



## **Benefits of a High School Core Curriculum**

Since the publication of *A Nation at Risk*, ACT has recommended that students take a core curriculum in high school in order to be prepared for college-level work. ACT's recommended core curriculum consists of four years of English and three years each of mathematics, science, and social studies. The benefits to students of taking the right number of core preparatory courses in high school have been well documented by ACT research. More recently, ACT research has also shown that taking certain specific courses in high school, such as Biology, Chemistry, Physics, and mathematics courses including Algebra II and beyond, substantially increases students' readiness for college-level work as well as their readiness for workforce training programs.

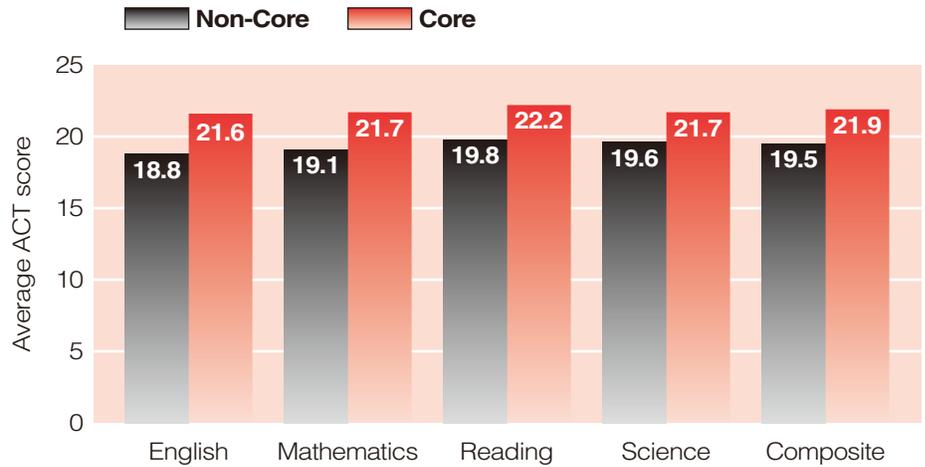
The purpose of this brief is to summarize ACT's research on the core curriculum. In the following sections we describe the relative benefits of taking the ACT-recommended core curriculum, and of taking specific high school courses. The brief is divided into two parts: benefits for academic achievement and college and workforce training readiness, and benefits for college success. Unless otherwise specified, the results reported below are based on the 2005 ACT-tested high school graduating class, totaling about 1.2 million students. Of these students, 56 percent took the core curriculum and 34 percent took less than the core curriculum.<sup>1</sup>

## I. Benefits of Taking a Core Curriculum and Specific High School Courses for Academic Achievement and College and Workforce Training Readiness

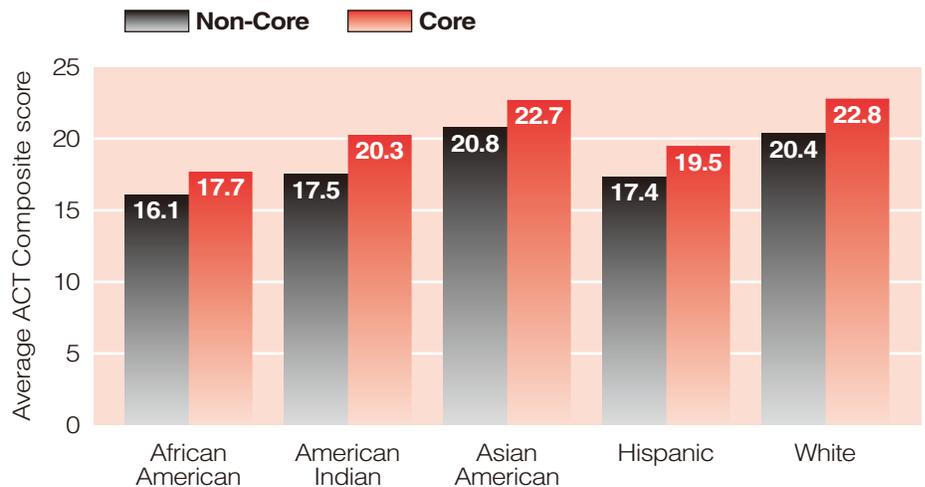
*Students who take the ACT-recommended core curriculum in high school achieve higher ACT scores than those who don't. Higher ACT scores offer students more opportunities for access to college and scholarships.*

### ▼ Students who take the ACT-recommended core curriculum in high school achieve higher ACT scores than those who don't, regardless of gender, family income, and racial/ethnic background.

