I'm not a bot

1. Lines and angles 13. Transformations Geometry is a branch of mathematics that studies the sizes, shapes, positions, angles, and dimensions of things. Flat shapes like squares, circles, and triangles are a part of flat geometry and are called 2D shapes. These shapes have only 2 dimensions, the length and the width. Examples of 2D shapes in flat geometry are as shown below. 2D shapes can be further classified as open shapes and closed shapes. Open shapes can be defined as a shape or figure whose line segments and/or curves do not meet. They do not start and end at the same point. Closed shapes are geometric shapes that begin and end at the same point. In geometry, a three-dimensional shape can be defined as a solid figure or an object or shape that has three dimensions – length, width, and height. Unlike two-dimensional figure are faces, edges, and vertices. The three dimensions compose the edges of a 3D geometric shape. A cube, rectangular prism, sphere, cone and cylinder are the basic 3-dimensional shapes we see around us. In geometry, an angle can be defined as the figure formed by two rays meeting at a common endpoint. An angle is represented by the symbol ∠. Angles are measured in degrees (°) using a protractor. For example, 45 degrees is represented as 45°. The angles are classified based on their measurements as: An acute angle measures less than 90°. An obtuse angle is between 90° and 180°. A right angle precisely measures 90°. An angle measuring exactly 180° is a straight angle. A reflex angle measures between 180°- 360°. A complete angle measures 360°. The vertex of a shape where two edges meet form an angle. Different shapes in geometry have different angle measures. For example: A triangle is a 3 sided shape, and the sum of its 3 interior angles is 180° A square, rectangle or quadrilateral are 4 sided shapes, and the sum of their 4 interior angles is 360° Other polygons like the pentagon, hexagon, heptagon, octagon have 5, 6, 7, 8 sides respectively and varying angles. Examples of different Polygons with their angles and sides are as shown below. We learn various aspects of shapes, like the measurement of angles, length of sides, area, volume, etc in geometry. Similarity and congruence are two important aspects of geometry. Similarity is when two shapes are the same but their sizes may vary. Congruence: Congruence is when two shapes are exactly the same in shape and size. A coordinate plane is a 2D surface formed by using two number lines that intersect each other at the right angle. The horizontal number line is the x-axis, and the vertical number line is the y-axis. The intersection of the two axes is the (0,0) coordinate. Using the coordinate plane, we plot points, lines, etc. By joining various points on the coordinate plane, we can create shapes. We use Formula and Theorems to solve the geometry problems. A formula is a mathematical equation to solve a geometry problem while a theorem is a statement that is proved using previously known facts. For example, the "Pythagoras Theorem" proved that $a2 + b2 = c2$ for a right-angled triangle, where a and b are the sides of the right-angled triangle, and c is the hypotenuse. However, $a2 + b2 = c2$ is the formula for finding the hypotenuse of a right-angled triangle. - The word geometry is derived from the Greek words "Geo" meaning "earth" and "metry" meaning "measurement". In the given shape an example of a simple closed curve that is also a polygon? Solution: A closed shape that does not cross itself is a simple closed curve. Polygons are closed shapes formed of only straight lines like triangles, rectangles, pentagons and so on. The given figure is a curved and is not made of only straight lines, it is a polygon. In a triangle ABC, right angled at B, if ∠C=45° what is the measure of ∠A? Solution: ∠ABC is the given right angle with ∠B=90°. Sum of the angles of a triangle = 180° ∠A+∠B+∠C=180° ∠A+∠C=180°-90°=90° But, ∠C=45° Therefore ∠A=90°-45°=45° identify the flat surfaces in the given prism. Solution: The flat surfaces in the prism are as given below: Rectangle AECB, Rectangle DCEF, Rectangle ABDF form the rectangular faces of the prism. △ BCD and △ AEF form the triangular faces of the prism. Attend this Quiz & Test your knowledge.ABCDCorrect answer is: BA closed shape that does not cross itself is a simple closed curve. It has the same start and end points.ABCDCorrect answer is: DThe given shape is a 3d shape and is called a cube.Correct answer is: 10 sides and 10 corners