Name: _____ **Date:** _____

Chemistry *~ Ms. Hart* **Class:** Anions or Cations

THE URBAN ASSEMBLY SCHOOL FOR CRIMINAL JUSTICE

Argumentative Paper #5: STEM versus Humanities

Background information-

STEM: classes on science, technology, engineering and mathematics.
Humanities: broad category that generally involves studying history, philosophy, religion, and literature. The idea is to try to understand what it means to be human.

Source #1: DON'T DEFUND HUMANITIES: THEY'RE CRUCIAL TO THE ECONOMY, TOO
Posted on September 17, 2013 by Jose Ferreira
From: http://www.knewton.com/blog/ceo-jose-ferreira/stem-vs-humanities/

Everyone is talking about the crisis in STEM education — the lack of qualified scientists, technologists, engineers, and mathematicians to fill the jobs of the future. The relative lack of STEM graduates in the U.S. is frequently mentioned as a threat to the country's global standing.

1. Why might a focus on science education help make the United States more competitive among other nations?

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But lately there has been a growing outcry from the "other side of campus" — humanities and social science departments wondering where their advocates have gone. Some argue that the STEM crisis is overblown – that in fact there are more STEM graduates than jobs. Others just want their fair share of resources. According to a New Republic article from earlier this month, while the "U.S. government spends more than U.S. $3 billion each year on 209 STEM-related initiatives overseen by 13 federal agencies," the proposed 2014 endowments of the National Endowments for the Arts and Humanities are $145.5 million respectively.

2. What areas of study are included in the humanities?

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3. What are the arguments against the STEM focus in education?

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4. What does our country currently focus on? _____

But a liberal arts education provides excellent training in at least three crucial areas – communications skills, critical thinking skills, and learning about other cultures and ideas. As any nation's economy increasingly becomes a global knowledge economy, these skills only grow more important. All knowledge economies – the USA among them – want more high-skill workers, of any type.

5. What are the benefits of a humanities education?

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So then what's going on here? In an environment that clearly has use for both types of skills, why focus so much more on STEM?

I think the real answer is that communications skills, critical thinking skills, and multicultural proficiency are much less measurable than STEM skills.

According to a study by Cathy Davidson, co-director of the annual Macarthur Foundation's Digital Media and Learning Competitions, 65% of today's elementary school students will end up doing jobs that don't exist yet. In addition to proficiency in science and technology, our workers need skills that can translate from job to job or industry to industry in a dynamic economy – skills like communications, strategy, interpersonal, and multicultural skills.

STEM skills are immediately and transparently applicable to a number of tasks when one enters the workforce. They provide a great foundation for early-stage career jobs. But no matter how strong one's technical skills, it is very difficult in most organizations to advance beyond a certain point without strong communication skills, interpersonal skills, and good judgment.

6. What are the benefits of the STEM education? What skills are they developing in our students?

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We might test this hypothesis by looking at which background, STEM vs. non-STEM, tends to be better represented in the ranks of corporate upper management. We can't just look at data of senior executives as a whole, because selection bias exists in the pool of talent available for promotion at most companies. That is, if companies have a shortage of STEM workers to begin with, we can expect as its non-STEM workers are gradually promoted that that dynamic will continue into upper management. However, it would be possible to find a careful sample of companies that have roughly equal numbers of STEM workers as non-STEM, performing tasks of roughly equal importance in aggregate, and where both sides have roughly equal opportunities for advancement. It would be very interesting to design a study around all the companies nationally that fit that profile, and see who gets promoted more to upper management. (It would also be interesting to see if that changes over time, or from country to country.) My bet is the non-STEM workers, as a group, tend to be more represented in upper management.

Humanities majors excel even in technology, where there are far more STEM-trained workers than not. Just off the top of my head I can name Reid Hoffman, Peter Thiel, and Chris Dixon – like me, all philosophy majors. At Knewton, we have plenty of programmers and data scientists who graduated with liberal arts degrees. One of our data scientists, John Davies, studied English at Harvard. He finds his education directly relevant to his job: "I wrote my thesis on Paradise Lost. One crucial skill I developed while studying literature, and especially while writing my thesis, was extracting structure from complicated systems. And that's exactly what I do here – try and find the fundamental structures that explain how education works." (Plus, he adds, "I'm good at catching typos in other people's code.")

As we make choices – personal career choices, or national policy choices, and everything in between – about promoting STEM and defunding non-STEM, are we to some degree choosing early or obvious needs over later or less obvious (but just as important) needs? As a society, we seem to blindly accept that since STEM is good we need more of it. And STEM is good. But are we making the right choices accordingly? There must be tests, like the one I tried to devise above, that could use data to assess the possible consequences of defunding non-STEM. Let's have that discussion – before we see even more schools cut back further on their humanities studies.

