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Three Types of Geometries Paper

Spherical, Euclidean, and hyperbolic are three types of geometries applied in the world today. Spherical geometry focuses on the two dimensional surface of a sphere. Euclidean geometry is the work of Euclid and the study of plane and solid figures. Hyperbolic geometry is a branch of non-Euclidean geometry. Euclid wrote five postulates which are applied in the geometries. The first postulate states that there is a straight line from any point to any point. The second postulate states a finite straight line can be produced in any straight line. The third postulate states there is a circle with any center and any radius. The fourth postulate states all right angles are equal to one another. The fifth and final postulate states if a straight line falling on two straight lines makes the interior angles on the same side less than two right angles, the two straight lines, if produced indefinitely, meet on that side on which the angles are less than the two right angles.

Euclid’s first postulate does not work in Spherical geometry. That is because a line on a sphere will always be curved rather than straight. Euclid’s second postulate does not work in spherical geometry because you cannot have a straight line on a sphere. Euclid’s third postulate works because it is possible to draw a circle on a sphere and each circle you draw will have a center and a radius. Euclid’s fourth postulate works because it is possible to make a triangle with ninety degrees on a sphere. Euclid’s fifth postulate does not work because all the lines on a sphere will eventually intersect. In spherical geometry, the triangles have special characteristics. The angle sum can only come close to 180 degrees. However, the angle sum can exceed 180 degrees and go to a maximum of 900 degrees. It is possible to have 3 right angles on a triangle in spherical geometry. In spherical geometry, the polygons can have two or more sides. Definitions are important so that all the terms can be defined and understood. The definitions help to make sense of broad ideas everyone may not understand. Definitions help to define whether they fit the description of the polygons in other geometries. For example, you can’t have a rectangle or square in spherical because a polygon with all right angles is impossible unless it has three sides. Spherical geometry is evident in the world around us because of the earth, the globe, and balls. These are all spheres and are important aspects to daily life. In spherical geometry, the special right triangle has one angle with measure 90 degrees. Another angle with measure 60 degrees. Finally, the remaining angle measure can be anywhere in between 30 and 120 degrees.

In Euclidean geometry, Euclid’s first postulate works because it will be a straight line to connect two points. Euclid’s second postulate is true because any finite straight line can be produced in any straight line. Euclid’s third postulate is true because a circle can be made from any circle with any radius. Euclid’s fourth postulate is accurate because all right angles are equal to one another. Euclid’s fifth postulate is true because if the same side interior angles formed by two straight lines and a line falling on those lines are less than two right angles, then the two straight lines will meet. In Euclidean geometry, the angle sum of triangles will always be 180 degrees. It is only possible to have one 90 degree angle. Also, all polygons must have three or more sides. Definitions help to explain the different parts of Euclidean geometry. They help to explain how things work and why things work. The definitions are useful to help define and describe the different types of polygons.

In hyperbolic geometry, the first postulate works. This is because you can connect any two points in hyperbolic however whether it is straight or not depends on your definition of a straight line. Next, the second postulate works. This is because the definition of a straight line depends on whether it works or not. The third postulate works because all circles in hyperbolic have a center and a radius. The fourth postulate works because all of the right angles are equal to each other. In hyperbolic, the fifth postulate somewhat works because there are infinitely many lines possible instead of just one which is stated in the original postulate. In hyperbolic, the angle sum of a triangle will always be less than 180 degrees. In hyperbolic, the polygons must have three or more sides. In order to create hyperbolic space, you must have seven vertexes at one point which will never create a totally flat surface. In addition, there are no rectangles in hyperbolic geometry. Definitions of hyperbolic geometry are important because they help to determine whether certain things actually work, for example the postulates. The definition of a straight line and whether a straight line includes geodesics and arcs are prevalent for hyperbolic geometry. Hyperbolic can be found in the real world by using saddles and Pringles. These shapes exist in hyperbolic space and are accurate because they are never on a flat surface. Finally, I would research more about special right triangles in hyperbolic geometry. I would research the importance of special right triangles and whether it is possible in hyperbolic geometry to determine the similarities and differences between the three geometries.

In conclusion, the three geometries all have similar and different characteristics. The three different types of geometries can be observed in the world around us. Spherical, non-Euclidean, and hyperbolic geometries show different ways the world and math coincide.