

On “Mathematics and genius” and “Math will rock your world,”

This essay aims to appreciate and describe the beauty, utility, and essence of mathematics. From my point of view, appreciating the beauty of mathematics goes beyond understanding of formulas ; it involves recognizing its ability to reflect human endeavor and unveil overlooked culture of humanity over millennia, providing us with a profound sense of awe and wonder.

The beauty of mathematics lies in its representation of collective wisdom of humanity, rather than that of geniuses. Mathematics exhibits a cumulative nature, as each generation builds upon the achievements of predecessors. Take Archimedes, the great genius, for example. He was unable to invent analytic geometry due to the lack of algebraic knowledge required for such a groundbreaking discovery during his time (Nathan, 1958). As Newton said, he was "standing on the shoulders of giants," Genius does not create new mathematical knowledge completely from 'zero'. The accomplishments of genius are dependent on the foundations laid by previous generations that are beyond any individual's control (Nathan, 1958). Nowadays, mathematical applications and inventions have become increasingly detached from individual control. More researchers from tech powerhouses are forming groups to build mathematical models (Baker, 2006). For example, researchers from Amazon have developed a model for estimating desired products, while researchers from IBM have developed a model for optimizing the supply chain (Baker, 2006). Utilization of mathematics can not only increase our productivity to create more value, but it can also

protect us from danger. Moreover, there are also mathematical models available for weather forecasting to minimize losses during natural disasters, genetic analysis to prevent diseases, security monitoring to prevent terrorist attacks in advance, and more (Baker, 2006). Utilization of mathematics has been deeply integrated into our lives, existing in every aspect, from financial conditions and medical records to the barcodes on our clothes. The beauty of mathematics is everywhere. Mathematics is a magnificent and unparalleled source of intellectual beauty, which developed by not only geniuses, but whole humanity, to persist in the pursuit of a better life.

Mathematics is present at all times and in almost every culture. It has become the universal language of humanity, demonstrating its unparalleled utility. While Eastern and Western mathematics were initially isolated from each other, mathematical activity also thrived in both countries (Philip et al., 1995). Despite of the isolation, the independent and simultaneous discovery of the same thing in mathematics is common, from numbering systems to geometric interpretation of complex numbers (Nathan, 1958). Mathematics initially evolved through empirical methods to serve practical and utilitarian needs. The demand for its utilizations remains constant across different time periods (Nathan, 1958). Thus, we can see that mathematics involves the interaction and reaction of various human cultural elements, resulting in the formation of new ideas independently and simultaneously (Nathan, 1958). In the present era of globalization, the existence of a international publications, and the cooperation in mathematics among global researchers (Baker, 2006, Philip et al., 1995), serves as evidence that

mathematics is a universally language. In short, the presence of mathematics in almost every culture shows that mathematics provides intellectual beauty, and its utility is essential for the development of human progress.

The utilization of mathematics is evidenced not only in numerous fields, but also in literature fields. The discovery of "0" allowed humans to handle large numbers, and it also is the foundation of binary computers (National Documentary Evidence, 2015). By combining computer and mathematical algorithms, the utilization of mathematics is greatly expanded. This enables humans to process large amounts of data quickly and accurately, benefiting financial decision-making, bioengineering analysis, and more (Baker, 2006). Increasing computing power and complexity of mathematical algorithm — expand the utilization of mathematics in the modern society — transform various industries being from manpower-based to computer-based (Baker, 2006). Additionally, process of abstraction further expand the utilization of mathematics in field of literature, including imaging and articles, by distilling the essence of literature into mathematical forms. The literature can be broken down into smaller pieces of information, and mathematical algorithms can manipulate these pieces using algebra, vectors, and geometry to form the abstracted representation (Baker, 2006). Take mathematical algorithms developed by Inform Technologies as an example, the articles are transformed into abstraction representation based on context, allowing mathematical models to group the related news, distill the grouped information, and then provided customized articles for clients (Baker, 2006). According to Plato's ideal world, idealized

objects are closely connected to mathematical abstraction (Philip et al., 1995). This demonstrates that mathematical abstraction is the essence of mathematics, and the essence of the world, allowing for a massive expansion of mathematical utilization, from enterprise quantitative analysis to unlocking phones with facial recognition.

Lastly, mathematics' beauty lies in its representation of the cumulative achievements of generations, showcasing interconnectedness of human progress. Mathematics also serves as a universal language, transcending cultural boundaries and demonstrating its unparalleled utility with mathematical abstraction in various fields and industries, from practical applications to the realm of literature. The beauty, utility, and essence of mathematics are deeply intertwined, making it a magnificent source of intellectual beauty and a driving force behind human progress to achieve ideal Platonic world.

(Word Counts: 846)

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