

Applications of Geometry: Understanding the Differences and Similarities between Euclidean and Non-Euclidean Geometries

Ali Asadov*

Department of Mathematics, Baku State University, Baki, Azerbaijan

Commentary

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***For Correspondence:**

Ali Asadov, Department of Mathematics, Baku State University, Baki, Azerbaijan

E-mail: asadovali@gmail.com

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DESCRIPTION

Geometry is a branch of mathematics that deals with the study of shapes, sizes, positions, and dimensions of objects in space. It is one of the oldest branches of mathematics and has been studied since ancient times. The word "geometry" comes from the Greek words "geo" meaning earth, and "metron" meaning measurement. Geometry has a wide range of applications in science, engineering, architecture, and art. Geometry can be broadly classified into two categories: Euclidean geometry and non-Euclidean geometry. Euclidean geometry is the study of geometry as it was developed by the ancient Greek mathematician Euclid. It is based on a set of axioms or assumptions that describe the properties of points, lines, and planes in space. Non-Euclidean geometry, on the other hand, is the study of geometry that is based on different sets of axioms or assumptions. It includes hyperbolic geometry and elliptic geometry. Euclidean geometry is the most familiar form of geometry and is used extensively in schools and colleges around the world. It deals with the properties of flat surfaces and three-dimensional objects in space.

Euclidean geometry is based on five postulates or axioms that describe the properties of points, lines, and planes. These postulates form the basis of all Euclidean geometry and are used to prove theorems and solve problems. Some of the important concepts in Euclidean geometry include points, lines, planes, angles, and triangles. A point is a location in space that has no size or dimension. A line is a straight path that extends infinitely in both directions. A plane is a flat surface that extends infinitely in all directions. An angle is the measure of the space between two intersecting lines. A triangle is a three-sided polygon that is formed by connecting three points that are not on the same line. One of the most famous theorems in Euclidean geometry is the Pythagorean theorem, which states that in a right-angled triangle, the square of the length of the hypotenuse (the longest side) is equal to the sum of the squares of the lengths of the other two sides. This theorem has many applications in science and engineering, including in the design of bridges, buildings, and other structures. The main difference between Euclidean and non-Euclidean geometry is the nature of parallel lines. In Euclidean geometry, parallel lines never intersect, whereas in non-Euclidean geometry, parallel lines can intersect. This is due to the fact that in non-Euclidean geometry, the sum of the angles of a triangle is not always equal to 180 degrees.

Non-Euclidean geometry is a more recent development in geometry and deals with the properties of curved surfaces and spaces. It includes hyperbolic geometry, which is based on the assumption that there are no parallel lines, and elliptic geometry, which is based on the assumption that there are no straight lines. Non-Euclidean geometry has important applications in physics, including in the study of general relativity and cosmology. In addition to its mathematical applications, geometry also has important applications in science, engineering, architecture, and art. In science, geometry is used to study the shapes and sizes of molecules, crystals, and other objects. In engineering, geometry is used to design and build structures, machines, and other devices. In architecture, geometry is used to design buildings, bridges, and other structures that are aesthetically pleasing and functional. In art, geometry is used to create intricate designs, patterns, and shapes.

CONCLUSION

Euclidean and non-Euclidean geometries are two different types of geometries with different assumptions and axioms. While they have some similarities, such as their applications in real life, they also have some fundamental differences, such as the nature of parallel lines and the concept of distance. Geometry is interesting and important branch of mathematics that has many applications in science, engineering, architecture, and art. Euclidean geometry and non-Euclidean geometry are two important subfields of geometry that deal with the properties of flat surfaces and curved spaces, respectively. By studying geometry, we can gain a deeper understanding of the fundamental principles of mathematics and their applications in the world around us.