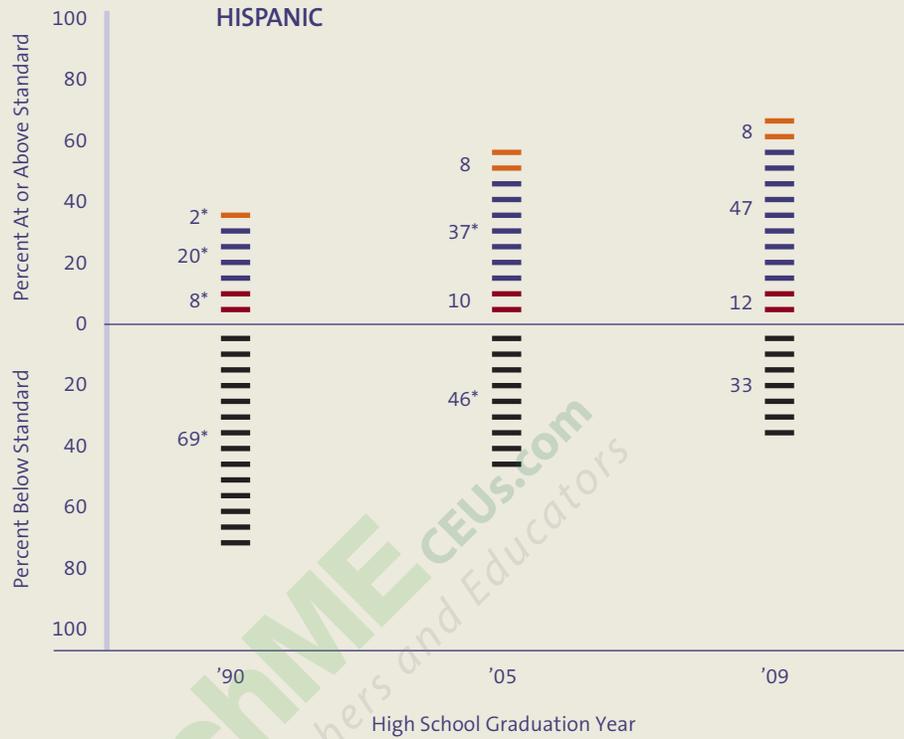
- Rigorous
- Midlevel
- Standard
- Below Standard

\*Significantly different ( $p < .05$ ) from 2009.

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

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (HSTS), 1990, 2005, 2009.

**FIGURE 25.** Trend in percentage of graduates completing each curriculum level, by race/ethnicity: 1990, 2005, 2009 (continued)



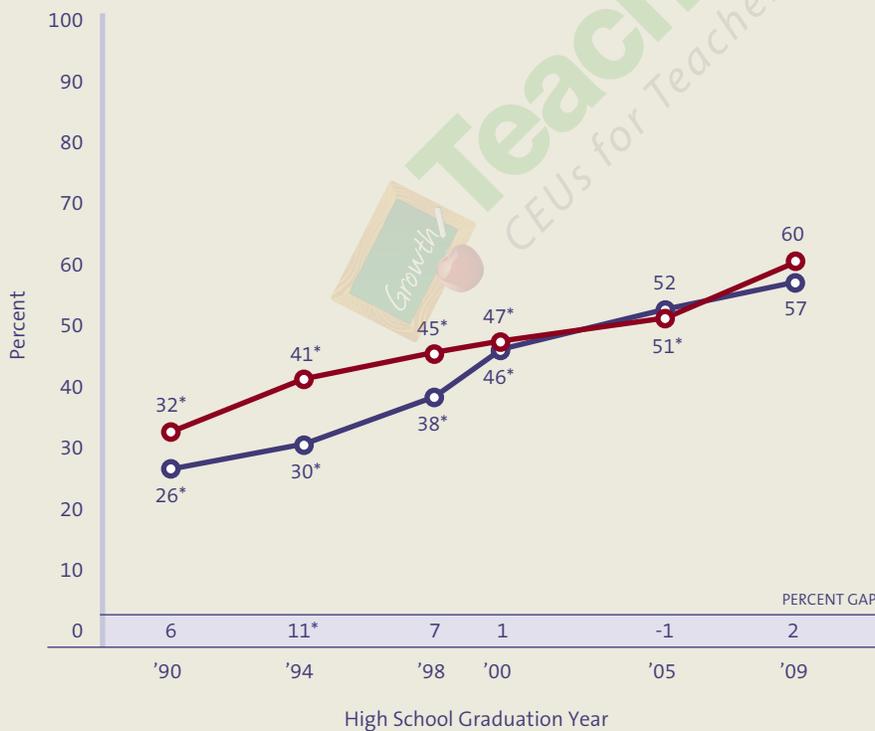
percent in 1990 to 21 percent in 2009. White graduates completing a below standard curriculum decreased from 59 percent in 1990 to 25 percent in 2009. In 2009, a smaller percentage of Black graduates than White graduates completed a below standard curriculum.

From 1990 to 2009, the percentage of Black and Hispanic graduates attaining a rigorous curriculum level increased 4 percentage points and 6 percentage points, respectively. Asian/Pacific Islander graduates

increased 16 percentage points and White graduates increased 9 percentage points at the rigorous curriculum level, widening the difference between Asian/Pacific Islander and White graduates from 8 percentage points in 1990 to 15 percentage points in 2009.

In 2009, there was not a significant difference between the percentage of Black and White graduates completing a curriculum at or above midlevel, while there was a 6 percentage point gap in 1990 (figure 26).

FIGURE 26. Trend in percentage of graduates completing at or above a midlevel curriculum and percent gaps, by selected racial/ethnic groups: 1990–2009



— White  
— Black

\* Significantly different ( $p < .05$ ) from 2009.

NOTE: Percent point gaps are calculated based on differences between unrounded numbers. White-Black gaps were found to be significant in 1990, 1994, and 1998.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (HSTS), various years, 1990–2009.

## Science Key to Attaining Standard and Midlevel Curricula for Black and Hispanic Graduates

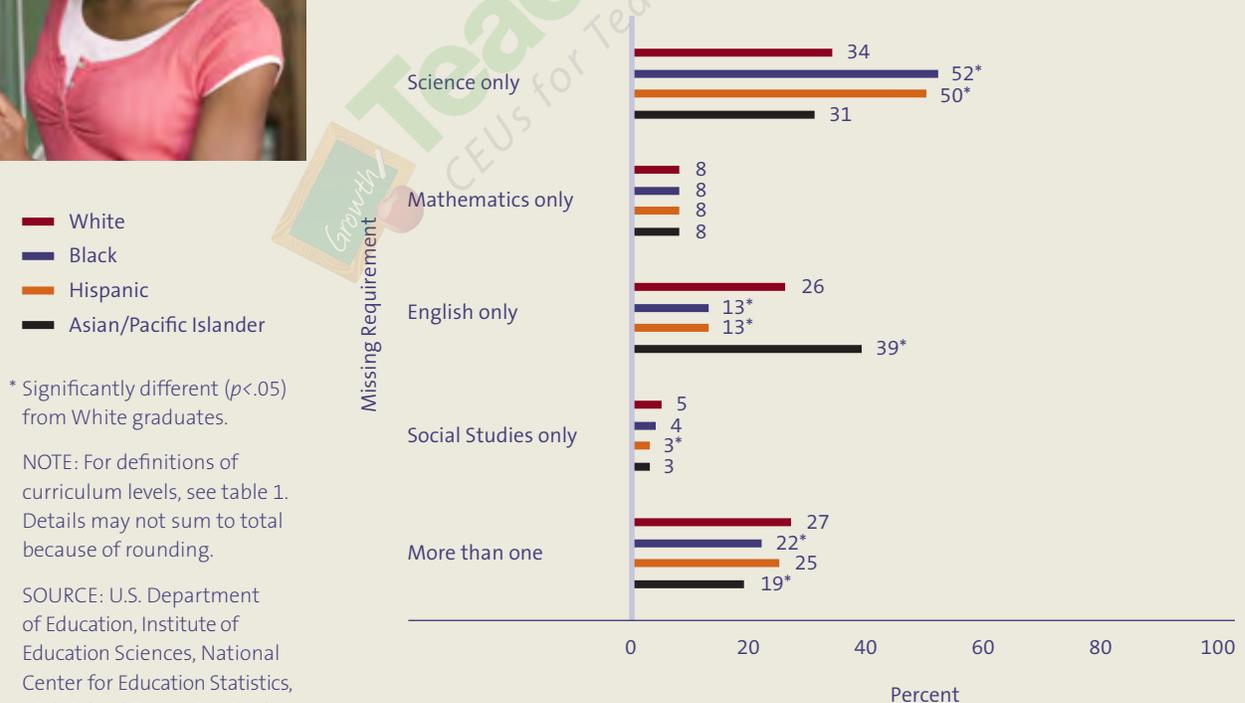
Over 40 percent of White, Black, and Hispanic graduates and about one-third of Asian/Pacific Islander graduates completed either a below standard or a standard curriculum. In 2009, about half of Black graduates (52 percent) and 50 percent of Hispanic graduates who completed a below standard curriculum were missing only the science requirements needed to achieve a standard curriculum (figure 27). Among graduates completing a standard but not a midlevel curriculum, 39 percent of