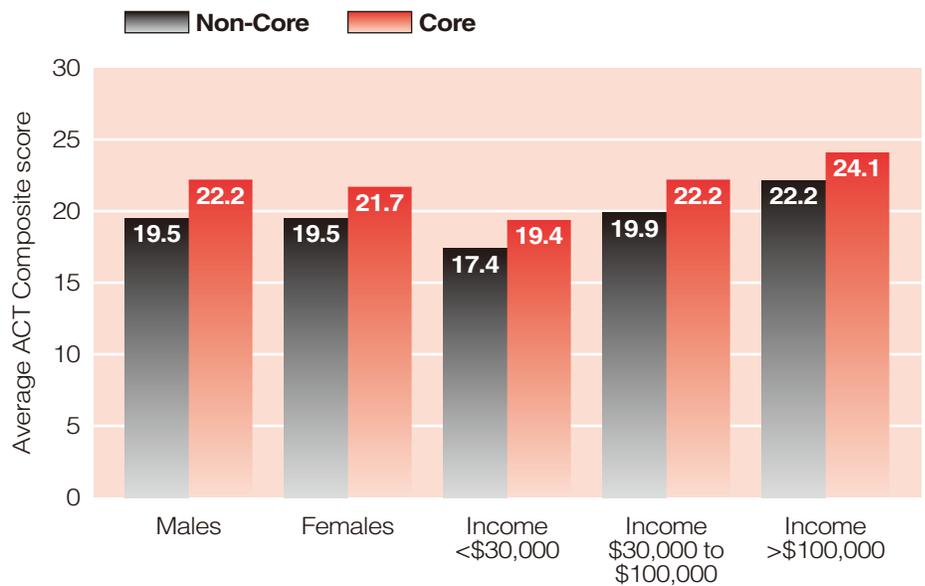
- Compared to graduates who do not take the core curriculum, graduates who take the core curriculum earn ACT scores that are 2.1 to 2.8 points higher.



- For all racial/ethnic groups, students who take the core curriculum score between 1.6 and 2.8 points higher on the ACT Composite than those who do not take the core.



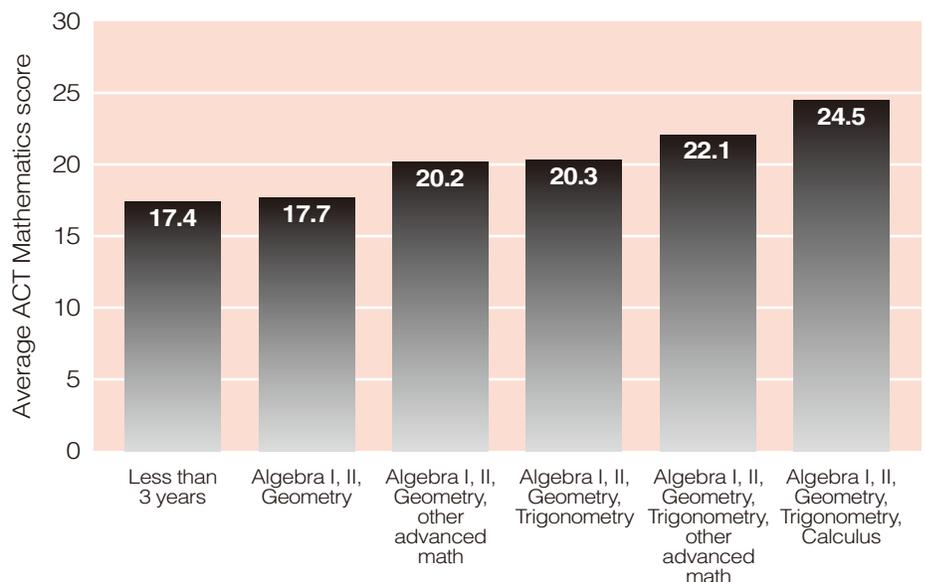
- For males and females, average ACT Composite scores of core takers are 2.2 to 2.7 points higher than those of non-core takers.
- Across family income groups, average ACT Composite scores of core takers are 1.9 to 2.3 points higher than those of non-core takers.



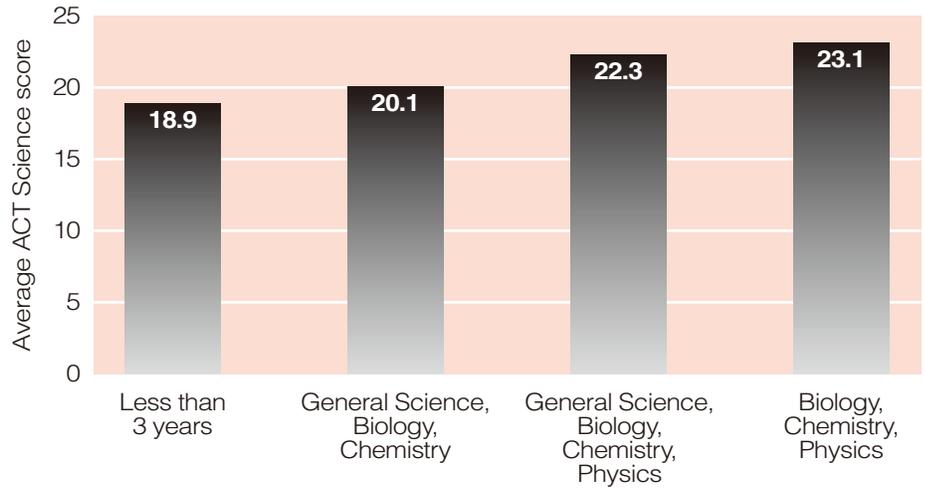
*Taking upper-level courses beyond core improves achievement of all students.*

▼ **Taking upper-level courses beyond core improves achievement of all students, regardless of gender, family income, and racial/ethnic background.**

- Compared to students who take less than the three core mathematics courses (Algebra I, Geometry, and Algebra II), those who take these three courses score slightly higher (0.3 score point higher) on the ACT Mathematics Test. Students who also take either Trigonometry or at least one other advanced mathematics course (excluding Calculus) score about 2.5 points higher than those who take only core mathematics courses. Moreover, students who take both Trigonometry and Calculus, in addition to the three core mathematics courses, score 6.8 points higher than graduates who take only the three core mathematics courses.