The star shaped figure is made of 10 straight lines. Thus, it has 10 sides and 10 corners. What is the relationship between mathematics and geometry? Mathematics is an umbrella term for various disciplines that focus on logic and abstract concepts. Geometry is one of the branches of mathematics that deals with shapes and sizes of figures and their properties. What are some applications of geometry? Geometry can be applied to many areas such as architecture, electronics, engineering, and construction. It can also be used in fields like science to develop projects or programs for space exploration. What is the main difference between 2D and 3D shapes? The main difference between 2D and 3D shapes is the absence of depth or height in 2D shapes. They are flat figures. 3D shapes exist in three dimensions with length, breadth, and height and do not appear flat. What is the difference between algebra and geometry? Algebra is a branch of mathematics that uses variables, in the form of letters, to act as numbers or quantities in equations and formulas. Geometry is a branch of mathematics that studies the sizes, shapes, positions, angles, and dimensions of things. Geometry is a branch of mathematics that studies the sizes, shapes, positions, angles, and dimensions of things. Geometry (from the Ancient Greek: γεωμετρία; geo- "earth", -metron "measurement") is, with arithmetic, one of the oldest branches of mathematics. It is concerned with properties of space that are related to distance, shape, size, and relative position of figures.

[... main body continues ...]

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Quotations related to Geometry at Wikiquote The dictionary definition of geometry at Wiktionary News from Commons News from Wikinews Texts from Wikisource Textbooks from Wikibooks Resources from Wikiversity Wikibooks has more on the topic of: Geometry Library resources about Geometry Resources in your library "Geometry". Encyclopædia Britannica. Vol. 11 (11th ed.). 1911. pp. 675–736. A geometry course from Wikiversity Unusual Geometry Problems The Math Forum – Geometry The Math Forum – K–12 Geometry The Math Forum – College Geometry The Math Forum – Advanced Geometry Nature Precedings – Pegs and Ropes Geometry at Stonehenge The Mathematical Atlas – Geometries Areas of Mathematics "4000 Years of Geometry", lecture by Robin Wilson given at Gresham College, 3 October 2007 (available for MP3 and MP4 download as well as a text file) Finitism in Geometry at the Stanford Encyclopedia of Philosophy The Geometry Junkyard Interactive geometry reference with hundreds of applets Dynamic Geometry Sketches (with some Student Explorations) Geometry classes at Khan Academy Retrieved from "Geometry is the branch of mathematics that deals with the study of points, lines, angles, surfaces, and solids. Understanding these fundamental concepts lays the foundation for exploring more advanced topics in geometry. This lesson introduces these basic geometric elements with definitions, examples, and visual aids to enhance your comprehension. Definition: A point is a precise location or a position in space. It has no size, dimension, or area—only position. It is represented by a dot.Notation: Points are usually named with uppercase letters (e.g., Point A).Real-Life Example: A specific location on a map, such as the location of a city. A Definition: A line is a collection of points that extends infinitely in both directions. It has length but no width or thickness. The two arrows are used to show that it extends forever.Notation: Lines are named using two points on the line (e.g., Line AF or Line FA).Real-Life Example: A straight road that extends endlessly in both directions. A F We put two points in order to name the line as line AF. However, there are an infinite amount of points. You can also name it line FA. Definition: A line segment is a part of a line that has two distinct endpoints. A segment has two endpoints while a line has no endpoints.Example: Segment AF has endpoints at Point A and Point F.Real-Life Example: A specific section of a road between two intersections. A F 4. Ray Definition: A ray starts at one point (the endpoint) and extends infinitely in one direction.Example: Ray AF starts at Point A and passes through Point F, extending indefinitely beyond Point F.Real-Life Example: A laser beam that starts at a specific point and continues indefinitely in one direction. A F 5. Angle Definition: An angle is formed by two rays that share a common endpoint, called the vertex.Example: Angle FAC is formed by Ray FA and Ray AC with Point A as the vertex. A F C Definition: A plane is a flat, two-dimensional surface that extends infinitely in all directions. We can use arrows to show that it extends in all directions forever. A plane has length and width but no thickness.Notation: Planes are often named using three non-collinear points (e.g., Plane ABC) or represented with a symbol.Real-Life Example: The surface of a tabletop or a perfectly flat sheet of paper. 