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Why Study Geometry?

Geometry by definition is the branch of mathematics that deduces information about points, lines, planes, shapes, angles, and figures by their characteristics based on a given assumptions. But why do we study this arbitrary subject? People with backgrounds in art find architecture aesthetically pleasing, and clearly architecture is heavily dependent on the knowledge of geometry. Many students see geometry as a required mathematics class to graduate high school. Others see it a necessary skill for test taking and ultimately admission into higher levels of learning. Euclid, finally, would argue that learning geometry in itself is worthy of pursuit. Although I do agree with Euclid’s views, I think that we study geometry for the purpose of obtaining logical reasoning skills, exact answers, and truth.

Geometry gives people with mathematical minds “exact” knowledge, which essentially means truth. Mathematicians like knowing that there is exactly one correct answer to a problem. In a world of uncertainties, which we live in today, geometry provides these people with exact minds exact answers. Because all geometric proofs give step-by-step instructions then, if you believe the initial assumptions you can find or follow the steps for the exact answer. Pascal addresses this idea in his quote when he says, “Mathematicians have exact minds, provided all things are explained to them by means of definitions and axioms.” By axioms and definitions, Pascal is referring to, in Euclidean terms, the postulates, common notions, definitions, and any previously proven propositions that were assumed going into the problem. If given these axioms and definitions, which have already been proven correct and true, then all mathematicians with exact minds will have clear understanding of problems.

They also will be able to use this geometric style of learning to help them solve real world problems. Colleges use geometry on the SAT’s in order to test the logic and reasoning skills of their applicants because they figure that if they can solve these problems then they can solve real world problems. Solving a proof takes logical and critical thinking. Every step must be clear, correct, and concise which requires time and effort. Any proposed real world problem would also require such methods of thinking in order to find the most advantageous solution. The steps of a proof in geometry provide practice and application of logical reasoning, an essential skill for problem solving. Some people may say that learning the style of a geometric proof would be too special or restricted in terms of training for logical thinking but I would disagree. In a geometric proof you critically think of every step and it all comes from your own brain, you do not extract information from any outside sources. So I, simply, don’t know how it could not be considered good training in logical thinking. I do, however, think that algebra also uses the same logic as geometry but the only thing is that algebra deals strictly with numbers, which limits its potential as a real world application. With algebra you need to learn various tables and equations but most of the steps can be done on calculators nowadays, while geometry requires thought for every step.

Euclid would argue in favor of studying geometry from a practical standpoint. Like the quote from Stobaeus, Euclid would say that acquiring knowledge about anything is worthy of pursuit for the sake of itself. He clearly states this when he says, “Give this man three obols, since he must profit from what he learns.” The key part of this quote is the word must and by reading it you can tell Euclid’s annoyed tone. Euclid sounds embarrassed for the man that he is not intelligent enough to see the importance of gaining the knowledge and problem solving skills acquired by geometry. Essentially, Euclid sees the man as quite ignorant. Euclid is making fun of the man by giving him three pennies because the man does not think that simply acquiring knowledge is important. Euclid would answer the question “why study geometry” in the exact opposite manner than this man because learning and acquiring knowledge is intriguing to Euclid. But I can understand why a man would think in this way. It remains difficult to see how understanding geometry has immediate benefits on your life. I would argue that in fact it does not have immediate benefits but through repetition and practice of geometric proofs one would eventually harness the skills of logical reasoning and be better off in the future, in terms of intellect and problem solving skills.

Philosophy has also argued in favor of the knowledge of geometry for a long time. Rene Descartes, a French philosopher and mathematician, from the 17th century paralleled geometry to philosophy in order to say that he could believe something to be true. Descartes had three ways of saying that he could doubt something to be true. The first was that one’s perception is unreliable, which means that your senses can deceive you. Everybody knows about illusions, and the rubber pencil trick and Descartes addressed these but he also went further with this doubt to say that even when reading something that is far away you must doubt what you read because maybe, when you get closer, it could say something else. The second form of doubting, according to Descartes, was that one could be dreaming. Descartes stated that he could doubt certain situations simply by saying he was dreaming. He figured this because, while sitting in front of his fire at home, he remembered having dreamt the same exact situation in the past. With these first two forms, Descartes said he was able to doubt everything thing except for shape, form, texture, and time. We know that geometry plays a major role in shape and form, so Descartes said that by using geometry in terms of shape and form he could still prove some things to be true given these two forms of doubt.

Plato’s philosophical ideas also view geometry and form as important things to understand. Plato believes that there is a world above us that has the true form of every object, and that where we are is simply made up of various kinds of the original forms. According to Plato, the goal of life is to aspire to the perfect geometric forms above us.

We study geometry, for the most part, in order to obtain the logical reasoning skills that come with mastering the subject. It is necessary to study geometry to gain entrance to elite universities of education of our country because we are tested on it in the SAT’s. The SAT’s and other real world problems require the logical reasoning skills that can be learned through the step-by-step answer to a geometric proof. Geometric proofs with their axioms and definitions provide people with mathematical minds exact answers to problems. Knowing that there are concrete answers to a problem satisfies all of these mathematical minds. Concrete answers to problems provide philosophers mathematicians like Descartes truths in a world of multiple doubts. Euclid agrees with the philosophical view of Descartes, because he sees acquiring knowledge as a pursuit worth in itself.