Black graduates and 46 percent of Hispanic graduates lacked only the science requirements needed to attain a midlevel curriculum (figure 28).

Thirty-four percent of White graduates completing a below standard but not a standard curriculum and 33 percent completing a standard but not a midlevel curriculum lacked only the science requirements necessary to achieve a standard curriculum. Among Asian/Pacific Islanders, 31 percent of those



FIGURE 27. Percentage of graduates who did not attain a standard curriculum, by missing requirement and race/ethnicity: 2009

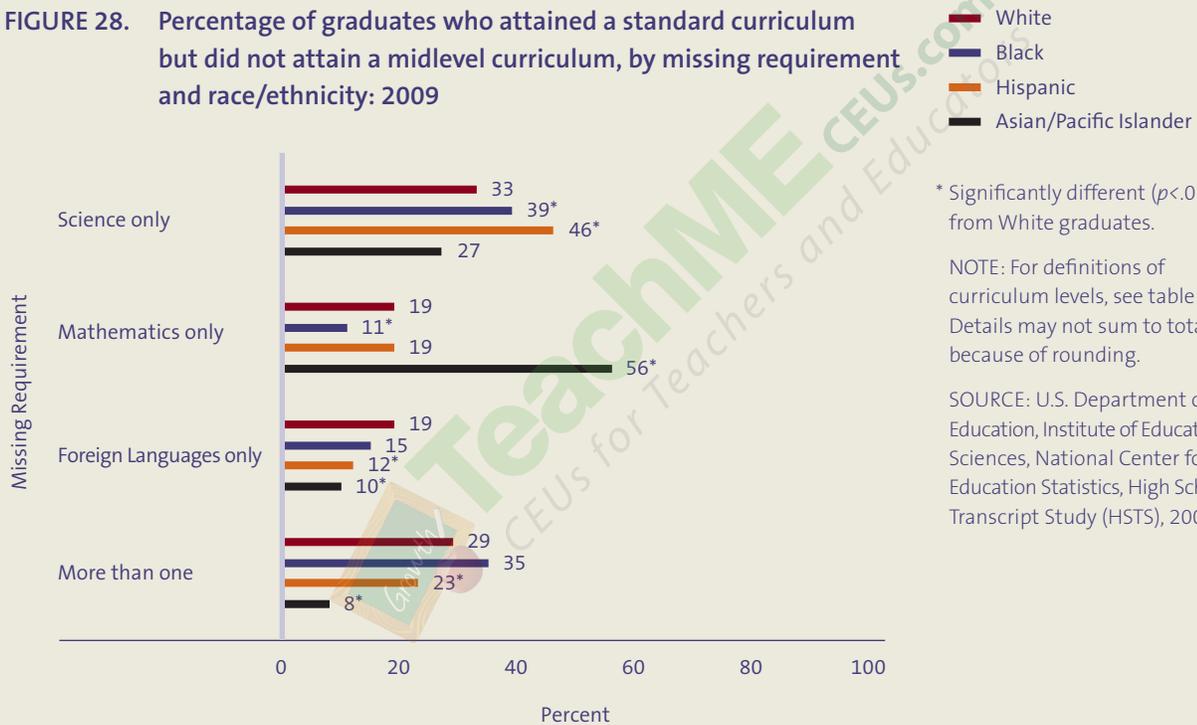


completing a below standard curriculum lacked only the science requirement needed to attain a standard curriculum and 27 percent completing a standard curriculum lacked only the science courses needed to attain a midlevel curriculum.

Many graduates were missing multiple requirements to attain either a standard or a midlevel

curriculum. Among graduates completing a below standard curriculum, between 19 percent and 27 percent lacked more than one requirement to attain a standard curriculum. Among those completing a standard but not a midlevel curriculum, between 8 and 35 percent lacked multiple requirements needed to achieve a midlevel curriculum.

**FIGURE 28. Percentage of graduates who attained a standard curriculum but did not attain a midlevel curriculum, by missing requirement and race/ethnicity: 2009**



About two-thirds of White graduates and about three-quarters of Black and Hispanic graduates who had completed a midlevel curriculum needed to meet additional requirements in two or three subject areas to attain a rigorous curriculum

(figure 29). However, among Asian/Pacific Islander graduates who had completed a midlevel curriculum, more than half (55 percent) needed only one additional requirement to reach a rigorous curriculum.



- White
- Black
- Hispanic
- Asian/Pacific Islander

\* Significantly different ( $p < .05$ ) from White graduates.

NOTE: For definitions of curriculum levels, see table 1. Details may not sum to total because of rounding.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (HSTS), 2009.

FIGURE 29. Percentage of graduates who attained a midlevel curriculum but did not attain a rigorous curriculum, by missing requirement and race/ethnicity: 2009