- Compared to students who take less than three years of natural science courses, students who take General Science, Biology, and Chemistry in high school score 1.2 points higher on the ACT Science Test.
- Students who take Physics in addition to General Science, Biology, and Chemistry score 2.2 points higher than those who take only the latter three courses. Those who take Biology, Chemistry, and Physics score 3.0 points higher than those students who take General Science, Biology, and Chemistry.<sup>2</sup>

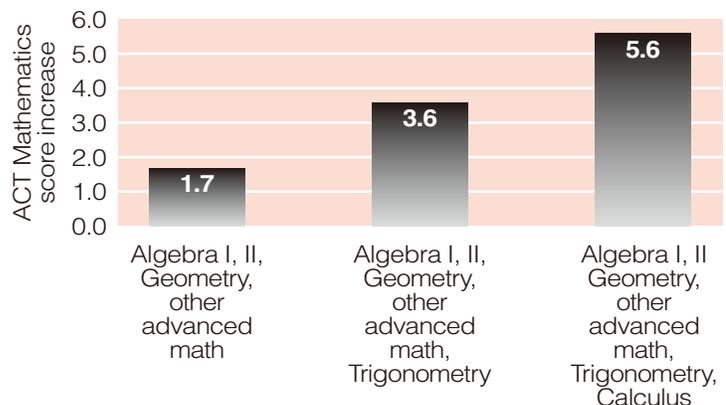


*Students gain from taking more rigorous courses, regardless of their achievement level. This means that students with lower high school grade point averages can benefit from taking rigorous courses.*

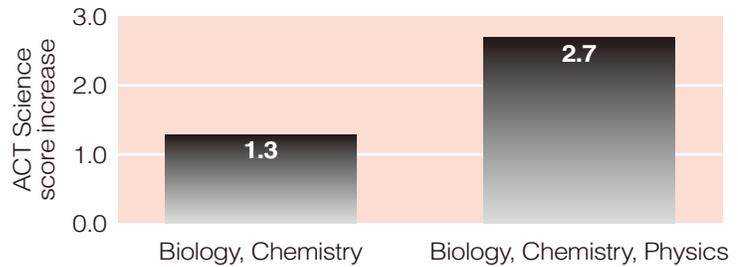
▼ **Even when students' achievement levels are taken into account, students gain from taking more rigorous courses.**

Because students select the courses they take, we conducted an additional analysis to determine whether the value added by these courses was dependent on student achievement level (that is, whether only the high-achieving students take and benefit from taking a particular course). To do this, we controlled for student achievement by using students' self-reported high school grade point average and grade level. We then looked at the benefits of taking particular courses for students in different ranges of high school grade point average.

- Students who take Trigonometry, Calculus, or other advanced mathematics courses beyond Algebra I, Geometry, and Algebra II score 1.7 points higher on the ACT Mathematics Test than students who take only the three core mathematics courses, regardless of prior achievement. Cumulatively, the potential score increase for students who take Trigonometry, Calculus, and at least one other upper-level mathematics course beyond core is 5.6 score points, regardless of prior achievement.



- Students who take Chemistry in addition to Biology score 1.3 points higher on the ACT Science Test than students who take only Biology, regardless of prior achievement. Taken together, Chemistry and Physics can increase student scores on the ACT Science Test by as much as 2.7 points over those attained by taking Biology only.

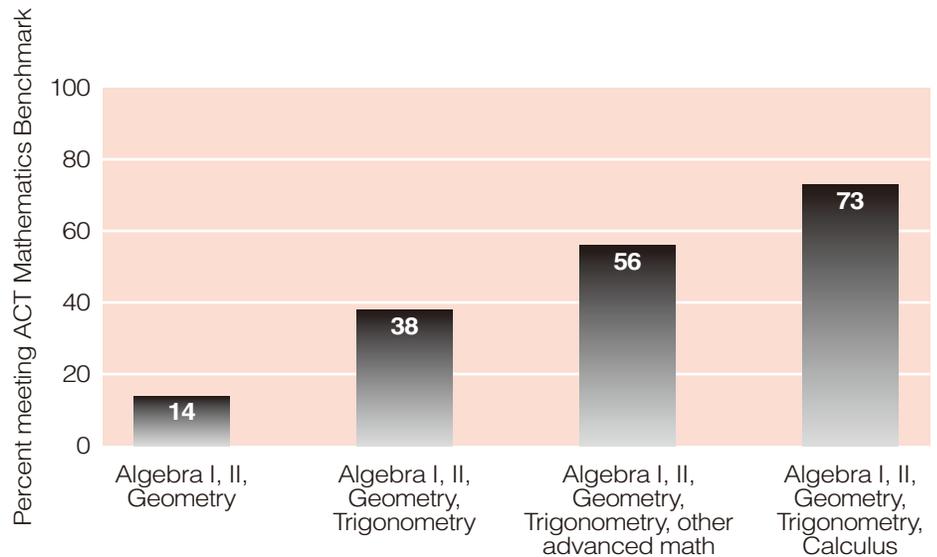


*Students who take one or more courses beyond core are more likely to meet or exceed the ACT College Readiness Benchmarks. This means that these students are more likely to enter college, be ready to take credit-bearing college courses, and succeed in those courses.*

