



# Moody's Mega Math Challenge® 2015

A contest for high school students

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## STEM Sells: What is higher education really worth? Can modeling show the cost, return, and value of a college education?

The United States has long held a reputation for being at the forefront of innovations in science and technology. In order to keep this edge, President Obama's Council of Advisors on Science and Technology (PCAST) estimates "a need for approximately one million more STEM (Science, Technology, Engineering, or Mathematics) professionals than the U.S. will produce at the current rate over the next decade."<sup>1</sup> At the same time, state funding for public higher education has decreased substantially for a number of years for most states,<sup>2</sup> shifting more of the cost to students and their families. Many high school graduates, therefore, are now facing questions not only about what fields to study and which careers to pursue, but also about their burden of debt (averaging close to \$30K per student<sup>3</sup>), raising an obvious question: is college worth it?

- **Looking beyond sticker prices.** Colleges post information about tuition and costs, but how much a student actually pays for his education is more complicated when you consider factors such as scholarships, household wealth, and the costs of financing. Build a mathematical model to determine how much an individual student will pay for an undergraduate degree. Apply your model to students from a single parent/one child household and a two parent/three children household each with the following annual incomes: \$35,000, \$75,000, and \$125,000 (i.e., at least six scenarios). Also, consider President Obama's recent suggestion to make two years of community college free for qualifying students; if implemented, how would this affect your model?
- **Show me the money!** Assuming that a college graduate's earning potential and financial stability is all that matters, create a model that contrasts the short- and long-term liabilities and rewards of entering the workforce with an undergraduate STEM degree as compared to other career preparation paths (for example a two-year degree/certificate, a non-STEM degree, or a high school diploma only). You may consider incorporating your results from the first question.
- **Life is short...** Earning potential is just one factor to consider when exploring the "value" of educational choices, such as a STEM vs. non-STEM career or the other possibilities explored above. Quantitative and qualitative factors can influence one's overall quality of life. Develop a ranking system (model) that high school students could use to help them make informed choices regarding their educational future.

Write your summary in the form of a letter to high school administrators persuading them to encourage students to use your model as a tool for evaluating education choices. Make sure to highlight both its usefulness and limitations for guiding students.

The following links may be useful:

<http://www.bls.gov>

<http://www.finaid.org/calculators/quickefc.phtml>

<http://www.bloomberg.com/news/articles/2015-02-18/student-debt-may-be-sabotaging-your-shot-at-buying-a-home>

<http://collegecompletion.chronicle.com/>

<http://www.pewsocialtrends.org/2014/02/11/the-rising-cost-of-not-going-to-college/>

1. [http://www.whitehouse.gov/sites/default/files/microsites/ostp/pcast-engage-to-excel-final\\_feb.pdf](http://www.whitehouse.gov/sites/default/files/microsites/ostp/pcast-engage-to-excel-final_feb.pdf)

2. <http://www.cbpp.org/cms/?fa=view&id=4135>

3. <http://www.usnews.com/news/articles/2014/11/13/average-student-loan-debt-hits-30-000>