The author's claim is:

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_____

_____

Source #2: WHY STEM EDUCATION MATTERS

http://www.nms.org/Portals/0/Docs/Why%20Stem%20Education%20Matters.pdf

Science, technology, engineering and math (STEM) are where the jobs are.

STEM job creation over the next 10 years will outpace non-STEM jobs significantly, growing 17 percent, as compared to 9.8 percent for non-stem positions. Jobs in computer systems design and related services – a field dependent on high-level math and problem-solving skills – are projected to grow 45 percent between 2008 and 2018. The occupations with the fastest growth in the coming years – such as biomedical engineers, network systems and data communications analysts, and medical scientists – all call for degrees in STEM fields.2

STEM workers can expect higher salaries.

College graduates overall make 84 percent more over a lifetime than those with only high school diplomas. But further analysis of 171 majors shows that STEM majors can earn higher wages. For example, petroleum-engineering majors make about $120,000 a year, compared with $29,000 annually for counseling psychology majors.

Math and computer science majors earn $98,000 in salary, while early childhood education majors get paid about $36,000. According to the Commerce Department, people in STEM fields can expect to earn 26 percent more money on average and be less likely to experience job loss. The STEM degree holders also tend to enjoy higher earnings overall, regardless of whether they work in STEM or non-STEM occupations.

And yet the United States is failing to produce enough skilled STEM workers.
Sixty percent of the new jobs that will open in the 21st century will require skills possessed by only 20 percent of the current workforce. The U.S. may be short as many as three million high-skills workers by 2018. Two-thirds of those jobs will require at least some post-secondary education. American universities, however, only award about a third of the bachelor's degrees in science and engineering as Asian universities. Worldwide, the United States ranks 17th in the number of science degrees it awards.

The United States is fast losing its competitive edge.

The competitive edge of the US economy has eroded sharply over the last decade, according to a new study by a non-partisan research group. The report found that the U.S. ranked sixth among 40 countries and regions, based on 16 indicators of innovation and competitiveness. They included venture capital investment, scientific research, spending on research, and educational achievement.7 The prestigious World Economic Forum ranks the U.S. as No. 48 in quality of math and science education.

American students aren't keeping up with students in other countries in math and science.

International results released in 2010 showed once again that U.S. students rank well below many foreign competitors in the crucial areas of math and science. The rankings from the Organization of Economic Cooperation and Development (OECD) showed American students scored 17th in science achievement and 25th in math ability out of 65 countries. According to the 2009 National Assessment of Education Progress (NAEP), the "Nation's Report Card," only one percent of U.S. fourth grade and 12th grade students and two percent of eighth grade students scored in the highest level of proficiency in science. In fact, the NAEP science results showed students' performance worsened the longer they were in school, with 72 percent of the fourth graders, 63 percent of the eight graders, and just 60 percent of the 12th graders scoring at or above the "basic" level. In an analysis comparing the NAEP math scores of "advanced" 8th graders with their counterparts overseas, the only countries that the U.S. ranked ahead of were Portugal, Greece, Turkey and Mexico.9

The decline in STEM knowledge capital is reducing the basic scientific research that leads to growth.

The U.S. is no longer the "Colossus of Science," dominating the research landscape in the production of scientific papers, that it was 30 years ago. In 1981, U.S. scientists fielded nearly 40 percent of research papers in the most influential journals. By 2009, that figure had shrunk to 29 percent. During the same period, European nations increased their share of research papers from 33 percent to

36 percent, while research contributed by nations in the Asia-Pacific region increased from 13 percent to 31 percent. China is now the second-largest producer of scientific papers, after the U.S. with nearly 11 percent of the world's total.

American STEM shortcomings mean crucial research and development that pushes the frontiers of innovation is waning.

According to the United Nations Educational, Scientific and Cultural Organization (UNESCO), almost 83 percent of research and development was carried out in developed countries in 2002, but dropped to 76 percent by 2007. China was leading the pack of emerging nations with 1.4 million researchers. By 2009, for the first time, over half of U.S. patents were awarded to non-U.S. companies.

Other nations are racing to establish dominance in math and science.

