Why Mathematics?
Compiled by Kelly MacArthur
(Collected from faculty and graduate students in the University of Utah Mathematics Department)

Here are some answers to the age-old questions: "Why do I have to take a mathematics class? When will I ever use this mathematics?"

- Many students understand the merit of cross-training at a gymnasium. They willingly endure the tedium of repetitive exercises, for isolated muscle groups, in order to improve overall fitness. With the exception of rare Olympians, nobody lifts weights to get better at lifting weights. People lift weights to prepare for the strain of lifting groceries, infants or shovels of snow. Most people will not use calculus every day but learning calculus contributes to overall mental agility. A proper education should provide intellectual cross-training.
For students of quantitative disciplines, the necessity of mathematical training is self-evident. For students of other disciplines, mathematics provides mental exercise in logic, analytic thinking and above all abstraction. Perhaps the greatest distinction between humans and other animals is an advanced ability to reduce the complexity of difficult problems by introducing symbols to encapsulate relationships between relevant quantities. This potent ability is honed by the study of mathematics. The power of abstraction facilitates mundane tasks, like recognizing computer icons, and critical tasks, like diagnosing patients by recognizing combinations of diverse symptoms. Failure to actively develop an ability for abstraction is a rejection of our evolutionary birth-right.

- A quality of taking a math class is that successful students typically figure out that methodical, well-organized approaches to problem solving are much more effective than random, haphazard attempts. This is a skill that translates well in anyone's life.

- Mathematics is the language of logic. Being able to communicate a logical argument does depend on some math fundamentals. Taking a math class is important in developing the skills to effectively communicate. For instance, these skills would be absolutely necessary for a lawyer.

- Math is essential for everyday tasks, such as (a) managing your credit card debts/mortgage, (b) buying groceries, (c) playing games like blackjack or poker, (d) computing the mileage one can travel by car (given the amount of cash in your wallet), and (e) splitting up a restaurant check with friends.

- Taking a math class is simply part of a well-rounded education, like taking a foreign language or art class.

- Mathematics courses force students to develop their quantitative thinking in the purest way possible.

- Mathematics is the science of problem solving. Our society is becoming ever more technical and complicated, and to be successful in almost any edeavor, you need to be able to solve problems.

- Mathematics exercises the brain, making students stronger thinkers in general. Math courses present a series of puzzles to solve, basically, with the purpose of strengthening analytical thinking skills.

- Students possessing the math skills found in our QA courses will be promoted more quickly in most jobs, and avoid being prey for financial scams. They'll also have the skills to make informed decisions as voters on significant issues. Navigating the 21st century without these basic math skills is like navigating the 20th century while being illiterate.

- The value of an undergraduate math requirement is not that they learn to solve a particular type of problem. It is that they learn to become problem solvers. Any math class is centered around a certain class of problems, of course, but to properly succeed in any particular math class, the student must come to recognize at least shadows of the principles that underly the problem and its solution.
Few 1090 students will factor a polynomial after they graduate, but the process of becoming competent in 1090 trains their brains at least a little bit. When presented with a real problem of any sort (be it personal financial planning, organizing a group of people, developing a life plan, or even just trying to plan an efficient path for driving from point A to point B), they can draw on that training to weed through the distractions, get to the guts of the problem, and have the confidence and drive to spend some time thinking creatively about the problem rather than just giving up on it. Polynomials are useless to most people, but the world could use a lot more problem solvers.

- From a mathematics graduate student: "On my first co-op job, I got hired to work at a bank helping the company implement/transition over to some new software that is used to evaluate stocks, bonds, etc. I asked my boss why he hired mathematicians for the job when there wasn't any "math" involved, 'Wouldn't it be better to hire someone with a strong business/finance background instead of someone from math who doesn't know much about business?' I asked. He told me that he hires math students because of how they're trained to think, not what they know about the business world. Math students are trained how to take apart a big problem, troubleshoot those pieces, and then troubleshoot putting the pieces back together again. He said that those from the 'softer sciences' aren't trained to think that way, so students from those backgrounds don't interest him as much."

- I try to point out that there is a lot of misunderstanding regarding what math is, and how it relates to other subjects. I've come to the conclusion that math is the study of relationships. Physics studies relationships of matter, energy, through gravitational and electromagnetic forces, and it studies them with geometry among other tools! Chemistry, Biology, Economics, and Social Sciences study chemical-atomic-elemental relationships; biological-life relationships; market, monetary and financial relationships; and social relationships. One reason math is so useful in all of these is that it studies and has developed a deep understanding of the aspects common to relationships themselves, independent of the particular setting.

For further questions or suggestions, contact Kelly MacArthur, advisor@math.utah.edu.