World Bulletin of Education and Learning (WBEL)
ISSN (E): 3072-175X
Volume 01, Issue 02, November 2025

https://worldbulletin.org/index.php/1

FORMATION OF AESTHETIC IDEALS IN THE SYSTEM OF EUCLIDEAN GEOMETRY

D. M. Makhmudova
Professor, Doctor of Pedagogical Sciences,
Chirchik State Pedagogical University

Abstract
This article is devoted to mathematical models of the phenomenon of beauty, studying their connection with the aesthetic ideals of Euclidean geometry. The mathematical analysis of beauty is carried out, in particular, through concepts such as symmetry, proportion, and the golden ratio. The article examines the basic principles of Euclidean geometry and their connection with the phenomenon of beauty through examples. Special attention is also paid to the use of these models in education and practical design.

Keywords: Phenomenon of beauty, mathematical models, Euclidean geometry, aesthetic ideals, symmetry, golden ratio, proportions, visual aesthetics, geometric symmetry, beauty in education.

Introduction

It is widely acknowledged that the phenomenon of beauty has always occupied an important place in human history. Attempts to understand beauty from a philosophical, cultural, and scientific perspective have found expression in many fields, including mathematics. Euclidean geometry, with its simple and perfect principles, serves as the fundamental tool for creating mathematical models of beauty.

Analysis and results. Mathematics is not only the science of numbers and shapes but also the purest expression of human thought. It combines the rigor of logic with a subtle sense of beauty. Nowhere is this harmony more clearly manifested than in Euclid's Elements. The Euclidean geometry, founded by Euclid in the 3rd

World Bulletin of Education and Learning (WBEL)
ISSN (E): 3072-175X
Volume 01, Issue 02, November 2025

https://worldbulletin.org/index.php/1

century BC, incorporates the fundamental laws of spatial relationships. The basic elements of this geometry—the point, the line, and the plane—play an important role in the creation of mathematical models of beauty.

It is important to emphasize that the origin of aesthetic ideals can be traced in the concepts of proportion and harmony in Euclidean geometry. The ancient Greeks, particularly Plato, considered geometric figures to be ideal forms. In Plato's Timaeus, the world is described as composed of geometric elements—the Platonic solids (square, cube, etc.), one of the first examples of aesthetic perfection. Having systematized these ideas, Euclid established the mathematical foundations of beauty. For example, the golden ratio ($\varphi \approx 1.618$) arose from proportions found in Euclid's Elements, which later became an aesthetic ideal in art and architecture.

The connection between geometry and aesthetics can also be seen in architecture. From the pyramids of ancient Egypt to Gothic cathedrals, geometric principles ensured aesthetic beauty. During the Renaissance, artists such as Leonardo da Vinci and Albrecht Dürer used Euclidean geometry to apply proportion and perspective to art.

It can be clearly observed that the origin of aesthetic ideals dates back to ancient Greek philosophy. The Pythagoreans believed that the basis of beauty was the harmony of numbers and forms. Euclid developed this with geometric proofs. For example, the circle, as a perfect figure, embodies the aesthetic ideal, since all its points are equidistant from the center. Numerous studies have confirmed that Plato associated geometric figures with the ideal world. He considered geometry the philosophical basis of beauty. In the 19th century, Oliver Byrne's color edition of Elements vividly presented the aesthetic aspects of geometry, uniting mathematics with art. The concept of aesthetic beauty in mathematics was described by G. H. Hardy as "everything in its place." G. H. Hardy examines objective criteria of beauty in mathematics that correspond to Euclid's proofs.

Natalie Sinclair analyzes the development of aesthetic beauty in mathematics in her article "Aesthetic Considerations in Mathematics." It emphasizes the aesthetic role of diagrams in Euclidean geometry, citing the works of Archimedes as an example. The author demonstrates the historical evolution of aesthetic ideals. It

World Bulletin of Education and Learning (WBEL)
ISSN (E): 3072-175X
Volume 01, Issue 02, November 2025

https://worldbulletin.org/index.php/1

is generally accepted that the aesthetic ideal of Euclidean geometry is embodied in its fundamental principles — axioms, postulates, and methods of proof. This ideal can be considered in several key aspects:

