Xuan Ha Nghiem

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Why Study Geometry?

 There is no point to math! As far as evidence from surviving records has shown, the ancient Egyptians did not have to go far beyond elementary to middle school algebra or geometry to build their perfectly symmetrical pyramids. In fact, as was stated in the “Mathematics for the Nonmathematician” by Morris Kline, it was not with impressive math skills but with “…care and patience…” (page 13) that they were able to build such impressive structures. After all, “A cabinetmaker need not be a mathematician“(page 13).

 The ancient Babylonians also had not made significant contributions to the study of mathematics. Evidence from the 400 clay tablets, which were identified to be “purely math,” has revealed that they too had only the basic mathematical skills that we can obtain from elementary or middle school. Some of these include the knowledge of rational numbers, irrational numbers, and the general rules for measuring areas and volumes. Yet, their civilization had advanced to relatively high levels in art, architecture, chemistry, astronomy and much more.

 Similarly, it is a fact that a person need not learn how to solve the cubic equation or how to find the derivative of a function to be successful in life. An artist does not need to solve an impressive math problem to create a masterpiece. So, there seems to be no point to math and if there is no point to math then there certainly is no point to studying geometry.

 Throughout history, the importance of mathematics to human existence has been constantly challenged. On one side it is seen as a waste of time. In a letter to Fermat, the distinguished mathematician Blaise Pascal admitted, “To speak freely of mathematics, I find it the highest exercise of the spirit; but at the same time I know that it is so useless that I make little distinction between a man who is only a mathematician and a common artisan” (Kline page 1). Another person who did not see its importance either asked Euclid, “What shall I get by learning these things?”

 What can any of us derive from the study of mathematics, particularly from geometry? Three main defenses for it are based on the beauty, logical thinking, and the “truths” in mathematics. Mathematics has been said to be an art that offers intellectual challenges. It is because of these challenges that many are engrossed into further study. Yet, the beauty of it alone is not sufficient enough to make it a worthy study.

 What is more significant, however, is the logical thinking and truths that can be developed from it. Mathematics is primarily centered on reasoning in order to derive knowledge or truths about the natural world. Since ancient times, what men did not know most often was what men feared. Thunder, lightning and storms for example were seen as punishments by the gods on people who had sinned (Kline page 6). But, with observations from the curious minds came logical connections and conclusions to help ease mankind’s fear from the wrath of god. Overtime, these observations turned into truths, which can be seen through abstract concepts and formulas in mathematics.

 Compared to other branches of study, the knowledge gained through mathematical concepts and formulas has been said to be the closest to absolute truth that we can ever obtain. Although the equations or symbols we are taught in school may seem pointless to many students, these are actually abstract concepts taken many times from the study of the natural world. Perhaps the clearest examples of these can be seen through experimentation conducted in physics. When taught with just the formulas, it is questionable whether the concepts are actually true or not and sometimes it contradicts what we thought of as truth. When experimentation is done alongside the formulas, however, most often we can see with only minor errors that the mathematical concepts and formulas are an accurate representation or depiction of what we can observe in the natural world. Therefore they can be taken as truths.

 Whenever man has questions about the natural world also, he most often turns to mathematical laws to conclude his understanding. Rene Descartes for example had doubts about the knowledge being taught to him. He wanted to find methods in which men can arrive at truths and his search led him to mathematics. Another example is Johann Balmer who wanted to find the pattern that kept reappearing in the atomic spectra of the gaseous atom hydrogen. He plotted one over wavelength and one over an integer squared (greater than 2) to find the mathematical equation that would point to the relationship. He found his answer through mathematics. One more example happened from 1550 to 1800. During this time period, many problems were raised by the development of weapons, navigation and industry. These issues gave rise to new improvements in mathematics, which helped to resolve many of the issues. Logarithms, for example, were created to “…facilitate the calculations of astronomers” (Kline page 72). So, whenever questions arise, mathematics frequently seems to step in to resolve or meet the needs of mankind.

 The ancient Egyptians and Babylonians also, although their mathematics was basic compared to the extended knowledge we have today, used mathematical concepts for many purposes. The Egyptians for example, used arithmetic and algebra in commerce and state administration. They also used geometrical rules to calculate areas of fields, estimate yield of pieces of land, volumes of structures, and quantity of bricks or stones used to build temples and pyramids (Kline page 12-13). The Babylonians used geometry in their construction of temples and irrigation projects. Mathematics also played a part in astronomy in both Egypt and Babylonia.

 Overall, mathematics has had a significant influence on other studies such as art, philosophy, engineering, and religion and many fields have branched out from it. If the beauty, logical thinking, and truths behind mathematics are not enough to convince a person to study mathematics, perhaps an acknowledgement in its influence in other fields will. Chemistry for example, not only uses algebra but geometric formulas and concepts of volume, angles, and shapes to calculate density, the radius of atoms, and the concentration of a sample. The logical reasoning through construction of proofs can also be applied to philosophy. Finally, in art the Euclidean geometry can be used to help artists paint more accurately or realistically as they have perceived it (Kline page 21).

 Without mathematics, many methods derived from it in other studies would be useless. Then, what truths will we have left? From one overwhelming semester of chemistry, physics and mathematics, where almost all of the lectures have been about math, it is clear that mathematics is a tiring field that is not concentrated in just one area of study, but an overwhelming majority. Whether it is geometry, algebra, or any other type of math, these concepts are scattered everywhere.

 Yet, despite this fact many of us still see it as a useless study because there seem to be little connections between concepts like derivatives to our daily lives. Perhaps the most common question that can be heard in many math classes is, “What would I use this for?” This a similar question to the one raised to Euclid, “What shall I get by learning these things?”

 To this question Euclid himself would answer, “Give this men three obols, since he must profit from what he learns.” This answer reveals that mathematics is mostly concerned with knowledge through logical reasoning and proofs. It does not have a clear connection to our daily want in life but that should not render the subject useless. As the fifth century philosopher and mathematician Proclus had commented, mathematics should be “…considered desirable in itself…” Its purpose is not based on daily need but on the intellectual study of the natural world. From this study we use the knowledge gained to not only understand the patterns in nature but to predict or manipulate some aspects of it to our advantage in order to advance in technology and other applications.

 Mathematics is an abstract study full of formulas and concepts that must be decipher to reveal the truth about the natural world, but perhaps sometimes it is too abstract and that is what causes many to question its usefulness. For example, besides the general definition of a derivative and the rules for it, what is it used for? Also, the geometry and algebra we have done in school where we are told basically what to do, it is often not clear why the concept is what it is. Yet, it works!

 Overall, mathematics is an important study that helps mankind to see truths in the natural world. It is one of the most influential and oldest fields that have branched out to other studies. Geometry particularly has been applied to physics, chemistry, and even philosophy where it helps to build up abstract concepts and spatial reasoning.

 If mathematics is a useful study, then geometry must be as well. As far as evidence from surviving records has shown, the ancient Egyptians went far with their just elementary to middle school algebra or geometry to build their perfectly symmetrical pyramids. The ancient Babylonians who also made use with the mathematics they had were able to construct temples and engineer irrigation projects, which today would require extensive knowledge of mathematics. Both civilizations had advanced relatively to high levels in art, architecture, chemistry, and astronomy. But, one thing to point out is the close connection between mathematics and these studies. A cabinetmaker need not be a mathematician, but a chemist, astronomer, engineer, and sometimes artist does.

 So, is mathematics really at all pointless? If not, then why do we study it? The answer placed here is that we study mathematics in order to gain a better understanding of the natural world and we study geometry for the very same reason as well.