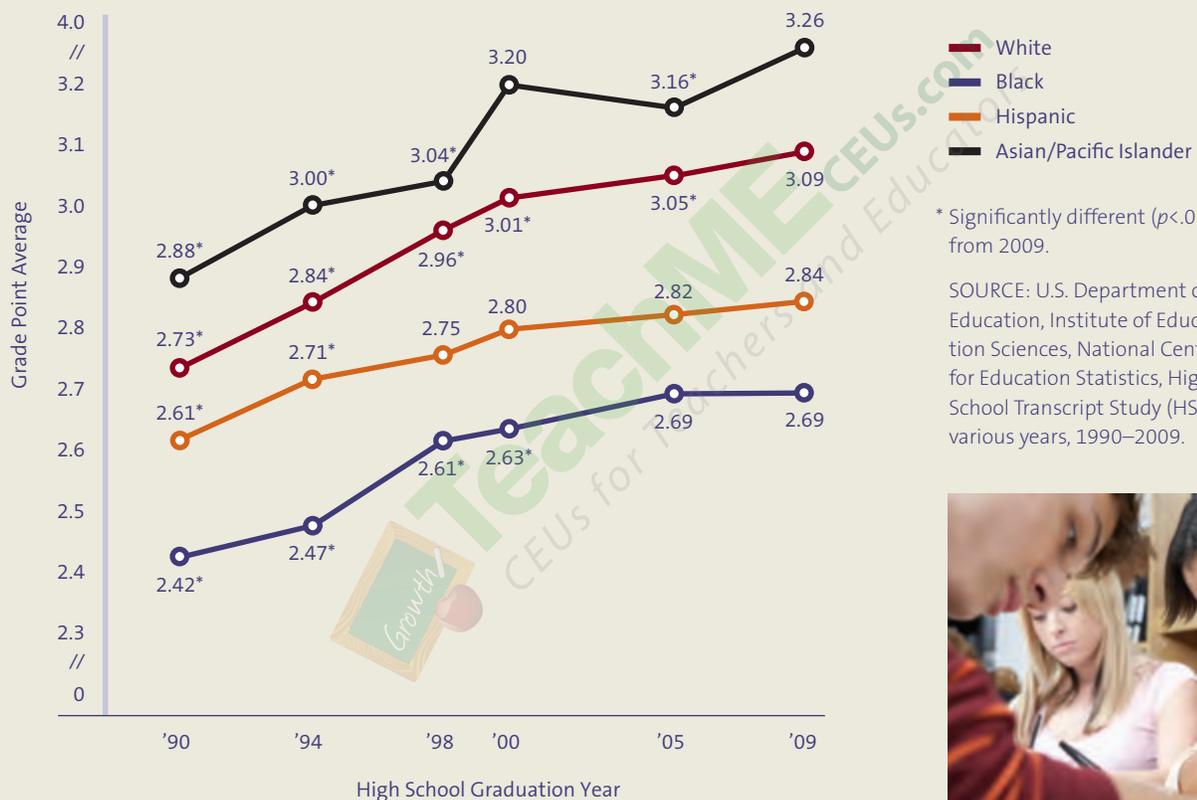


## White and Asian/Pacific Islander Graduates Earn Higher GPAs

Although the average GPA has increased for all racial/ethnic groups from 1990 to 2009, for Black and Hispanic graduates there was no significant change from 2005 to

2009 (figure 30). The average GPAs of Asian/Pacific Islander and White graduates increased from 2005 to 2009.

FIGURE 30. Trend in average GPAs, by race/ethnicity: 1990–2009



# In All Racial/Ethnic Groups, Graduates Completing a Rigorous Curriculum Earn the Highest NAEP Scores

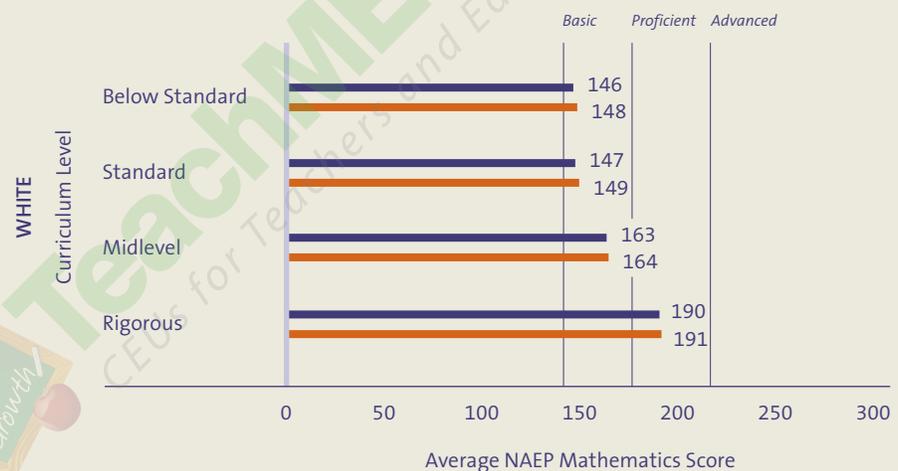
Average NAEP mathematics scores for racial/ethnic groups at each curriculum level were generally unchanged from 2005 to 2009 (figure 31). However, for Hispanic graduates completing a below standard curriculum or a standard curriculum, scores increased by 8 points and 12 points, respectively.

For Asian/Pacific Islander graduates completing a midlevel curriculum, scores increased by 15 points.

White-Black and White-Hispanic gaps in NAEP mathematics scores continued from 2005 to 2009. In 2009, the magnitude of the White-Hispanic gap for graduates who



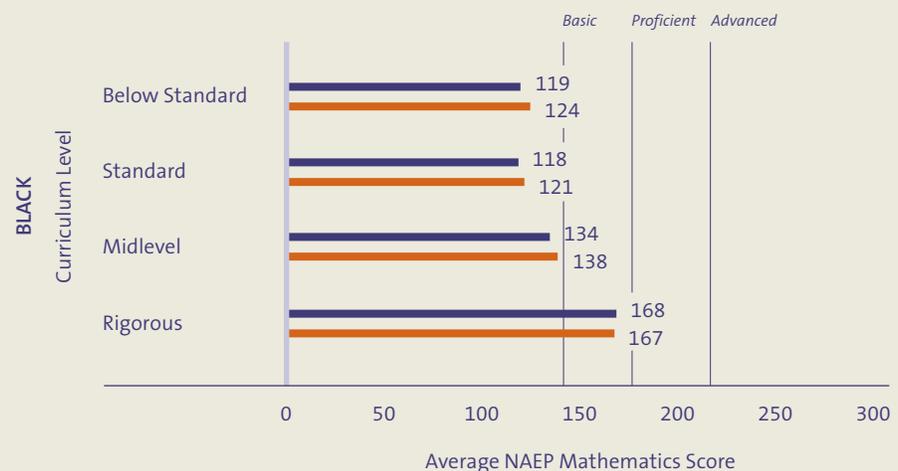
FIGURE 31. Average NAEP mathematics scores, by curriculum level and race/ethnicity: 2005 and 2009



■ 2005  
■ 2009

\* Significantly different ( $p < .05$ ) from 2009.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (HSTS), 2005 and 2009; National Assessment of Educational Progress (NAEP), 2005 and 2009 Mathematics Assessments.

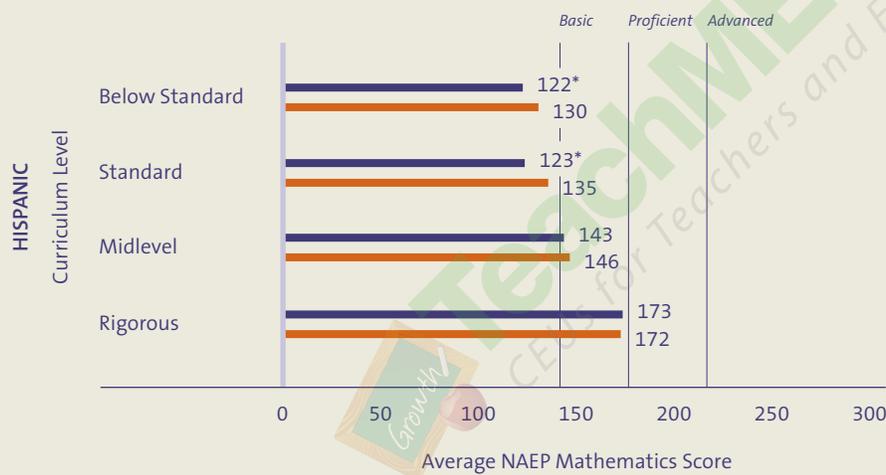


completed a standard curriculum decreased by 10 points (figure 31). In 2005, there were no statistically significant differences between the measurable White and Asian/Pacific Islander average NAEP mathematics scores. However, in 2009 there were White-Asian/Pacific Islander gaps within each curriculum level. In 2009, across racial/ethnic groups, graduates completing a rigorous curriculum earned the highest average NAEP

scores (figure 32). For example, Hispanic graduates completing a rigorous curriculum had an average NAEP mathematics score 27 points higher than Hispanic graduates completing a midlevel curriculum. The difference in the science scores of Hispanic graduates who completed a rigorous curriculum versus a midlevel curriculum was 19 points.