Russia is building an "innovation city" outside of Moscow. Saudi Arabia has a new university for science and engineering with a $10 billion endowment. China is creating new technology universities by the dozens and has replaced the U.S. as the world's top high technology exporter. Singapore has invested more than a billion dollars to make that country a medical science hub and attract the world's best talent. These nations and many others have rightly concluded that the way to win in the world economy is by doing a better job of educating and innovating.12

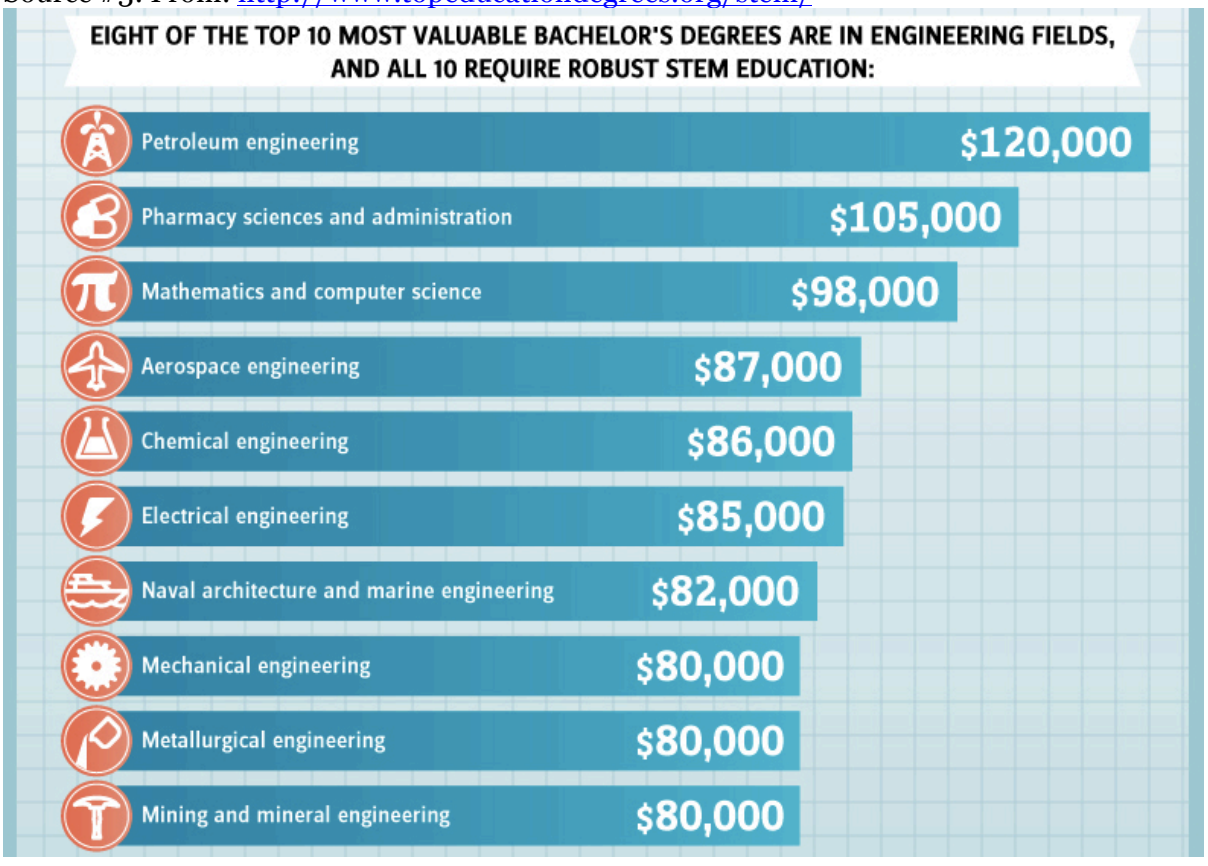
The STEM gap is costing Americans jobs and money.

U.S. students fall behind 31 countries in math proficiency, according to a 2011 Harvard study that concluded the U.S. could increase GDP growth per capita by enhancing its students' math skills. Over an 80-year period, economic gains from increasing the percentage of math proficient students to Canadian or Korean levels would increase the annual U.S. growth rate by 0.9 percentage points and 1.3 percentage points, respectively. That increase could yield $75 trillion.13

It's time for the U.S. get back in the game in education.

25 years ago, the U.S. led the world in high school and college graduation rates. Today, the U.S. has dropped to 20th and 16th.14 We can do better. The good news is that APTIP schools already are.

Source #3: From: http://www.topeducationdegrees.org/stem/



WHY STEM MATTERS

ABOUT 3 MILLION JOBS ARE UNFILLED BECAUSE AMERICANS LACK THE BASIC TECHNICAL SKILLS TO FILL THEM. With many positions in science, technology, engineering and mathematics being filled by people born outside the country, the United States is stepping up its efforts and making STEM education a top priority.