7. Parallel Lines Definition: Parallel lines are two lines in the same plane that never meet, no matter how far they are extended.Example: Lines m and n are parallel because they never intersect.Real-Life Example: Railroad tracks that run side by side without ever meeting. m n 8. Intersecting Lines Definition: Intersecting lines are lines that meet or cross each other at a single point.Example: Lines p and q intersect at Point X.Real-Life Example: Crossroads where two roads meet. p q X 9. Vertex Definition: The vertex is the common endpoint where two rays meet to form an angle.Example: Below and in blue you can see what the vertex looks like for an angle, a cube, intersecting lines, and a triangle.Real-Life Example: The corner of a room where two walls meet. Intersecting Lines V Angle V Triangle Vertex V Cube Vertex V Understanding these basic geometric concepts is essential for delving deeper into the study of geometry. These elements form the building blocks for more complex shapes, theorems, and proofs. Practice identifying and drawing these geometric entities to strengthen your grasp of the subject. Geometry is all about shapes and their properties. If you like playing with objects, or like drawing, then geometry is for you! Geometry can be divided into: Plane Geometry is about flat shapes like lines, circles and triangles ... shapes that can be drawn on a piece of paper Solid Geometry is about three dimensional objects like cubes, prisms, cylinders and spheres. Hint: Try drawing some of the shapes and angles as you learn ... it helps. A Point has no dimensions, only position A Line is one-dimensional A Plane is two dimensional (2D) A Solid is three-dimensional (3D) Why do we do Geometry? To discover patterns, find areas, volumes, lengths and angles, and better understand the world around us. Plane Geometry Plane Geometry is all about shapes on a flat surface (like on an endless piece of paper). General Drawing Tool Square Calculator and Rectangle Calculator Polygons A Polygon is a 2-dimensional shape made of straight lines. Triangles and Rectangles are polygons. Here are some more: Pentagon Pentagram Hexagon Properties of Regular Polygons Diagonals of Polygons Interactive Polygons The Circle Circle Theorems (Advanced Topic) There are many special symbols used in Geometry. Here is a short reference for you: Geometric Symbols Congruent Shapes Similar Shapes Types of Angles Using Drafting Tools Transformations: Rotation Reflection Translation Resizing Symmetry: Tessellations Tessellation Artist Pythagoras' Theorem Pythagorean Triples Circle Theorems Triangle Centers Trigonometry Trigonometry is a special subject of its own, so you might like to visit: Introduction to Trigonometry Trigonometry Index Solid Geometry is the geometry of three-dimensional space - the kind of space we live in ... ... let us start with some of the simplest shapes: Common 3D Shapes Polyhedra and Non-Polyhedra There are two main types of solids, "Polyhedra", and "Non-Polyhedra": Polyhedra (they must have flat faces): Cubes and Cuboids (Volume of a Cuboid) Platonic Solids Prisms Pyramids Investigating Solids Activity Non-Polyhedra (when any surface is not flat): Sphere Torus Cylinder Cone Copyright © 2025 Rod Pierce Geometry is the branch of mathematics that deals with shapes, angles, dimensions and sizes of a variety of things we see in everyday life. Geometry is derived from Ancient Greek words – 'Geo' means 'Earth' and 'metron' means 'measurement'. In Euclidean geometry, there are two-dimensional shapes and three-dimensional shapes. 