Graduates of all racial/ethnic groups completing a rigorous curriculum

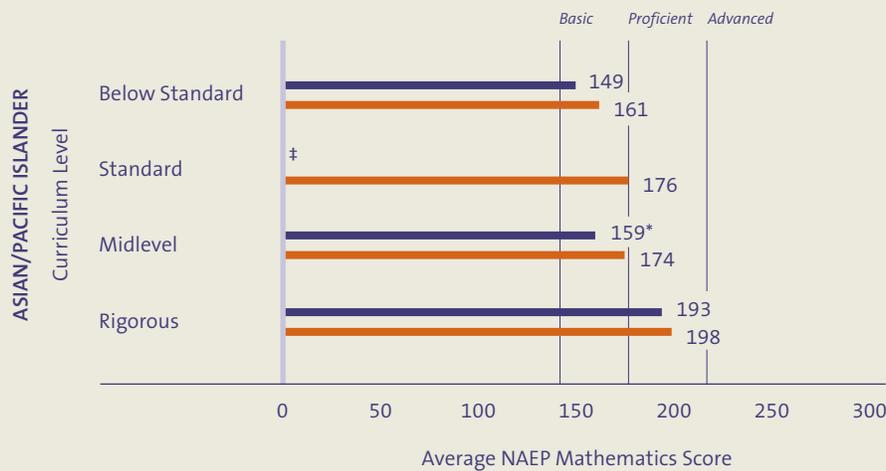
FIGURE 31. Average NAEP mathematics scores, by curriculum level and race/ethnicity: 2005 and 2009 (continued)



‡ Reporting standard not met.

\* Significantly different ( $p < .05$ ) from 2009.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (HSTS), 2005 and 2009; National Assessment of Educational Progress (NAEP), 2005 and 2009 Mathematics Assessments.



earned average NAEP mathematics and science scores at the *Basic* or *Proficient* achievement levels. Asian/Pacific Islander, Hispanic, and White graduates completing a midlevel curriculum earned average

mathematics and science scores at the *Basic* level. Asian/Pacific Islander and White graduates reached the *Basic* level regardless of curriculum level completed.



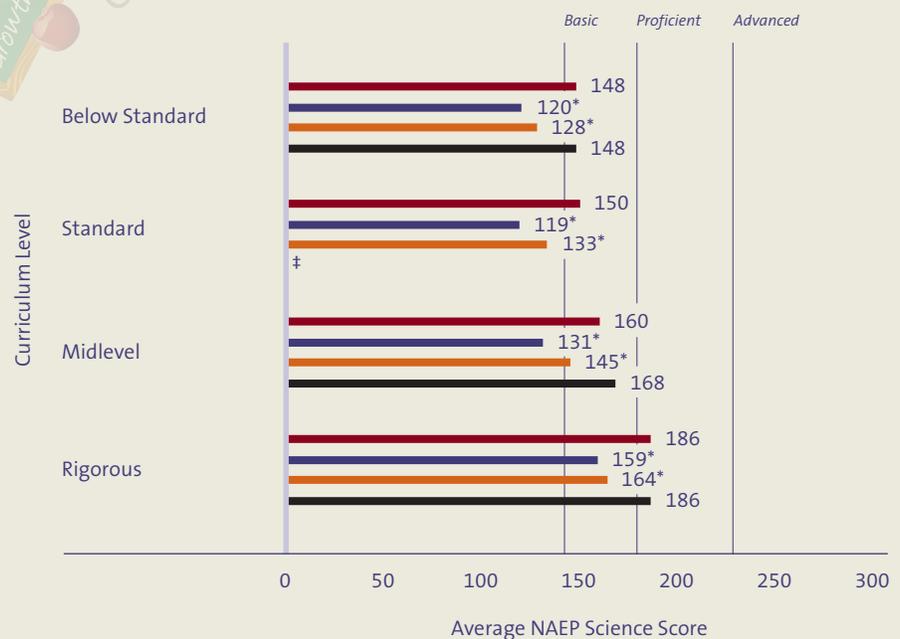
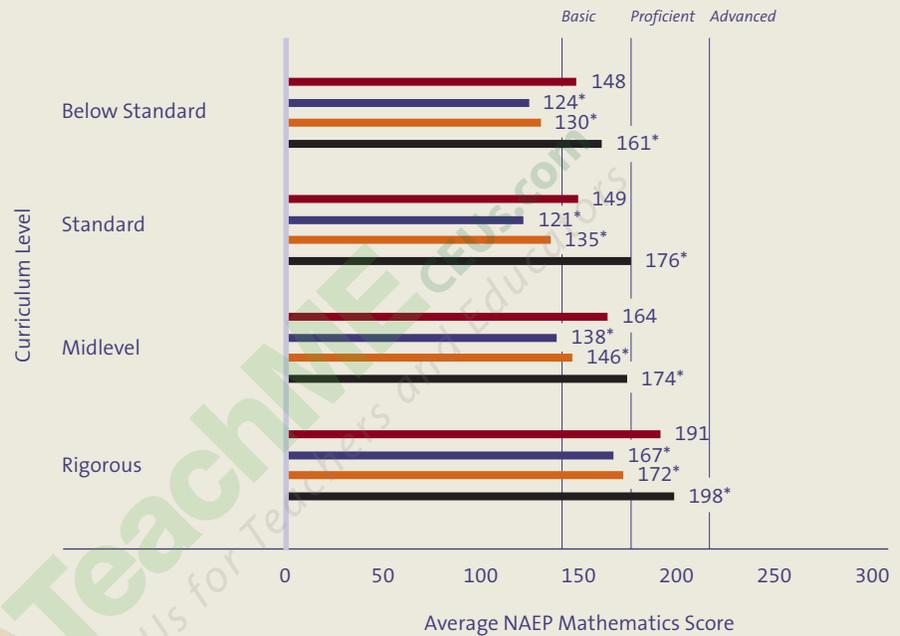
- White
- Black
- Hispanic
- Asian/Pacific Islander

‡ Reporting standard not met.

\* Significantly different ( $p < .05$ ) from White graduates.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (HSTS), 2009; National Assessment of Educational Progress (NAEP), 2009 Mathematics and Science Assessments.

FIGURE 32. Average NAEP mathematics and science scores, by curriculum level and race/ethnicity: 2009



## A Closer Look at How Graduates Find Time to Earn More Credits

Credits earned by graduating seniors have risen from 23.6 credits in 1990 to 27.2 credits in 2009 (see figure 1). The number of days in the school term and the length of the school day, however, have remained stable during this same period (Council of Chief State School Officers 1990, 2009). Educators may wonder where students are finding the time to earn the higher number of credits. Potential explanations that can be explored using HSTS data include earning additional credits during

the summer, receiving high school credit for classes taken in middle school, and taking online courses.

### *One in five graduates attended summer school*

Twenty-one percent of 2009 graduates were enrolled in summer school at some point during high school (table 6). A greater percentage of graduates who did not attain a standard curriculum (30 percent) took summer school classes, compared to graduates who completed a standard

**TABLE 6. Percentage of graduates taking summer school, by selected student characteristics: 2009**

Student characteristics	Percent
All graduates	21
<b>Student gender</b>	
Male	22
Female	21*
<b>Student race/ethnicity</b>	
White	14
Black	26*
Hispanic	39*
Asian/Pacific Islander	36*
<b>Curriculum level</b>	
Below standard	30
Standard	18*
Midlevel	19*
Rigorous	16*

\* Significantly different ( $p < .05$ ) from base groups (Male, White, Below Standard).

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (HSTS), 2009.