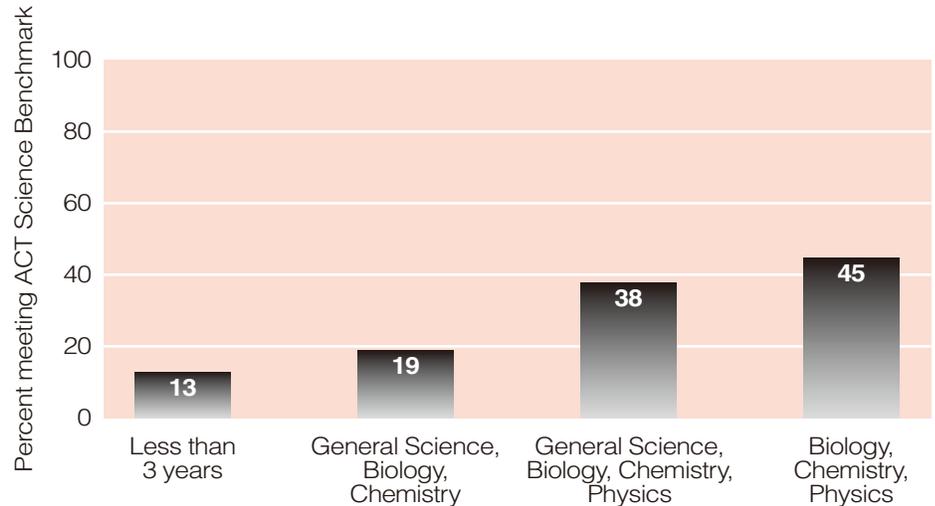
- Similar patterns of ACT Mathematics and Science score increases are seen for low- and high-achieving students.<sup>3</sup>

▼ **Students who take one or more courses beyond core are more likely to meet or exceed the ACT College Readiness Benchmarks.**

- Compared to students who take only Algebra I, Geometry, and Algebra II, students who also take Trigonometry are almost three times more likely to meet the College Readiness Benchmark in Mathematics, and students who take both Trigonometry and Calculus are about five times more likely to meet the Mathematics Benchmark.



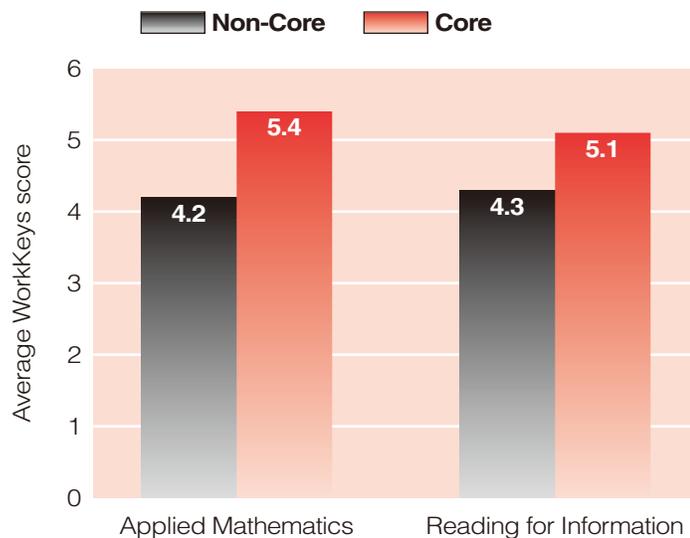
- Compared to students who take less than three years of science in high school, students who take General Science, Biology, and Chemistry are more likely to meet the ACT College Readiness Benchmark in Science (19 percent vs. 13 percent). Students who also take Physics are about three times more likely to meet the Science Benchmark (38 percent or 45 percent vs. 19 percent) than students who take only General Science, Biology, and Chemistry.<sup>4</sup>



*Compared to high school graduates who do not take the recommended core curriculum, graduates who take the core are more likely to be ready for workforce training.*

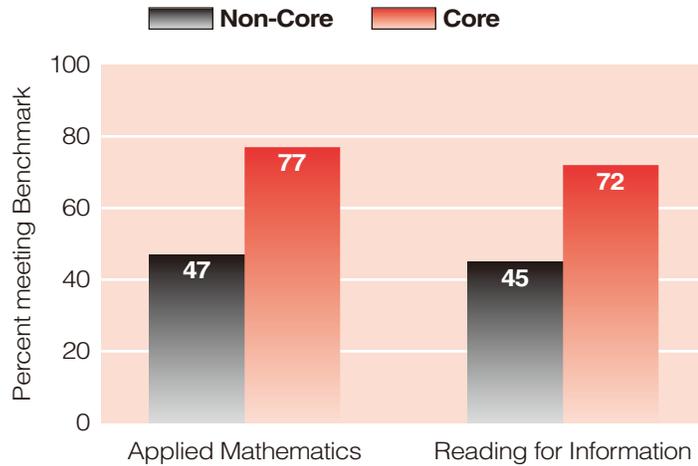
▼ **Compared to high school graduates who do not take the recommended core curriculum, graduates who take the core are more likely to be ready for workforce training.**<sup>5</sup>

- In a state where all public school juniors take WorkKeys, the average Applied Mathematics score of students who take the core curriculum is higher than the Workforce Training Readiness Benchmark for Applied Mathematics (Level 5), while the average score of students who do not take the core is lower than this Benchmark.
- The average Reading for Information score of students who take the core curriculum is higher than the Workforce Training Readiness Benchmark for Reading for Information (Level 5), while the average score of students who do not take the core is lower than this Benchmark.