1.The aesthetics of order and clarity. The greatest charm of Euclidean geometry lies in its construction. It presents the entire system as a logical construct, refusing to be accepted without proof, as clear and immutable as existence itself. The axiomatic method. Euclid begins his work with just five postulates and five general concepts (axioms). Everything is based on these simple, "self-evident" foundations. This is the principle of achieving complexity from simplicity, just as a composer constructs a work from a few fundamental notes. The findings indicate that the rigorous logical chain. Each new theorem is proven by strictly logical steps, building on the previous one. There is no room for speculation or criticism. This process provides a certain aesthetic satisfaction with its clarity and certainty. The reader experiences a feeling of "yes, this is absolutely true" at every step. This systematic construction left a deep imprint on Western philosophy and science. Similarities to Euclid's logical structure can be seen in Spinoza's Ethics and Newton's Principia Mathematica.

2. The aesthetics of simplicity and universality. The objects of Euclidean geometry—the point, the line, the circle—represent ideal forms, unlike the fine lines of the real world. They are conceptual objects, eternal and unchanging, without any flaws. The ideal forms. There is no "perfect circle" in the real world. However, in Euclidean geometry, there is a circle—a set of points equidistant from the center. Through these ideal forms, the human mind strives to comprehend the purest and most beautiful essence of spatial relationships. The law of simplicity. Euclid created a comprehensive system using a minimal number of postulates. This simplicity and conciseness contributed to its aesthetic value. There is a special beauty in explaining complexity through simple and clear concepts.

3. The Aesthetics of Symmetry and Balance. Geometric figures themselves also contain profound aesthetic principles. Equilateral Triangle. An equilateral triangle, in which all sides and angles are equal, is a symbol of balance, stability, and perfect proportions. It has fascinated people from ancient architecture to

World Bulletin of Education and Learning (WBEL)
ISSN (E): 3072-175X
Volume 01, Issue 02, November 2025

https://worldbulletin.org/index.php/1

modern design. The Golden Ratio. Mentioned (but not directly named) in the Elements, this ratio (approximately 1.618) appears repeatedly in nature, art, and architecture. It was accepted by people as the most acceptable and pleasing proportion. Euclid describes how to divide this ratio geometrically, which testifies to his desire to measure and understand beauty.

4. Beauty in Problem Solving. In Euclidean geometry, proof itself is an aesthetic phenomenon. A good proof is one that is not only correct but also necessary, unique, and remarkably simple. Mathematicians speak of proofs as "beautiful" or "pleasing." This beauty stems from their laconic, direct, and unusual way of thinking. The analysis of this literature shows that aesthetic ideals developed philosophically and practically from Euclidean geometry. Modern works argue that they are subjective and dependent on historical context. Today, aesthetic ideals are used in computer graphics and design, but their roots lie in Euclidean geometry, although aesthetic views change over time. In the future, these ideals may take new forms in digital design and virtual reality.

Conclusion

The aesthetic ideal of Euclidean geometry is a respect for order, logic, simplicity, and perfection. It is a testament to the human mind's potential. It is not simply a mathematics textbook, but a poetic attempt to understand and organize the world. It is imperative to recognize that despite the modern discovery of non-Euclidean geometry, it has not negated Euclid's aesthetic legacy; on the contrary, it has enriched it. It has demonstrated that different logical foundations can create different systems of beauty. But Euclid's Elements was the first to create the purest example of this beauty—a timeless ideal that pleases not only the eye but also the mind, harmonizing reason and aesthetics.

REFERENCES

1. Ananda K. Coomaraswamy. A Mathematician's Apology. G. H. Hardy // The Art Bulletin. CAA, vol. 23, no. 4 (December 1941), p. 339 https://doi.org/10.2307/3046793

World Bulletin of Education and Learning (WBEL)
ISSN (E): 3072-175X
Volume 01, Issue 02, November 2025

https://worldbulletin.org/index.php/1

2. Sinclair, N. (2006). Mathematics and Beauty: Aesthetic Approaches to Children's Education.
3. Sinclair, N. Aesthetic Aspects of Mathematics. 2011
4. Sinclair, N. Mathematics and the Body: Material Complexities in the Classroom. 2016.