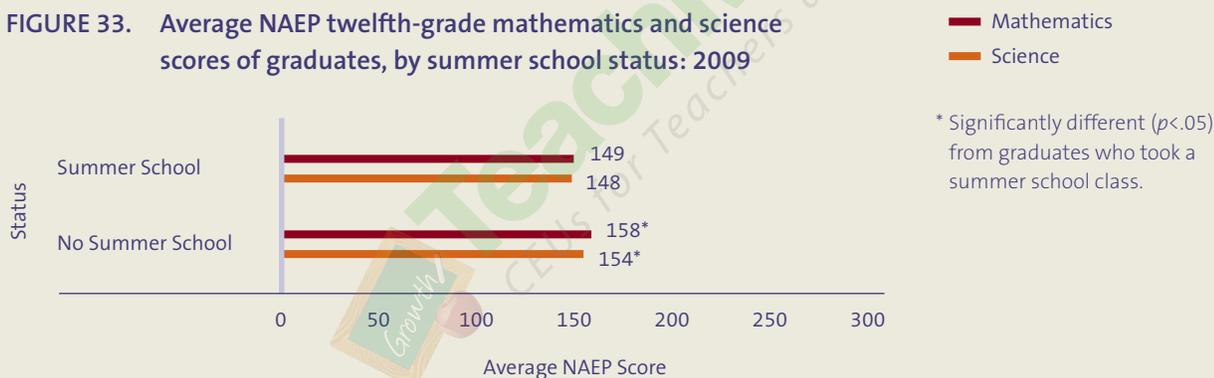


(18 percent), midlevel (19 percent), or rigorous curriculum (16 percent). Students who fail courses may be using summer school to make up credits rather than to earn additional credits. However, 19 percent of graduates completing a midlevel curriculum and 16 percent of graduates completing a rigorous curriculum also took summer school classes during high school.

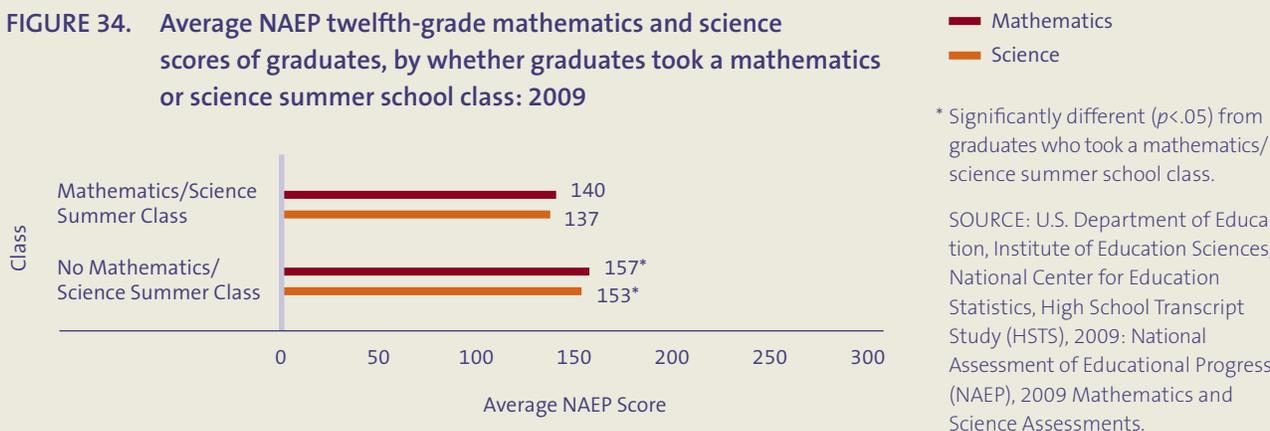
High school graduates who took summer school classes earned fewer credits (26.2 credits) and a lower overall grade point average (2.82) than their peers who did not take

summer school classes (27.4 credits and a 3.05 grade point average). These differences were evident across the four major racial/ethnic groups and all curriculum level subgroups (data not shown). Students who took summer school classes also earned lower NAEP mathematics and science scores (figure 33) than graduates who did not take summer school classes. Graduates who took summer classes in mathematics or science scored lower on the NAEP twelfth-grade mathematics and science assessments than graduates who did not take summer classes in these subjects (figure 34).

**FIGURE 33. Average NAEP twelfth-grade mathematics and science scores of graduates, by summer school status: 2009**



**FIGURE 34. Average NAEP twelfth-grade mathematics and science scores of graduates, by whether graduates took a mathematics or science summer school class: 2009**



*Some graduates earn high school credits in middle school*

Another way to increase credits is to receive credits for courses taken before high school. Middle school courses that might receive high school credit include algebra I, geometry, Spanish I, and biology. Middle school courses taken for high school credit are not consistently identified on high school transcripts, so it can be challenging to identify them.

Algebra I, a common high school class in the past, is increasingly being taken in middle school. Described as the “gateway” mathematics course for high school students (Loveless 2008), school systems differ on whether students should be taking it in middle or high school. Table 7 shows the academic profiles of high school graduates who took algebra I before high school in 2005 and 2009.

**TABLE 7. Academic profiles of graduates who took first-year algebra before high school: 2005 and 2009**

2005	2009
20* percent of all graduates	26 percent of all graduates
20* percent of male graduates	25 percent of male graduates
20* percent of female graduates	27 percent of female graduates
23* percent of White graduates	29 percent of White graduates
8* percent of Black graduates	12 percent of Black graduates
10* percent of Hispanic graduates	17 percent of Hispanic graduates
30* percent of Asian/Pacific Islander graduates	48 percent of Asian/Pacific Islander graduates
11* percent of below standard curriculum graduates	14 percent of below standard curriculum graduates
14 percent of standard curriculum graduates	14 percent of standard curriculum graduates
20* percent of midlevel curriculum graduates	26 percent of midlevel curriculum graduates
56* percent of rigorous curriculum graduates	64 percent of rigorous curriculum graduates

\* Significantly different ( $p < .05$ ) from 2009.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, NAEP High School Transcript Study (HSTS), 2005 and 2009.



From 2005 to 2009, there was an increase in the percentage of high school graduates who took algebra I before entering high school. In 2005, approximately one in five graduates took algebra I before high school; by 2009, it was about one in four graduates. The increase can be seen among both male and female graduates, as well as across all four major racial/ethnic groups.

There was no significant difference between males and females in 2005 in the percentage who took algebra I before high school. In 2009, however, a higher percentage of females than males took first-year algebra before high school (27 percent versus 25 percent).

Approximately 48 percent of 2009 Asian/Pacific Islander high school graduates took algebra I before high school, more than any other major racial/ethnic group. A greater percentage of White graduates (29 percent) took algebra I before high school than either Black (12 percent) or Hispanic (17 percent) graduates. However, the White-Black and White-Hispanic gaps in algebra I coursetaking before high school did not significantly change from 2005 to 2009.

Nearly two-thirds of graduates who attained a rigorous curriculum in 2009 took first-year algebra before high school, an 8 percentage point increase over 2005. Graduates completing a midlevel curriculum also showed an increase, from 20 percent in 2005 to 26 percent in 2009.

### *Some graduates earn credits through online courses*

There are growing trends among schools offering and students taking online courses. As of 2005, around 57 percent of public secondary schools “provided access to students for online learning” (Wells and Lewis 2006). Online courses serve two major purposes. First, they can help students graduate high school by offering credit recovery for courses they failed during the school year (Trotter 2008). Second, online courses can provide coursework that was not otherwise available to students, like Advanced Placement courses, foreign language courses, or other courses that schools with limited resources could not readily provide.