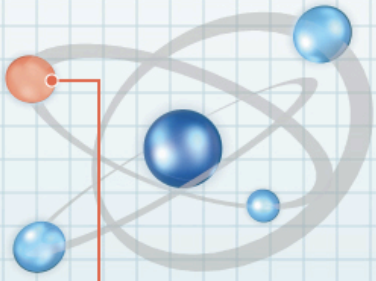
It Starts in School

Effective education in STEM fields is vital to ensuring the American workforce will remain competitive with others around the world. So how bad are things now?

ONLY

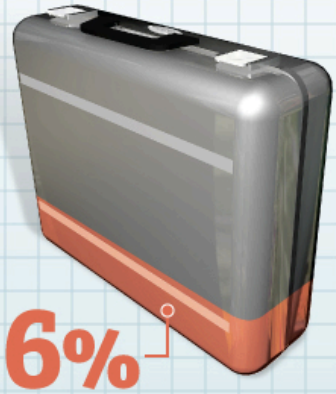
1 IN 2

U.S. high schools that offer calculus



37%

American high schools that don't offer physics

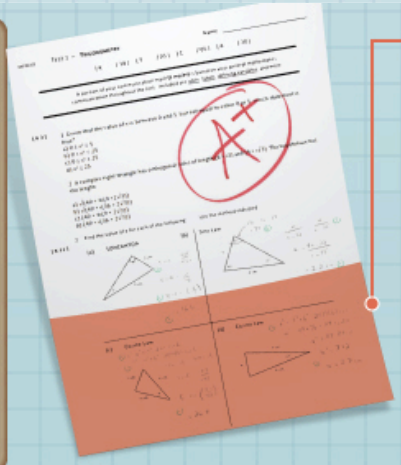


16%

Percentage of high school seniors proficient in math and interested in a STEM career

29%

Public school math teaching vacancies that were difficult to fill or left unfilled



34%

Percentage of U.S. eighth-graders rated proficient or higher in a national math assessment in 2009

27TH

Where the U.S. ranks among developed nations in undergraduate degrees in science or engineering

EIGHTH-GRADERS WHO HAD TEACHERS MAJORING IN THE FIELD THEY TEACH:

Math **31%**

Science **48%**

1 IN 3

Americans who said they'd rather clean a bathroom than solve a math problem

The Plan to Get Ahead

The Educate to Innovate initiative, launched in 2009, aims to move American students from the middle of the pack to the top of the pack in math and science over the next decade. It has garnered $700 million in public-private partnerships.

THE PLAN INCLUDES INCREASING EFFECTIVENESS OF INVESTMENT IN:

- K-12 instruction
- Undergraduate education
- Graduate fellowships
- Educational activities that take place outside the classroom

Why STEM Matters

Degrees in STEM fields can help graduates land jobs – jobs that pay better than average.

60% Employers having difficulty finding qualified employees

+11% Difference in STEM wages vs. same-degree counterparts in other jobs

47% Bachelor's degree-holders in STEM fields who earn more than PhDs in non-STEM occupations

