Sample Essay

Math and Philosophy

What good is math, some of us used to complain when the teacher said to take out our text? In the following essay, written for a first-year university course in English, Colin Klein provides an answer. The prompt to read this information appears on p. 139 of *Acting on Words*.

Math and Philosophy

Colin Klein

The purpose of mathematics is to describe how the universe and everything therein exists. This description can be as simple as an accounting of the number of apples an individual possesses or as complex as the wave-particle nature of subatomic particles. The concepts used in math can vary from the highly straightforward to the very abstract. Regardless of the complexity or level of abstraction involved, all mathematical concepts are in some way philosophical in nature and can be debated as such.

Two of the more abstract and debatable concepts are infinity and n-dimensional vectors. Some may regard infinity as a number, but that is incorrect. Infinity is itself a concept of what value a function or variable would obtain if it continued to grow forever. However, there is no limit to how large numbers can be so infinity can never be reached. Philosophy becomes involved here when considering whether or not the infinite can exist if its value can never be reached as Russell states:

> It cannot be said to be certain that there are in fact any infinite collections in the world. The assumption that there are is what we call the "axiom of infinity" … [T]here is certainly no logical reason against infinite collections, and we are therefore justified, in logic, in investigating the hypothesis that there are such collections (77).

Another issue when thinking about infinity is that one reaches a paradox if he/she considers, for example, an object with infinite mass. This object would have a mass of infinitely many kilograms and infinitely many pounds, but a kilogram is greater than a pound implying that there would be a greater number of pounds. However, since both numbers are infinite it is not possible for one number to be greater than another. Careful mathematical and philosophical consideration would be necessary to solve this problem.

A vector is best described as a line that connects two points in space. Every vector has a magnitude and direction. Vectors are commonly denoted as a set of numbers in brackets, indicating the magnitude of the vector's components along a particular reference axis. For example the vector (2, 3) indicates that it moves 2 units along the x (horizontal) axis and 3 units along the y (vertical) axis. Vectors are most commonly considered having two or three components corresponding to two dimensional or three dimensional spaces. The philosophical issues arise when one considers vectors with more than three dimensions, as it is mathematically possible for a vector to have four, five or even an infinite number of dimensions. This shows how math can often involve the age old philosophical question of whether or not something that cannot be perceived can exist.

Finally, even the most basic concepts of mathematics are not free from philosophical consideration: the most basic concept of math being numbers. When one considers the question "What is a number?" the answer may seem obvious, but deeper reflection may lead one to realize that it is not. On this topic Russell states the following:

> Number is what is characteristic of numbers, as man is what is characteristic of men. A plurality is not an instance of number, but of some particular number. A trio of men, for example, is an instance of the number 3, and the number 3 is an instance of number; but the trio is not an instance of number" (11).

Whether or not one agrees with this statement, it shows that even the most basic concepts of math must be considered carefully in order to be completely understood.

Regardless of the complexity or level of abstraction involved, all mathematical concepts are in some way philosophical in nature and can be debated as such. Philosophy is most needed when one considers if a proposition that cannot be proven mathematically but is apparently true, is actually so. Such propositions are called axioms. The "axiom of infinity," mentioned previously, states that an infinite number does actually exist. Axioms form the basis of many concepts in mathematics, and if they could not be accepted as true nothing in math could. This concept shows how important to mathematics philosophy can be.

Works Cited:

Russell, Bertrand. Introduction to Mathematical Philosophy. London: George Allen and Unwin, 1920.

For Further Thinking

1. Has this essay provided you with new excitement or understanding? Explain.

2. Has this essay in any way raised questions that you would have liked explained further? Give a specific example, and suggest a method of explanation that you would find helpful in your efforts to follow a discussion on this sort of abstract, technical topic.

3. Does the author provide an overview or overviews of structure to follow? Identify where preview statements occur, and comment on the success of their organization.

4. How does the author's work cited enhance and/or possibly restrict ethos? Does the one source seem sufficient? Why or why not?

5. Does this essay contain an implicit persuasive appeal? Explain.

Practice

Drawing on your answers to some of the above questions, describe Klein's "connections," that is, his relationship to his topic, readers, and research, as discussed in the comments that follow the first two sample essays in Chapter 9. Describe his controlling idea. Despite the third-person style, does an emotional position on the topic (pathos) come through? Write an outline for this essay, one with directions to the writer, in the style of those that follow the first two essays in this chapter.