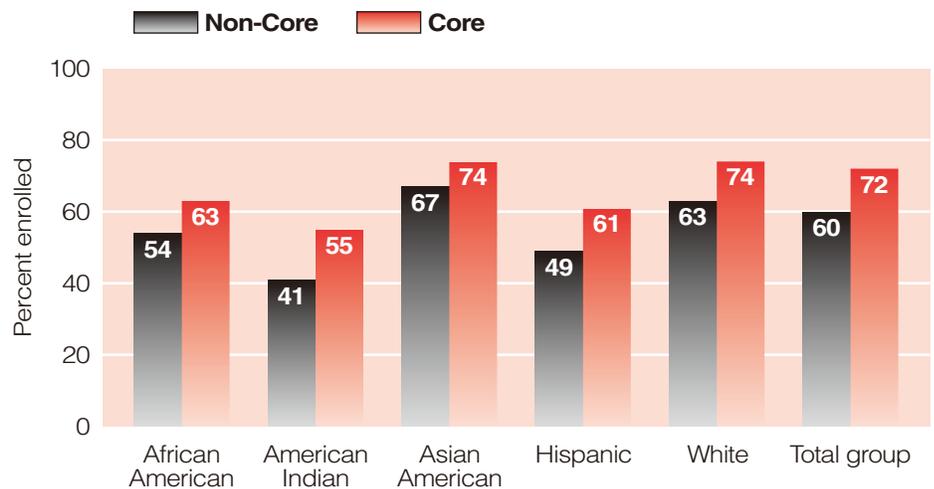
*Students who take the recommended core curriculum enroll in college at a higher rate than those who do not.*

- In the same state, students who take the core curriculum are more likely than students who do not take the core to meet the Workforce Training Readiness Benchmark for Applied Mathematics (77 percent vs. 47 percent).
- Students who take the core curriculum are more likely than students who do not take the core to meet the Workforce Training Readiness Benchmark for Reading for Information (72 percent vs. 45 percent).



## II. Benefits of Taking a Core Curriculum for College Success

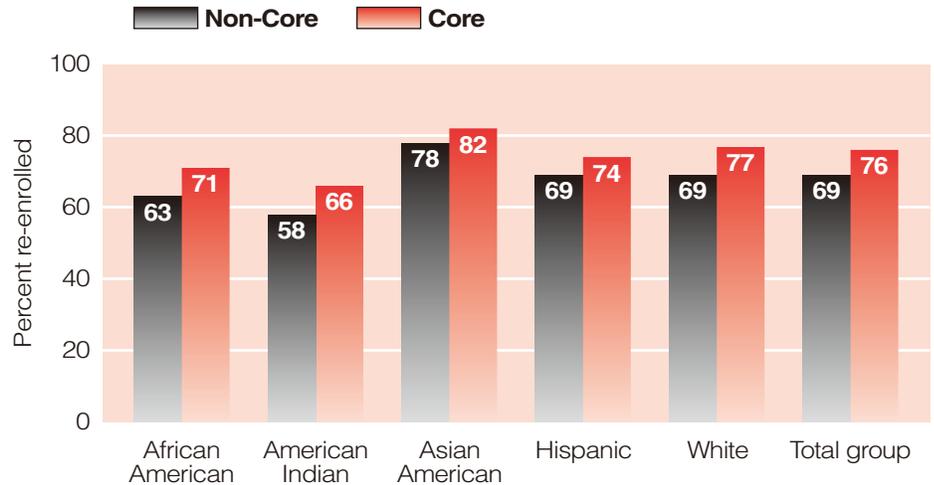
- ▼ **Students who take the recommended core curriculum enroll in college at a higher rate than those who do not, regardless of gender, family income, and racial/ethnic background.**
- Students who take the core curriculum are more likely than those who do not take the core to enroll in college in the fall following graduation (72 percent vs. 60 percent for the total group).<sup>6</sup>



*Taking upper-level courses beyond core in high school improves college retention for all students.*

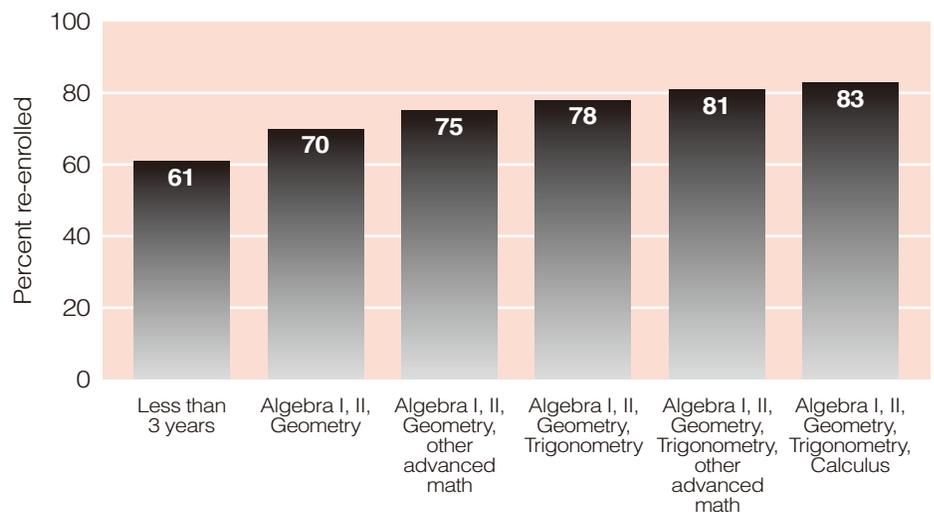
▼ **Students who take the core curriculum have higher college retention rates than students who do not take the core, regardless of gender, family income, and racial/ethnic background.**