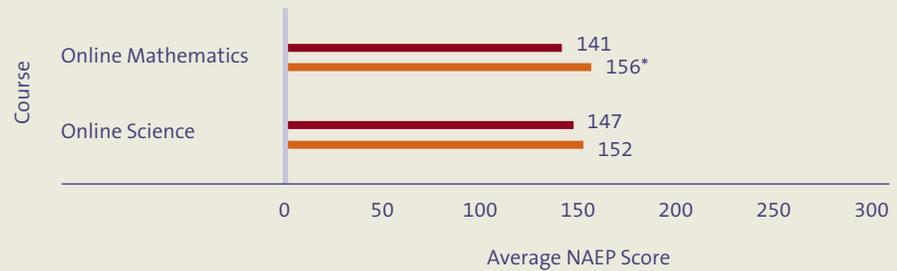
Transcripts indicate that approximately 5 percent of high school graduates in 2009 took an online course. However, this percentage is lower than the percentage of high school students who report taking online courses in the NAEP 2009 twelfth-grade assessments. Approximately 12 percent of students from the NAEP 2009 twelfth-grade reading assessment reported taking an online English / language arts course. Around 7 percent of students who participated in the twelfth-grade science assessment reported taking an online science course, and around 6 percent of students taking the twelfth-grade mathematics assessment reported taking an online mathematics course.

- Took course
- Did not take course

\* Significantly different ( $p < .05$ ) from graduates who took online mathematics or science courses.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, NAEP High School Transcript Study (HSTS), 2009; National Assessment of Educational Progress (NAEP), 2009 Mathematics and Science Assessments.

**FIGURE 35. Average NAEP twelfth-grade mathematics and science assessment scores of graduates, by online mathematics or science course: 2009**



Although many HSTS sampled schools' catalogs offered online courses, fewer schools actually identified what courses were taken online on their student transcripts.

Figure 35 displays the NAEP mathematics and science assessment scores earned by high school graduates based on whether they took an online mathematics or science course according to their transcripts.

High school graduates who took online mathematics courses did not perform as well on the NAEP 2009 twelfth-grade mathematics assessment as those graduates who did not take online mathematics

courses. Graduates who took online mathematics courses had an average score of 141, or 15 points lower than the 156 average score earned by graduates who did not take online mathematics courses.

Those high school graduates who took an online science course earned an average score of 147 on the NAEP twelfth-grade science assessment, compared to the 152 average score of graduates who did not take an online science course. Despite the apparent difference in scores, there was no statistically significant difference in the science assessment performance between the two student groups.

## A Closer Look at STEM: Science, Technology, Engineering, and Mathematics

To compete globally and keep up with expanding scientific and technical expertise, educators and policymakers have called for increasing emphasis on science, technology, engineering, and mathematics (STEM) course-taking in our schools (President's Council of Advisors on Science and Technology 2010).

The percentage of high school graduates who earned credits in advanced mathematics courses was greater in 2009 than in 2005, continuing the upward trend from 1990 (table 8). Seventy-six percent of graduates took algebra II in 2009 compared to 53 percent in 1990. The percentage of graduates who

**TABLE 8.** Percentage of graduates earning credits in STEM courses, selected years: 1990–2009

STEM course	Year of graduation			
	1990	2000	2005	2009
	Percent			
Advanced mathematics	57*	74*	78*	84
Algebra II	53*	67*	70*	76
Other advanced mathematics	16*	20*	24*	30
Pre-calculus/analysis	14*	27*	30*	35
Calculus	7*	13*	14*	17
Advanced science and engineering	61*	76*	77*	86
Advanced biology	28*	40*	40*	45
Chemistry	45*	57*	56*	70
Advanced environmental/earth science	5*	5*	6*	11
Physics	24*	34*	36*	39
Engineering	#*	1*	1*	3
STEM-related technical	29	37*	32	31
Engineering/science technologies	2*	6	7	6
Health science/technology	3*	10	9	9
Computer science	25*	25*	20	19

# Rounds to zero.

\* Significantly different ( $p < .05$ ) from 2009.

NOTE: "Other advanced mathematics" includes primarily trigonometry and statistics/probability courses. "Advanced biology" courses include AP/IB biology, physiology, anatomy, and genetics. "Advanced environmental and earth sciences" courses include AP/IB environmental science, college preparatory earth science, and various geology courses. "Engineering/science technologies" courses focus on instrumentation, equipment maintenance, and other technical tasks conducted in engineering and science-related occupations.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (HSTS), various years, 1990–2009.

took pre-calculus/analysis in 2009 was 35 percent compared to 14 percent in 1990. Seventeen percent of graduates took calculus in 2009 compared to 7 percent in 1990. The percentage of graduates who earned credits in advanced science and engineering courses was also higher in 2009 than in 1990, with significant increases in each subject from 2005 to 2009.

The percentage of graduates who earned credits in the engineering/science technologies and health science/technology courses was larger in 2009 than in 1990 but has not significantly changed since 2000. For the same time period, there was a decrease in the percentage of

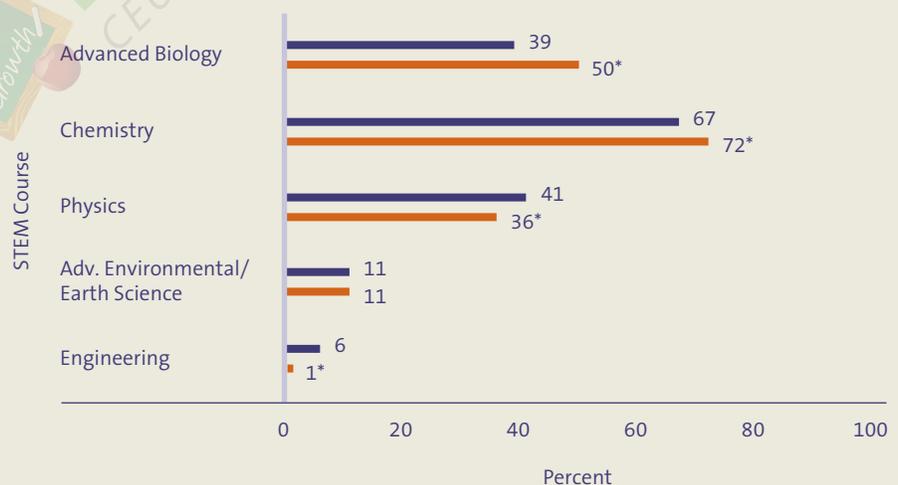
graduates who earned credits in computer science.

### *Differences in STEM credits for males and females*

In 2009, differences between the percentage of male and female graduates earning credits in advanced science and engineering courses varied across the specific subject areas. As shown in figure 36, a larger percentage of males than females earned credits in physics (41 percent compared to 36 percent) and engineering (6 percent compared to 1 percent). However, more females than males earned credits in chemistry (72 percent compared to 67 percent) and advanced biology (50 percent compared to 39 percent).

■ Male  
■ Female

**FIGURE 36. Percentage of graduates who earned credits in STEM advanced science and engineering courses, by gender: 2009**



\*Significantly different ( $p < .05$ ) from males.

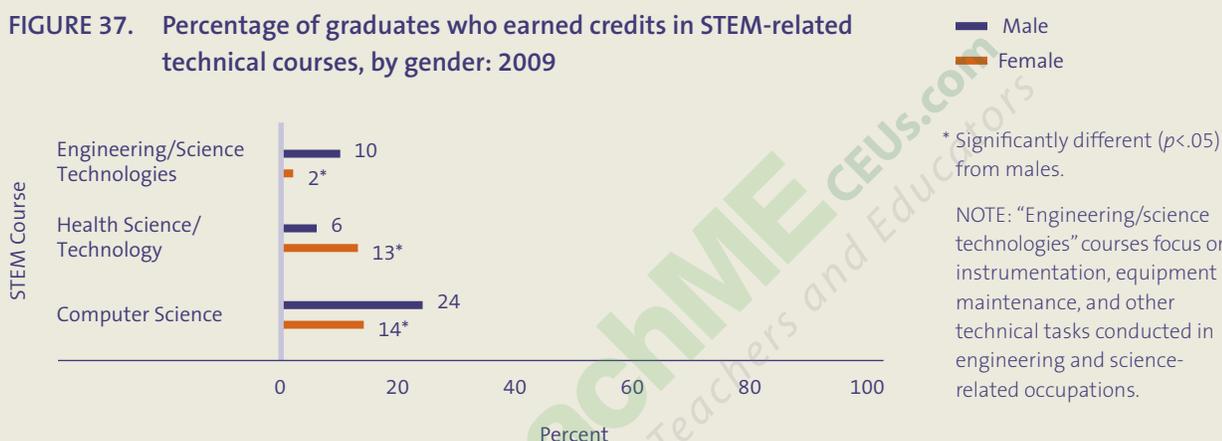
NOTE: "Advanced biology" courses include AP/IB biology, physiology, anatomy, and genetics. "Advanced environmental/earth science" courses include AP/IB environmental science, college preparatory earth science, and various geology courses.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (HSTS), 2009.