48% Computers and math

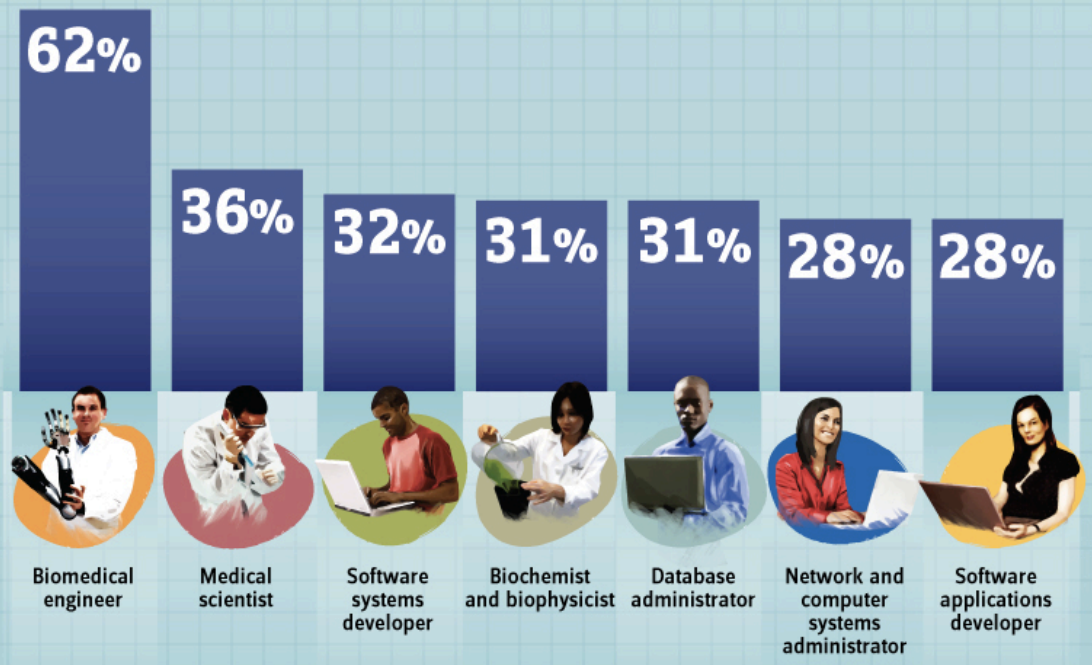
30% Engineering

13% Physical and life sciences

9% Management

WHERE THEY'RE GOING:

HIGHEST PROJECTED GROWTH THROUGH 2020 IN STEM JOBS



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Argumentative Essay Organizer

Directions: As you are reading the articles, take note of claims and counterclaims from the sources provided. Be sure to note the source for any information you use.

STEM	
Claim/Counterclaim	**Evidence**

Continue on the back for Humanities!

Humanities	
Claim/Counterclaim	**Evidence**

Name: _____ **Date:** _____

Chemistry *~ Ms. Hart* **Class:** Anions or Cations

THE URBAN ASSEMBLY SCHOOL FOR CRIMINAL JUSTICE

Argumentative Essay #5

PROMPT:

A STEM (Science Technology Engineering Mathematics) education is one that focuses higher-level education in the U.S. on the influence of the sciences. In a constantly and rapidly changing and increasingly more competitive economy, many critics argue that we need to shift our high school and college curriculums to focus more predominantly on the sciences, versus the humanities. Many students are majoring in subjects such as English, Philosophy, and History, only to be left with limited job opportunities after graduation.

Should high schools focus on humanities or STEM education? Is a curriculum focused on the sciences of more value in our evolving economy, or is a focus on the humanities in high school still necessary to balance our society?

New York City Performance Assessment Common Rubric							
Grades 9-10 ELA	**Level 4 Exceeding the Standards**	**3.5**	**Level 3 Meeting the Standards**	**2.5**	**Level 2 Approaching the Standards**	**1.5**	**Level 1 Attempting the Standards**
Trait 1: Focus: Position (CCLSW.1)	Establishes a precise and credible position, **grounded in evidence and reasoning**.		Establishes a **precise and credible position that responds appropriately to the prompt.**		**States** a position **but does not completely address the prompt**.		**Position is unclear**. **Credible position that responds appropriately to the prompt.**
Trait 2: *Elaboration* (CCLS W.1)	Provides **detailed** explanations of **the most important** claim(s), reasons and evidence that support and develop the position.		Position is **explained** with claim(s), reasons and evidence.		Position is **minimally developed** with **little explanation** of claim(s), reasons and evidence.		Position is **unsupported** with little or no use of claim(s), reasons, or evidence.
Trait 3: *Textual Analysis* (CCLSR.1)	**Analyzes** both explicit and inferred ideas/ information. Interpretation of the author's meaning and purpose; **Consistently refers to sources** when appropriate		**Analyzes** explicit ideas/information from texts and interprets the author's meaning and purpose; Refers to sources **when appropriate.**		**Summarizes** explicit ideas/information from texts; Refers to sources **rarely**.		**Restates** explicit ideas/information from texts; **Does not refer** to or cite sources**.**
Trait 4: *Counterclaims* (CCLSW.1)	**Develops a counterclaim or alternate claim fairly** with relevant evidence; Explains why counterclaim is less convincing than the claim		**Discusses** counterclaim and or alternate claim **and/or** evidence		**Makes note of a specific** counterclaim, alternate claim or counter evidence		**Demonstrates awareness** of a counterclaim, alternate claim or counter-evidence
Trait 5: Reading (CCLS R.1)	Represents content from reading materials accurately; When appropriate, **… note of gaps in information…**		Represents content from reading materials **accurately.**		Content from reading materials is incomplete.		Content from reading materials is incomplete or misinterpreted.
Trait 7: *Convections* (CCLSW.1)	Uses **precise** language and tone **consistently** appropriate to the purpose; Demonstrates a command of standard English conventions with occasional minor errors		Uses language and tone **appropriate** to the audience and purpose; Demonstrates a command of standard English conventions with **occasional minor** errors		Uses language tone **generally appropriate** to the audience and purpose with minor lapse; Includes a number of minor errors that do not interfere with the audience understanding		Uses **basic** language and **uneven tone** with some **improper usage of words and phrases;** Includes **numerous major** errors that interfere with audience understanding

Grade: _____/24 *Comments:*