2d shapes are flat shapes like squares, rectangles, circles, etc. that have only two dimensions length and width. In solid geometry, 3d shapes such as a cube, cuboid, cone, etc. are also called solids. The basic geometry is based on points, lines and planes explained in coordinate geometry. The different types of shapes in geometry help us to understand the shapes day to day life. With the help of geometric concepts, we can calculate the area, perimeter and volume of shapes. Geometry Definition Geometry is the study of different types of shapes, figures and sizes in Maths or in real life. In geometry, we learn about different angles, transformations and similarities in the figures. The basics of geometry depend on majorly point, line, angles and plane. All the geometrical shapes are based on these basic geometrical concepts. Branches of Geometry The branches of geometry are categorized as: Algebraic geometry Discrete geometry Differential geometry Euclidean geometry Convex geometry Topology Algebraic Geometry It is a branch of geometry studying zeros of the multivariate polynomial. It includes linear and polynomial algebraic equations that are used for solving the sets of zeros. The application of this type comprises Cryptography, string theory, etc. Discrete Geometry It is concerned with the relative position of simple geometric objects, such as points, lines, triangles, circles etc. Differential Geometry It uses techniques of algebra and calculus for problem-solving. The various problems include general relativity in physics etc. Euclidean Geometry The study of plane and solid figures based on axioms and theorems including points, lines, planes, angles, congruence, similarity, solid figures. It has a wide range of applications in Computer Science, Modern Mathematics problem solving, Crystallography, etc. Convex Geometry It includes convex shapes in Euclidean space using techniques of real analysis. It has application in optimization and functional analysis in number theory. Topology It is concerned with the properties of space under continuous mapping. Its application includes consideration of compactness, completeness, continuity, filters, function spaces, grills, clusters and bunches, hyperspace topologies, initial and final structures, metric spaces, nets, proximal continuity, proximity spaces, separation axioms, and uniform spaces. Also, check: Analytic geometry Geometry Formulas To calculate the area, perimeter, volume and different measures using length, breadth and height of different geometrical figures, geometry formulas are important. By using the formulas, we can calculate the measures easily. There are loads of formulas to learn in Geometry. Here, you are provided with all the important geometry formulas in the PDF. Download the below-given PDF to learn and solve all the problems related to geometry. Geometry Formulas–Download PDF Here Plane Geometry (Two-dimensional Geometry) Plane Geometry deals with flat shapes which can be drawn on a piece of paper. These include lines, circles & triangles of two dimensions. A plane geometry is also known as two-dimensional geometry. All the two-dimensional figures have only two measures such as length and breadth. It does not deal with the depth of the shapes. Some examples of plane figures are square, triangle, rectangle, circle, and so on. The important terminologies in plane geometry are: Point A point is a precise location or place on a plane. A dot usually represents them. It is important to understand that a point is not a thing, but a place. Also, note that a point has no dimension; preferably, it has the only position. Line The line is straight (no curves), has no thickness and extends in both directions without end (infinitely). It is important to note that it is the combination of infinite points together to form a line. In geometry, we have a horizontal line and vertical line which are x-axis and y-axis respectively. Line Segment – If a line has a starting and an endpoint then it is called a Line Segment. Ray – If a line has a starting point and has no endpoint is called Ray. Eg. Sun Rays Angles in Geometry In planar geometry, an angle is the figure formed by two rays, called the sides of the angle. Types of Angle Acute Angle – An Acute angle (or Sharp angle) is an angle smaller than a right angle. ie. can range between 0 – 90 degrees. Obtuse Angle – An Obtuse angle is more than 90 degrees but is less than 180 degrees. Right Angle – An angle of 90 degrees. Straight Angle – An angle of 180 degrees is a straight angle, i.e. the angle formed by a straight line Polygons in Geometry A plane figure that is bounded by a finite chain of straight line segments closing in a loop to form a closed polygonal chain or circuit. The name 'poly' refers to multiple. An n-gon is a polygon with n sides; for example, a triangle is a 3-gon polygon. General Formula for Sum of internal Angles of a polygon – Types of Polygon The types of polygons are: Triangles