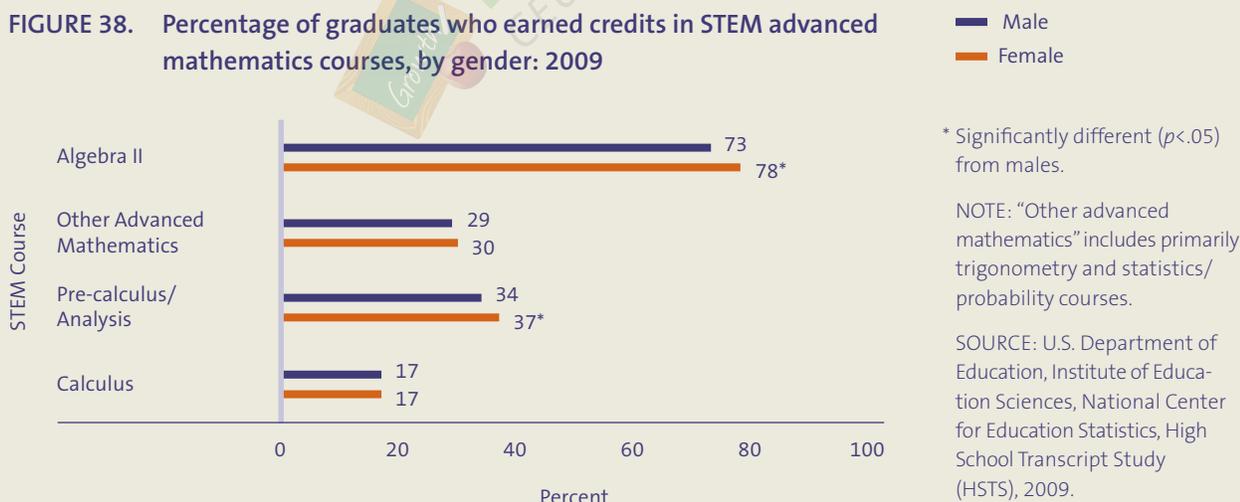
As shown in figure 37, a larger percentage of males than females earned credits in the engineering/science technologies (10 percent compared to 2 percent) and in computer science (24 percent compared to 14 percent). In health science/technology, however, more females than males earned credits (13 percent compared to 6 percent).

In advanced mathematics, as shown in figure 38, a greater percentage of females than males took algebra II (78 percent compared to 73 percent) and pre-calculus (37 percent compared to 34 percent). However, there were no measurable differences in the percentages of male and female graduates who took calculus or other advanced mathematics.

**FIGURE 37. Percentage of graduates who earned credits in STEM-related technical courses, by gender: 2009**



**FIGURE 38. Percentage of graduates who earned credits in STEM advanced mathematics courses, by gender: 2009**



## A Closer Look at Students with Disabilities and English Language Learners

This section presents information on credits earned, GPAs, and curriculum levels of students with disabilities and English language learners who received a standard or honors diploma.

### *Students with disabilities*

In the HSTS, students with disabilities (SD) are defined as (1) students with an Individualized Education Program (IEP) for reasons other than being gifted and talented, or (2) students with 504 plans. Students with disabilities represented 8 percent of all graduates in 2009. Compared with

students without disabilities, students with disabilities earned fewer credits overall (26.8 credits versus 27.2 credits), fewer credits in core academic courses (15.0 credits versus 16.0 credits), and fewer credits in other academic courses (3.7 credits versus 5.4 credits) (table 9). In other courses, students with disabilities earned more credits than students without disabilities (8.0 credits compared to 5.8 credits). Additionally, students with disabilities earned lower GPAs than students without disabilities (2.65 compared to 3.03).

\* Significantly different ( $p < .05$ ) from students without disabilities.

NOTE: Core academic courses are English, mathematics, science, and social studies. Other academic courses are fine arts, foreign languages, and computer-related studies. Other courses include courses such as vocational education, personal health, and physical education. Details may not sum to total because of rounding.

**TABLE 9. Average credits earned and average GPAs, by student disability status and course type: 2009**

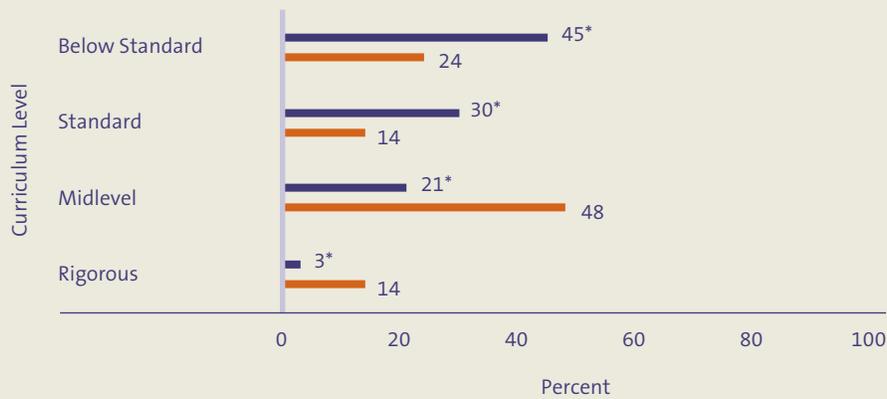
Course type	Students with disabilities		Students without disabilities	
	Credits	GPA	Credits	GPA
Overall	26.8*	2.65*	27.2	3.03
Core academic	15.0*	2.43*	16.0	2.82
Other academic	3.7*	2.74*	5.4	3.18
Other	8.0*	3.02*	5.8	3.43

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (HSTS), 2009.

As shown in figure 39, over half of students with disabilities completed at least a standard curriculum level in 2009, with nearly a quarter completing at least a midlevel curriculum level. However, 45 percent of students with disabilities completed a below

standard curriculum. About three-quarters of students without disabilities completed at least a standard curriculum level, with more than half completing at least a midlevel curriculum level.

**FIGURE 39. Percentage of graduates completing each curriculum level, by student disability status: 2009**



■ Students with disabilities  
■ Students without disabilities

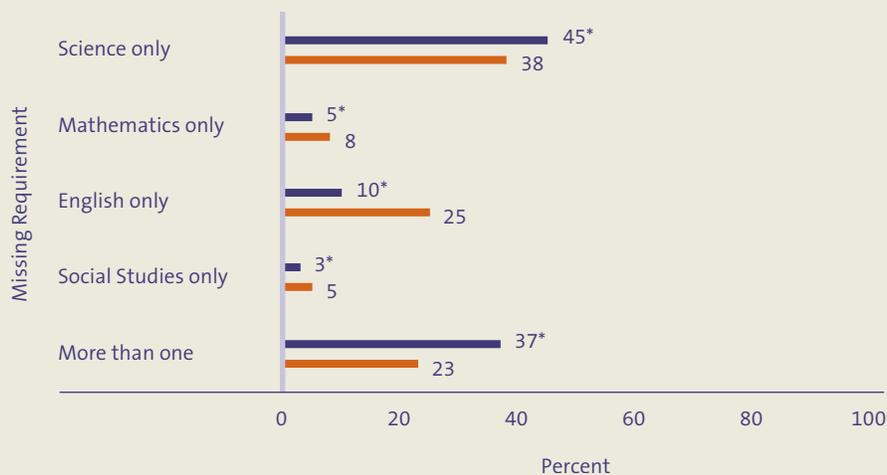
\* Significantly different ( $p < .05$ ) from students without disabilities.