- Students who take the core curriculum are more likely than those who do not take the core to re-enroll in the same postsecondary institution for a second year of college (76 percent vs. 69 percent for the total group).<sup>7</sup>

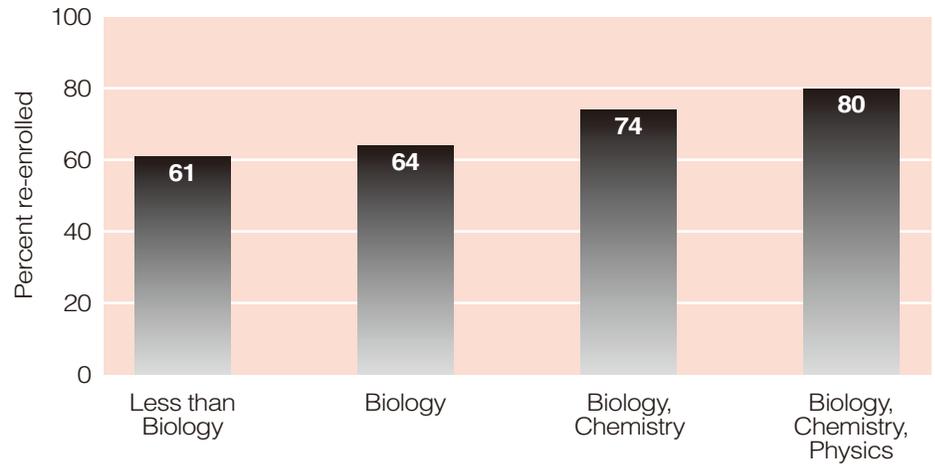


▼ **Taking upper-level courses beyond core in high school improves college retention for all students, regardless of gender, family income, and racial/ethnic background.**

- Students who take at least the three core mathematics courses are more likely than students who take fewer mathematics courses to re-enroll in the same postsecondary institution their second year (70 percent vs. 61 percent).<sup>8</sup>
- Students who take Trigonometry and Calculus in addition to the core mathematics courses are most likely to re-enroll in the same postsecondary institution their second year.<sup>9</sup>



- Students who take Biology and Chemistry in high school are more likely than those who take only Biology to re-enroll in the same postsecondary institution their second year (74 percent vs. 64 percent).<sup>10</sup>
- Students who take Biology, Chemistry, and Physics are most likely to re-enroll in the same postsecondary institution their second year.<sup>11</sup>

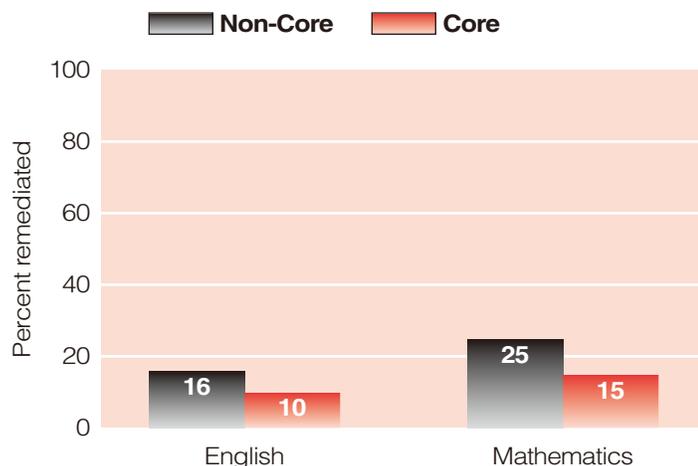


*Students who take the core curriculum in high school are less likely to need remedial coursework in college than students who do not take the core.*

- Similar results are found for all gender, family income, and racial/ethnic groups.

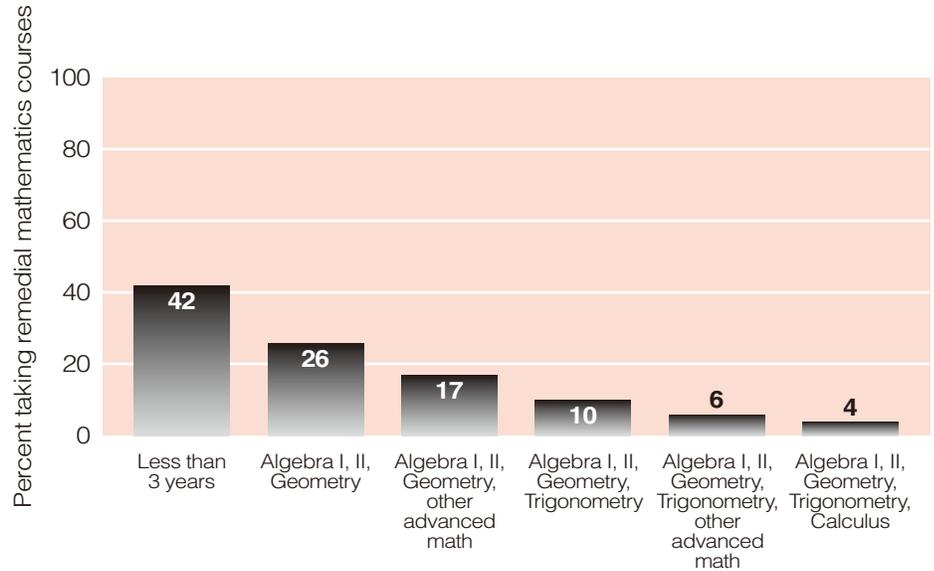
▼ **Students who take the core curriculum in high school are less likely to need remedial coursework in college than students who do not take the core, regardless of gender, family income, and racial/ethnic background.**