Quadrilaterals Pentagon Hexagon Heptagon Octagon Nonagon Decagon Polygon type Definition & Property Types (i) Triangle – A 3 sided polygon whose sum of internal angles always sums to 180 degrees. (ii) Quadrilateral A 4-sided polygon with four edges and four vertices. Sum of internal angles is 360 degrees Square – Has 4 equal sides and vertices which are at right angles. Rectangle – Has equal opposite sides and all angles are at right angles. Parallelogram – has two pairs of parallel sides. The opposite sides of a parallelogram are of same measure. Rhombus – Has all the four sides to be of equal length. Trapezium – Has one pair of opposite sides to be parallel. (iii) Pentagon A plane figure with five straight sides and five angles – (iv) Hexagon A plane figure with six straight sides and six angles – (v) Heptagon A plane figure with seven sides and seven angles – (vi) Octagon A plane figure with eight straight sides and eight angles. – (vii) Nonagon A plane figure with nine straight sides and nine angles – (viii) Decagon A plane figure with ten sides and ten angles. – In the below figure, we can see the different types of polygons. Circle in Geometry A Circle is a simple closed shape. From a certain point called the centre, all points of a circle are of same consistent distance, i.e. the curve traced out by a point that moves so that its distance from the centre is constant. Similarity and Congruency in Geometry Similarity – Two figures are said to be similar if they have the same shape or have an equal angle but do not have the same size. Congruence – Two figures are said to be Congruent if they have the same shape and size. Thus, they are totally equal. Solid Geometry (Three-dimensional geometry) Solid Geometry deals with 3-dimensional objects like cubes, prisms, cylinders & spheres. It deals with three dimensions of the figure such as length, breadth and height. But some solid solids do not have faces (e.g. sphere). Solid geometry is the study of three dimensions in Euclidean space. The objects which are around us are three-dimensional. All the three-dimensional shapes are obtained from the rotation operation of 2D shapes. The important attributes of 3D shapes are: Go through these terms in detail for different geometric shapes here. Edges An edge is defined as the line segment on the boundary that joins one vertex to the other vertex. It means that it joins one corner point to the other. It forms the skeleton of 3D shapes. In other words, it can be defined as the faces, that meet in the straight line is called edge. Following are the list of edges for the different solid shapes: Solid Shapes No. of Edges Triangular Prism 9 Cube 12 Rectangular prism 12 Pentagonal Prism 15 Hexagonal Prism 18 Triangular Pyramid 6 Square Pyramid 8 Pentagonal Pyramid 10 Hexagonal Pyramid 12 Faces We know that all the geometric shapes are made up of flat surface called faces. It is a flat surface enclosed by the edges. For any three-dimensional solid shapes, the face should be a two-dimensional figure. The list of the number of faces for different solid shapes are given below: Solid Shapes No. of. Faces Triangular Prism 5 Cube 6 Rectangular prism 6 Pentagonal Prism 7 Hexagonal Prism 8 Triangular Pyramid 4 Square Pyramid 5 Pentagonal Pyramid 6 Hexagonal Pyramid 7 Geometry Related Articles Video Lesson Geometry is used in configuring and measurement of different shapes and sizes, such as circles, squares, cubes, triangles, etc. Geometry has wide usage in daily life. Its major applications are in the field of constructions, such as the construction of building, roads, dams, bridges, etc. and also in surveying, mapping, navigation. In software industries, it is used in graphics designing, gaming, animations, etc. In the medical field as well, for CT scanning and MRI's geometry concepts are used. In our lives, geometry is important to understand the shapes we see and use around us. Geometry means the measurement. So any object which is present on earth has some dimensions that are being described by geometry. The measurement 'measurement' is a branch of mathematics, that is primarily concerned with the shapes and sizes of the objects, their relative position, and the properties of space. There are many postulates and theorems applied by the Greek mathematician Euclid, who is often referred to as the "Father" of Geometry. What is Geometry? Geometry is the branch of mathematics that relates the principles covering distances, angles, patterns, areas, and volumes. All the visually