Achieve, Inc.

math works

All Students Need Advanced Mathematics

To thrive in today's world, all students will need to graduate with very strong mathematics skills. That can only mean one thing: Advanced math courses are now essential courses.

Advanced math equals college success.

- 90% of 2010 graduates agree that "In today's world, high school is not enough, and nearly everybody needs to complete some kind of education or training after high school."[1] These students have it right: Three-quarters of occupations with a "bright outlook," (meaning they are high growth or represent new and emerging fields) require some education and training beyond high school.[2]
- Completing advanced math courses in high school has a greater influence on whether students will graduate from college than any other factor—including family background. Students who take math beyond Algebra II increase their likelihood of persisting to sophomore by about 20 percentage points[3] and nearly double their chances of earning a bachelor's degree.[4]
- College students who took Algebra II or beyond during high school are more than twice as likely to report feeling prepared for the math they are expected to do in college.[5] They also perform significantly better in a range of college courses, including physics, chemistry and even biology.[6]

Advanced math equals career opportunity.

- STEM jobs (17% growth) are growing at almost twice the rate of non-STEM jobs (10% growth).[7]
- Simply taking advanced math has a direct impact on future earnings, apart from any other factors. Students who take advanced math have higher incomes ten years after graduating—regardless of family background, grades and college degrees.[8]
- A little over half of all U.S. occupations require a significant level of "knowledge of arithmetic, algebra, geometry, calculus, statistics, and their applications." Included in these nearly 500 occupations are about 45% of low skills jobs, about half of middle skills jobs, and over 80% of high skills jobs.[9]
- Many "blue collar" jobs also require advanced math: One study found that the math skills required by electricians, construction workers, upholsterers and plumbers match what's necessary to do well in college courses.[10] The International Brotherhood of Electrical Workers' test for prospective apprentices includes algebra problems.[11]

Advanced math equals a stronger economy.

- Economists say that if the U.S. could improve math and science achievement so that its students become globally competitive, America's gross domestic product could eventually grow by an additional 36 percent.[12]
- Advanced math can help spread economic opportunity, too: Inequities in advanced math course-taking account for one-quarter of the income gap between students from low-income and middle-class families ten years after graduation.[13]

ENDNOTES

1 College Board (2011). *One Year Out: Findings From A National Survey Among Members Of The High School Graduating Class Of 2010.* http://www.collegeboard.org/OneYearOut

2 Achieve (2012). *The Future of the U.S. Workforce: The Limited Career Prospects for High School Graduates without Additional Education and Training.* http://www.achieve.org/LimitedCareerProspects

3 Klepfur, Kasey & Jim Hull (2012). *High School Rigor and Good Advice: Setting Up Students to Succeed.* Center for Public Education for the National School Boards Association. www.centerforpubliceducation.org/Main-Menu/Staffingstudents/High-school-rigor-and-good-advice-Setting-up-students-to-succeed/High-school-rigor-and-good-advice-Setting-up-students-to-succeed-Full-Report.pdf

4 Adelman, C. (2006, February). *The Toolbox Revisited: Paths to Degree Completion from High School Through College.* Washington, DC: U.S. Department of Education.

5 Peter D. Hart Research Associates/Public Opinion Strategies. (2005). *Rising to the Challenge: Are High School Graduates Prepared for College and Work?* Washington, DC: Achieve, Inc. http://www.achieve.org/RisingtotheChallenge

6 Sadler, P. M. & Tai, R. H. (2007). The two high-school pillars supporting college science. *Science*, 317, 457-8.

7 Langdon, David et al. (July 2011). *STEM: Good Jobs and For the Future.* Economics and Statistics Administration Issue Brief. http://www.esa.doc.gov/sites/default/files/reports/documents/stemfinalyjuly14_1.pdf

8 Rose, H. & Betts, J. R. (2004, May). The effect of high school courses on earnings. *The Review of Economics and Statistics*, 86(2), 497-513.

9 Achieve analysis of O*NET data

10 ACT, Inc. (2006). *Ready for College or Ready for Work: Same or Different?* Iowa City, IA: Author.

11 National Joint Apprenticeship and Training Committee for the Electrical Construction and Maintenance Industry, http://www.njatc.org/training/apprenticeship/index.aspx.

12 Hanushek, E. A., Jamison, D. T., Jamison, E. A., & Woessmann, L. (2008, spring). Education and economic growth. *Education Next*, 8(2), 62-70.

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