- ACT-tested students who take the core curriculum in high school are less likely than those who do not take the core to take remedial English or mathematics courses in college (10 percent vs. 16 percent for English, and 15 percent vs. 25 percent for mathematics).<sup>12</sup>



*The lower the level of mathematics courses students take in high school, the more likely they are to take remedial mathematics courses in college.*

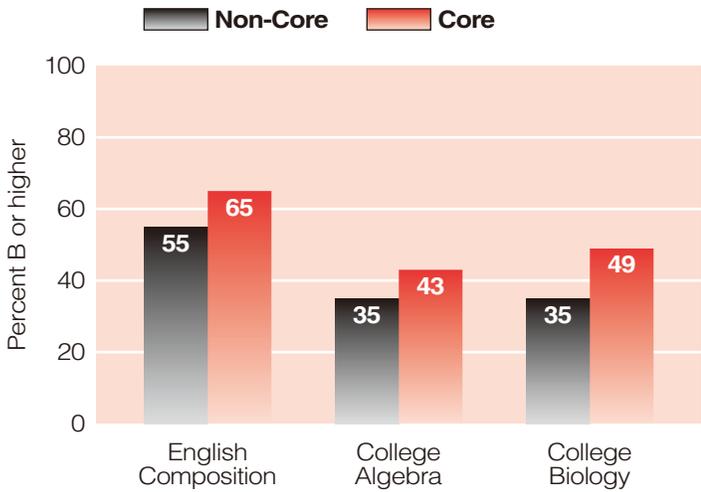
- Differences in remediation rates between core takers and non-core takers are similar for all gender, family income, and racial/ethnic groups.
- The lower the level of mathematics courses students take in high school, the more likely they are to take remedial mathematics courses in college. For example, students who take only the three core mathematics courses are more than twice as likely to take remedial mathematics courses in college as students who also take Trigonometry.
- Students who take Trigonometry and Calculus in addition to the three core mathematics courses are least likely to take remedial mathematics courses in college.



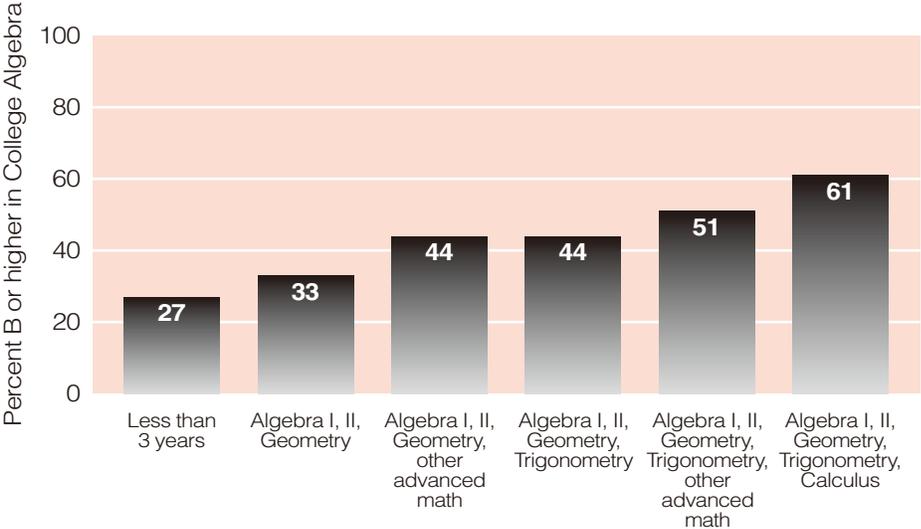
*Students who take the recommended core curriculum in high school are more likely than those who do not to succeed in first-year college courses. When students succeed in college courses, they are significantly more likely to stay in college and attain a degree.*

▼ **Students who take the recommended core curriculum in high school are more likely than those who do not take the core to succeed in first-year college courses, regardless of gender, family income, and racial/ethnic background.**<sup>13</sup>

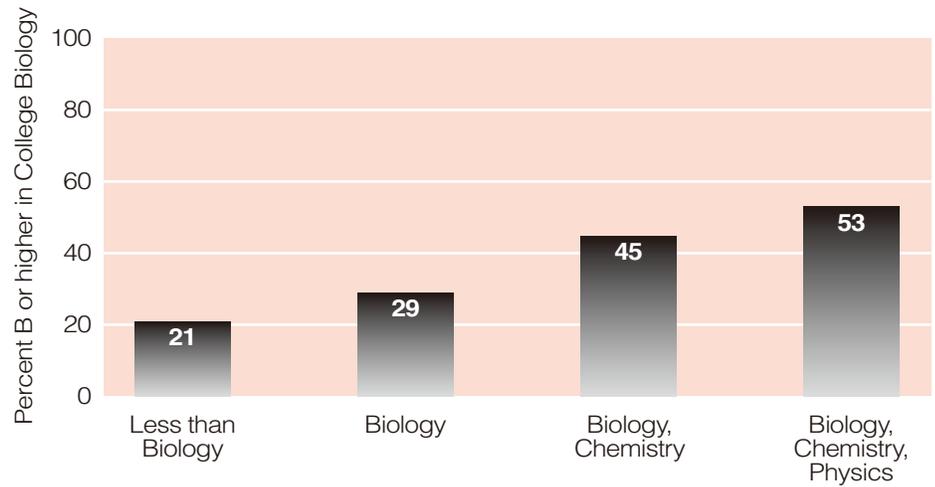
- Students who take the core curriculum in high school are more likely than students who do not take the core to achieve a B or higher grade in English Composition (65 percent vs. 55 percent).
- Students who take the core curriculum are more likely than students who do not take the core to achieve a B or higher grade in College Algebra (43 percent vs. 35 percent).
- Students who take the core curriculum are more likely than students who do not take the core to achieve a B or higher grade in College Biology (49 percent vs. 35 percent).
- Differences in success rates between core and non-core students are fairly similar across gender, family income, and racial/ethnic groups.



