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WHY STUDY MATH?

As an instructor of students in the area of mathematics, I am sometimes asked such questions as, "When am I ever going to use this?" or "Why do I have to study math?" I usually take the time to go over the list of reasons why studying mathematics is important. Since mathematics is a required subject for almost every course of study, it is important that students understand its importance to their own education.

We live in a world which primarily operates on math. Developing good mathematical skills opens doors to productive futures. A lack of mathematical skills closes doors. I owe it to my students to prepare them well for life in the mathematical world in which they will live.

It is estimated that someone entering the workforce today may have between 12 and 15 jobs over the course of his/her lifetime. The ability to learn quickly and to recall information accurately are necessary skills to develop as people change jobs throughout their lives. Learning math improves those skills.

I use math problems in a classroom setting to determine how well developed those skills are and to give students opportunities to practice them. We learn how and where to apply certain math formulas, and test on the material to determine if the students have learned and whether they can now recall it accurately. It is a very efficient way for me, the instructor, to determine if the student needs some help.

Employers are looking for three basic traits. They want their employees to be able to reason, work with technical equipment, and communicate well with other employees. Learning math helps to develop reasoning skills and proficiency in working with technical equipment. Using math can improve the ability to speak and write more clearly. Written communication, at least the type needed for work, tends to be extremely structured; and mathematical ability helps deal with that structure. Developing abstract reasoning skills that algebra teaches improves a student's ability to write a coherent essay; essays require the writer to alternate back and forth between abstract concepts and supporting facts. Again, math class is a good place to learn and develop reasoning and clear communication skills.

I often ask students why an employer would pay someone a good salary and allow that person to operate an expensive piece of equipment without the reasoning and technical skills to do it expertly. Students must demonstrate that they have the capacity to reason well and the potential to learn to operate expensive technical equipment. The best and most efficient way that I have of checking that they can do this is to have them work through math problems.

The ability to read, write, and compute well is required in many disciplines, including mathematics. Imprecision in reading leads to misunderstanding and writing errors. People are often required to communicate their work to others. Reading and writing mathematically and making convincing mathematical arguments develop communication skills.

Mathematics requires an orientation to noticing details. What might happen if a nurse misreads a label as 50 mg rather than 500 mg, or copies down the wrong emergency contact number for a family member? What might happen if someone working in a law office gives a client the wrong court date, or working in a distribution center sends out the wrong part number?

Studying math improves problem-solving skills. Successful problem-solvers are able to understand how to find solutions to the problems they face. They can gather all of the details surrounding the problem at hand, decide what is superfluous, and carry out the most important strategy or strategies to solve the problem. Once an actual solution is proposed, it must be tested to determine whether or not it is reasonable and accurate. This requires attention to detail and patience. A very small segment of the workforce will be called upon to actually *do* mathematics, but most will be called on to reason mathematically. Jobs and job classifications that require higher mathematics, language, and reasoning abilities are growing at increasingly faster rates than those that do not.

Learning math develops stick-to-it-ness, defined as

dogged perseverance or resolute tenacity, and develops perseverance, resilience, persistence, and patience. Students have opportunities to develop their work ethic in my math class by not making excuses, not blaming others, and not giving up easily.

Students can use math learning to develop their "lifelong learning" skills: asking others for help, looking up information, learning to focus deeply on tasks, being organized, and checking over work. Mathematics helps students become mature thinkers as it furthers their decision-making skills, trains them to think deeply, and helps them identify sound and concrete solutions. As students think their way through math problems, they build new and stronger brain circuitry that translates into meeting challenges more effectively. Students will tell me at the end of a class that their heads hurt. I tell them that this shows that they are exercising their brains and growing the connections between the brain cells. Math is a workout for the human brain!

Modeling is the process by which students first determine whether a problem can be solved using mathematics. Real problems almost never involve only one branch of mathematics. They are not math problems that come at the end of a chapter in an algebra textbook so that students know they are to use the method they just learned. In the real world, problems are not labeled as algebraic, geometric, or statistical. Learning different topics in mathematics will help students become better problem solvers. In my class, students learn math primarily by doing word problems that demonstrate and allow them to practice their abstract and analytical thinking skills. If students cannot distinguish between good and faulty reasoning, then they are vulnerable to manipulation and to making poor decisions. Statistics provides tools that students need in order to react intelligently to information they hear or read. Learning to calculate odds, chances, and probability helps students develop reasoning skills.

Students in my math class get better at learning complicated concepts. As a result, they are less afraid of complex ideas and classes. They develop pride and confidence in their ability to understand complicated concepts. They find new and easier ways to solve problems. Science, technology, engineering, and math education skills enable workers to be more productive and innovative.

Reading and following directions are important skills. If the student is struggling with word problems, or does not answer the specific question asked, we will work on some strategies to strengthen these skills and apply them to other areas.

I tell students that I only use about five percent of the material that I teach. However, I do use 100 percent of what I learned in math class on a daily basis—problem solving, attention to detail, logical thinking, abstract reasoning, critical thinking, good communication, ability to learn quickly and recall accurately, ability to follow directions, stick-to-it-ness, reasoning, and better decision-making skills, to name a few. Math is the most efficient way that I have of finding out to what extent a student possesses these skills and helping improve these skills in a safe and friendly environment.

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