and spatially related concepts are categorized under geometry. There are three types of geometry: Euclidean Hyperbolic Elliptical Euclidean Geometry We study Euclidean geometry to understand the fundamentals of geometry. Euclidean Geometry refers to the study of plane and solid figures on the basis of axioms (a statement or proposition) and theorems. The fundamental concepts of Euclidean geometry include Points and Lines, Euclid's Axioms and Postulates, Geometrical Proof, and Euclid's Fifth Postulate. There are 5 basic postulates of Euclidean Geometry that define geometrical figures. A straight line segment is drawn from any given point to any other. A straight line is extended indefinitely in both directions. A circle is drawn with any given point as its center and any length as its radius. All right angles are congruent. Any two straight lines are infinitely parallel that are equidistant from one another at two points. Euclid's Axioms: Axioms or postulates are based on assumptions and have no proof for them. A few of Euclid's axioms in geometry that are universally accepted are: The things that are equal to the same things are equal to one another. If a = C and B = C then a = C If equals are added to equals, the wholes are equal. If A = B and C = D, then A + C = B + D If equals are subtracted, the remainders are equal. The coinciding things are equal to one another. The whole is greater than its part. If A > B, then there exists C such that A = B + C. The things that are double of the same things are equal to one another. Non-Euclidean Geometry Spherical geometry and hyperbolic geometry are the two non-Euclidean geometries. Non-Euclidean geometry differs in its postulates on the nature of the parallel lines and the angles in the planar space, as validated by Euclidean geometry. Spherical geometry is the study of plane geometry on a sphere. Lines are defined as the shortest distance between the two points that lie along with them. This line on the spheres in the triangle is greater than 180°. Hyperbolic geometry refers to a curved surface. This geometry finds its application in topology. Depending on the inner curvature of the curved surface, the planar triangle has the sum of the angles lesser than 180. Plane Geometry Euclidean geometry involves the study of geometry in a plane. A two-dimensional surface extending infinitely in both directions forms the plane. Planes are used in every area of geometry and graph theory. The basic components of planes in geometry are analogous to points, lines, and angles. A point is the no-dimensional basic unit of geometry. Points lying on the same line are the collinear points. A line is a uni-dimensional unit that refers to a set of points that extends in two opposite directions and the line is said to be the intersection of two planes. A line has no endpoints. It is easy to differentiate a line, line segment, and ray. Lines may or not intersect. Angles in Geometry When two straight lines or rays intersect at a point, they form an angle. Angles are usually measured in degrees. The angles can be an acute, obtuse, right angle, straight angle, or obtuse angle. For any three different angles of parallel lines and their theorems. Plane Shapes in Geometry The parts of angles can be supplementary or complementary. The construction of angles and lines is an intricate component of geometry. The study of angles in a unit circle and that of a triangle forms the stepping stone of trigonometry. Transversals and related angles establish the interesting properties of parallel lines and their theorems. Plane Shapes in Geometry The properties of plane shapes help us identify and classify them. The plane geometric shapes are two-dimensional shapes or flat shapes. Polygons are closed curves that are made up of more than two lines. A triangle is a closed figure with three sides and three vertices. There are many theorems based on the triangles that help us understand the properties of triangles. In geometry, the most significant theorems based on triangles include Heron's formula, the exterior angle theorem, the angle sum property, the basic proportionality theorem, the similarity and Congruence in Triangles, the Pythagoras Theorem, and so on. These help us recognize the angle-side relationships in triangles. Quadrilaterals are polygons with four sides and four vertices. A circle is a closed figure and has no edges or corners. It is defined as the set of all points in a plane that are equidistant from a given point called the center