- Success in College Algebra increases with the level of high school mathematics coursework taken. For example, taking Trigonometry and Calculus in high school in addition to the core mathematics courses almost doubles students' chances of success in College Algebra. Similar results are found for all gender, family income, and racial/ethnic groups.



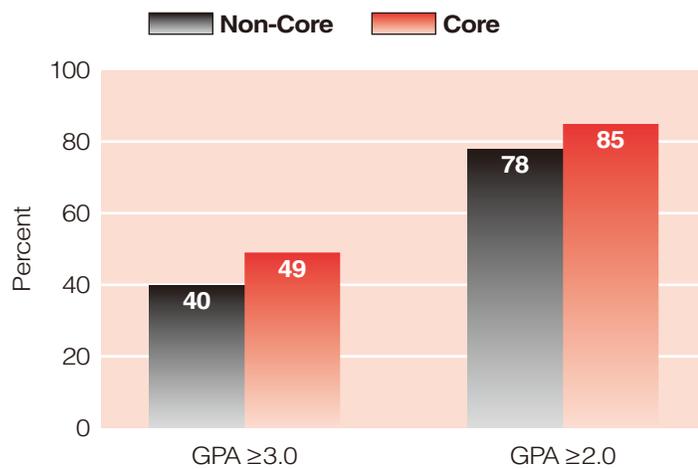
- Success in College Biology increases with the level of high school science coursework taken. For example, taking Chemistry and Physics in high school in addition to Biology almost doubles students' chances of success in College Biology. Similar results are found for all gender, family income, and racial/ethnic groups.



*Students who take the core curriculum in high school tend to earn higher first-year college GPAs than students who do not take the core.*

▼ **Students who take the core curriculum in high school tend to earn higher first-year college GPAs than students who do not take the core, regardless of gender, family income, and racial/ethnic background.**

- Students who take the core curriculum are more likely than students who do not take the core to earn a first-year college GPA of 2.0 or higher (85 percent vs. 78 percent) or 3.0 or higher (49 percent vs. 40 percent).<sup>14</sup>



## Summary

In this brief we have summarized ACT research showing that students benefit by taking the ACT-recommended core curriculum (identified as four years of English and three years each of mathematics, science, and social studies) and certain specific courses in high school in the following ways:

### ▼ **Benefits for academic achievement and college and workforce training readiness**

- Higher ACT scores
- Higher WorkKeys scores
- Greater chance of being ready for college and workforce training programs
- Increased readiness associated with taking particular courses such as Algebra II, upper-level mathematics, Chemistry, and Physics

### ▼ **Benefits for college success**

- Greater chance of enrolling in college
- Greater chance of persisting to a second year of college at the same institution
- Lesser chance of needing remedial coursework in college
- Greater chance of succeeding in selected first-year college courses
- Greater chance of achieving higher first-year college GPAs

It is clear from our research that students who take the ACT-recommended core curriculum in high school are better prepared for college and workforce training programs, and are more likely to be successful in college, than students who do not take the ACT-recommended core.

## Notes

- <sup>1</sup> These percentages do not sum to 100 because not all students report their course taking information.
- <sup>2</sup> The difference in performance between the Biology–Chemistry–Physics sequence and the General Science–Biology–Chemistry–Physics sequence is likely due to the types of students who elect to take these particular course sequences. Because students select the courses they take, the average test scores associated with course patterns reflect not only the contribution of course content but also the achievement level of the students who elect to take a particular course sequence.
- <sup>3</sup> Low- and high-achieving students were identified as those with high school grade point averages of 0.0 to 2.99 and 3.00 to 4.00, respectively.
- <sup>4</sup> See note 2 for more information about these course patterns.
- <sup>5</sup> These results are based on Spring 2004 WorkKeys data. WorkKeys scores lower than 3 are treated as zero. This does not substantially affect the results reported.
- <sup>6</sup> These results are based on 2003 ACT-tested high school graduates.
- <sup>7</sup> These results are based on 2003 ACT-tested high school graduates who enrolled in college in Fall 2003.
- <sup>8</sup> See note 7.
- <sup>9</sup> See note 7.
- <sup>10</sup> See note 7.
- <sup>11</sup> See note 7.
- <sup>12</sup> These results are based on ACT-tested 1993–2004 high school graduates who enrolled in college.
- <sup>13</sup> These results are based on data for ACT-tested 1993–2004 high school graduates who enrolled in standard, credit-bearing college English Composition, College Algebra, or College Biology courses.
- <sup>14</sup> These results are based on ACT-tested 1993–2004 high school graduates who enrolled in college and had a valid first-year college GPA.