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

Of the 45 percent of students with disabilities who did not complete at least a standard curriculum, 45 percent lacked only the science requirements needed to attain a standard curriculum compared with 38 percent of students without disabilities (figure 40). Ten percent of students with disabilities lacked

only the English requirement needed to attain a standard curriculum compared with 25 percent of students without disabilities. Over a third of students with disabilities (37 percent) were missing more than one requirement for a standard curriculum compared to 23 percent for students without disabilities.

**FIGURE 40. Percentage of graduates who did not attain a standard curriculum, by missing requirement and student disability status: 2009**



■ Students with disabilities  
■ Students without disabilities

\* Significantly different ( $p < .05$ ) from students without disabilities.

NOTE: For definitions of curriculum levels, see table 1. Details may not sum to total because of rounding.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (HSTS), 2009.

### English Language Learners

English language learners (ELL) represented 2 percent of all graduates in 2009. ELL graduates earned fewer credits overall, fewer credits in core academic courses, and lower

GPA than non-ELL graduates (table 10). In other academic courses, such as fine arts, foreign languages, and computer-related studies, ELL graduates earned more credits compared to non-ELL graduates.

\* Significantly different ( $p < .05$ ) from non-English language learners.

NOTE: Core academic courses are English, mathematics, science, and social studies. Other academic courses are fine arts, foreign languages, and computer-related studies. Other courses include courses such as vocational education, personal health, and physical education. Details may not sum to total because of rounding.

**TABLE 10. Average credits earned and GPAs, English language learner status and course type: 2009**

Course type	English language learners		Non-English language learners	
	Credits	GPA	Credits	GPA
Overall	26.3*	2.75*	27.2	3.00
Core academic	14.4*	2.52*	16.0	2.79
Other academic	6.1*	2.91*	5.2	3.15
Other	5.8	3.10*	6.0	3.40

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (HSTS), 2009.

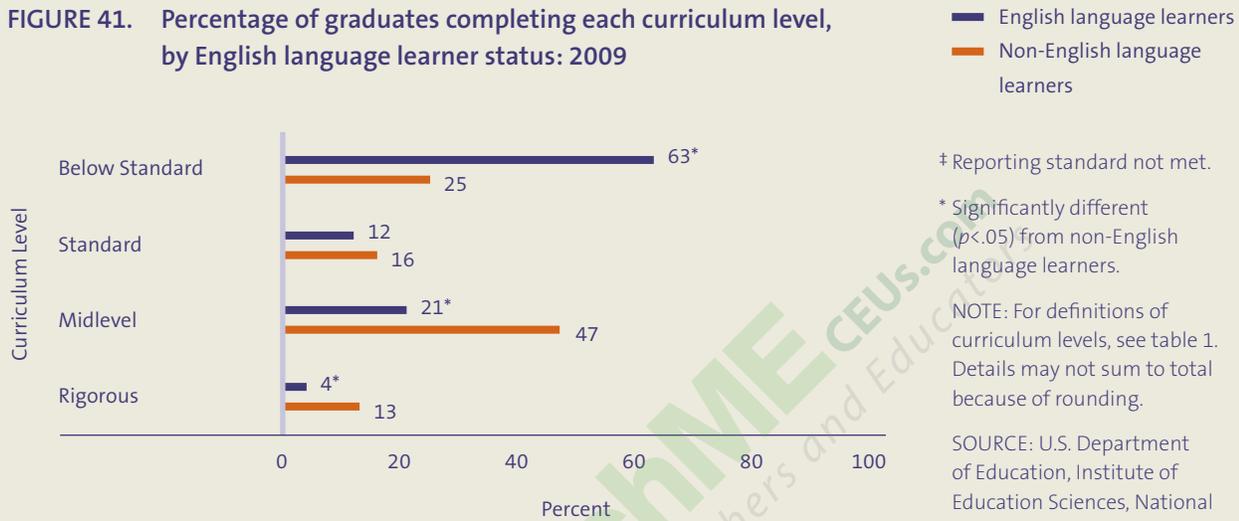
Sixty-three percent of ELL graduates completed a below standard curriculum compared to one-quarter of non-ELL graduates (figure 41). To meet the requirements of a standard level curriculum as defined in HSTS, a graduate must earn four credits in English. ELL graduates earned, on average, 3.8 credits in English and 2.0 credits in English as a Second Language (ESL) (data not shown). As defined in the HSTS, ESL courses are counted as foreign language courses and not English.

ELL and non-ELL graduates who completed a below standard curriculum level differed in the requirements they lacked to attain a standard curriculum level. Nearly a third of ELL graduates (32 percent) were missing only the required number of English credits to reach a standard curriculum (figure 42). Another 29 percent of ELL graduates lacked only the science requirements necessary to reach a standard curriculum. Among non-ELL graduates, 40 percent lacked only

the science requirements needed to reach a standard curriculum level, and 22 percent lacked only the English requirement. Over a third of ELL graduates (35 percent) were missing

more than one requirement for a standard curriculum compared with 25 percent of non-ELL graduates.

**FIGURE 41. Percentage of graduates completing each curriculum level, by English language learner status: 2009**



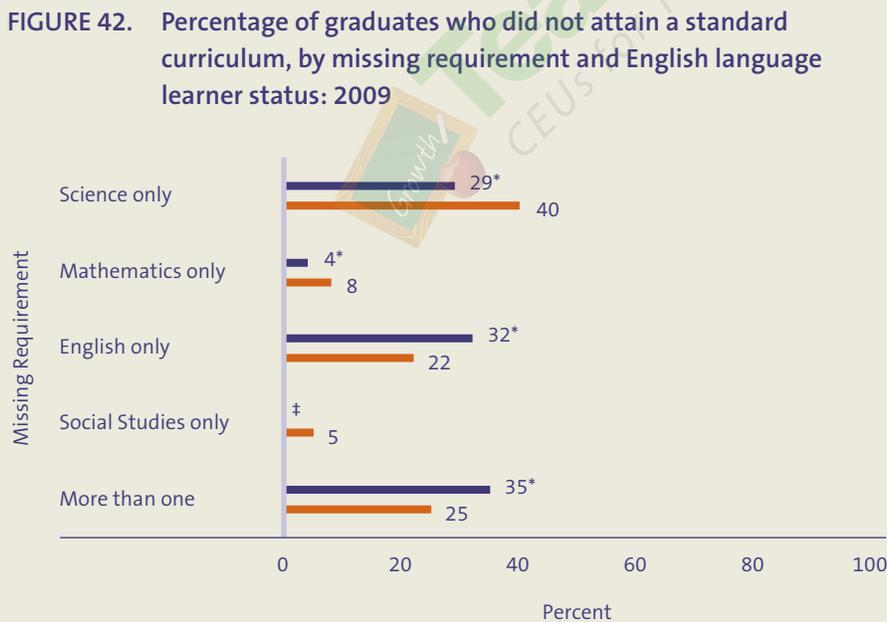
‡ Reporting standard not met.

\* Significantly different ( $p < .05$ ) from non-English language learners.

NOTE: For definitions of curriculum levels, see table 1. Details may not sum to total because of rounding.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (HSTS), 2009.

**FIGURE 42. Percentage of graduates who did not attain a standard curriculum, by missing requirement and English language learner status: 2009**





“This document was developed from the public domain document: America’s High School Graduates – U.S. Department of Education, National Center for Education Statistics, Institute of Education Services (IES).”