of the circle. Various concepts centered around symmetry, transformations in shapes, construction of shapes are the formative chapters in geometry. Solid Geometry Solid shapes in geometry are three-dimensional in nature. The three dimensions that are taken into consideration are length, width, and height. There are different types of solid figures like a cylinder, cube, sphere, cone, cuboids, prism, pyramids, and so on and these figures acquire some space. They are characterized by vertices, faces, and edges. The five platonic solids and the polyhedrons have interesting properties in Euclidean space. The nets of the plane shapes can be folded into solids. Measurement in Geometry Measurement in geometry ascertains the calculation of length or distance, the area occupied by a flat shape, and the volume occupied by the solid objects. Mensuration in geometry is applied to the computation of perimeter, area, capacity, surface areas, and volumes of geometric figures. Perimeter is the distance around the plane shapes, the area is the region occupied by the shape, volume is the amount of region occupied by a solid, and the surface area of a solid is the sum of the areas of its faces. Two-dimensional Analytical Geometry Analytical geometry is popularly known as coordinate geometry is a branch of geometry where the position of any given point on a plane is defined with the help of an ordered pair of numbers, or coordinates. The coordinate axes divide the plane into four quadrants. Identifying and plotting points will be a building block of visualizing the geometric objects on the coordinate plane. In the example below, point A is defined as (4,3) and Point B is defined as (-3,1). The various properties of the geometric figures like straight lines, curves, parabolas, ellipse, hyperbola, circles, and so on can be studied using coordinate geometry. In analytical geometry, the curves are represented as algebraic equations, and this gives a deeper understanding of algebraic equations through visual representations. The distance formula, the section formula, midpoint formula, the centroid of a triangle, the area of the triangle formed by three given points, and the area of the quadrilateral formed by four points are determined using the known coordinates in the cartesian coordinate system. The equation of a straight line passing through a point, or two points, the angle between two straight lines are computed easily using the formulas. Three-dimensional Geometry The three-dimensional geometry discusses the geometry of shapes in 3D space in the cartesian planes. Every point in the space is denoted by 3 coordinates, represented as an ordered triple (x, y,z) of real numbers. Direction Cosines of a Line If a straight line makes angles α, β and γ with the x-axis, y-axis, and z-axis respectively then cos α, cosβ, cosγ are called the direction cosines of a line. These are denoted as l = cosα, m = cosβ, and n = cosγ. For l, m, and n, l2 = m2 + n2 = 1, direction cosines of a line joining the points P(x_1, y_1, z_1) and Q(x_2, y_2, z_2) are given by $\dfrac{x_2 - x_1}{PQ}$, $\dfrac{y_2 - y_1}{PQ}$, $\dfrac{z_2 - z_1}{PQ}$, where PQ = $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2 + (z_2 - z_1)^2}$)}. Direction Ratios of a Line The directional ratios of a line are the numbers that are proportional to the direct cosines of the line. If l, m, n are the direction cosines, and a,b,c are the direction ratios, then l =\dfrac{a}{\sqrt{a^2+b^2+c^2}}, m = \dfrac{b}{\sqrt{a^2+b^2+c^2}}, and n = \dfrac{c}{\sqrt{a^2+b^2+c^2}}. Direction ratios of line joining the points P(x_1, y_1, z_1) and Q(x_2, y_2, z_2) are: x(x_2-x_1), (y_2-y_1), (z_2 - z_1) or \dfrac{x_2 - x_1}{1}, \dfrac{y_2 - y_1}{1}, \dfrac{z_2 - z_1}{1} Skew lines in Geometry The skew lines are the lines in space that are neither parallel nor intersecting, and they lie in different planes. The angle between two lines that are parallel to each of the skew lines is the angle between skew lines. If θ is the angle between two lines, then cos θ = |\(l_1 l_2 + m_1m_2 + n_1n_2\)| where θ is the acute angle between the lines. Also Cos θ = |\dfrac{\vec{b_1} \cdot \vec{b_2}}{|\vec{b_1}| |\vec b_2|}| Also Check: Example 1. Find the acute angle between two lines whose direction ratios are given as (1, 1, 2) and ($\sqrt{3}$ - 1, $-\sqrt{3}$ -1, 4). Solution: Cartesian equation of the line passing through the points (x_1, y_1, z_1) and (x_2, y_2, z_2) is \dfrac{x - x_1}{x_2 - x_1} = \dfrac{y - y_1}{y_2 - y_1} = \dfrac{z - z_1}{z_2 - z_1} Vector Between Two Lines Angle between intersecting lines drawn parallel to each of the skew lines is the angle between skew lines. If θ is the angle between two lines, then cos θ = |\(l_1 l_2 + m_1m_2 + n_1n_2\)| where θ is the acute angle between the lines. If the length of BC if AD = 7 units, DB = 3 units, AE = 4 units and DE = 10 units. Solution: In geometry, we know that similar triangles are proportional. In the given triangles, ABC and ADE are similar. Thus, AB/AD = AC / AE = BC/ DE To find: BC Given: AB , AD, DB, DE and AE. AB = AD + DB = 7 + 3 = 10 units We know that AB/ AD = BC/ DE 10/7 = BC/ 70/7 = BC 2C = 10 units Answer: The missing side BC = 10 units Example 2. What is the vertex of the given parabola? Solution: According to coordinate geometry, the vertex is the point where the axis of symmetry intersects the parabola. Here the parabola opens up, so the axis of symmetry is vertical. Looking at the graph we know that the axis of symmetry is x = -1. The y-coordinate is 3. Thus the vertex is at (-1, 3) Answer: The vertex of the given parabola is at (-1, 3) Example: 3 Find the direction cosines of the x-axis. Solution: In 3-dimensional geometry, if a straight line makes angles, α and γ with the x-axis, y-axis, and z-axis respectively then cosα, cosβ, cosγ are called the direction cosines of a line. The z-axis makes 90°, 90°, and 0° with x, y, and z axes respectively. Thus their cosines are cos 90°, cos 90°, and cos 0° = 0, cos 0° = 1. Therefore the direction cosines of x-axis are 0,0,1 Answer: The direction cosines of the z-axis are 0,0,1. View More > go to slidego to slidego to slide Great learning in high school using simple cues Indulging in rote learning, you are likely to forget concepts. With Cuemath, you will learn visually and be surprised by the outcomes. Book a Free Trial Class FAQs on Geometry What is Geometry? Geometry is the branch of mathematics that studies the shape, size, patterns, angle positions, dimensions, and properties of the objects around us and the spatial relationships among the objects. What are The Three Types of Geometry? The three types of geometry are Euclidean, Hyperbolic, and Elliptical Geometry. Who is The Father of Geometry? The father of Geometry is Euclid, a Greek mathematician. His book 'Elements' is the most influential work in maths serves as the fundamentals of geometry. It is a collection of propositions and postulates. The book consists of 13 volumes and it was second to the Bible in publications. What are The Five Basic Postulates of Euclidean Geometry? The five basic postulates are to be the fundamentals of geometry learned in the formative years. A straight line segment may be drawn from any given point to any other. A straight line segment may be extended indefinitely in both directions. A circle may be drawn with any given point as center and any length as its radius. All right angles are congruent. Any two straight lines are infinitely parallel that are equidistant from one another at two points. What is LW in Geometry? LW is the formula used in geometry to find the area of a rectangle. Length and width are the parameters of a rectangle. The product of length and width is the area of the rectangle. Area of a rectangle = LW square units. How Do You Use Euclidean Geometry? Euclidean geometry studies the basic and complex geometric structures that are both plane shapes and solid shapes. Thus Euclidean geometry is used in art and architecture, computer science, astronomy, and other fields of mathematics. Euclidean geometry considers the study of points, lines, angles, and similarity and congruence in shapes, their patterns, and visualization. Thus it has its practical applications in our day-to-day life. Why is it Called Hyperbolic Geometry? The 5th Euclidean postulate on parallel lines is not satisfied by the hyperbolic geometry. Hyperbolic geometry illustrates three key points that differ from Euclidean geometry. Two parallel lines converge in one direction and diverge in the other. The sum of angles in a triangle is less than 180°. Similar polygons of different areas don't exist. What Is The Difference Between Euclidean and Non-Euclidean Geometry? Euclidean Geometry is the study of geometry of flat shapes on a plane, while non-Euclidean geometry aims at studying curved surfaces. What are the 2 Types of Geometry? Two types of geometry are plane geometry and solid geometry. Plane geometry deals with two-dimensional shapes and planes (x-axis and y-axis), while solid geometry deals with three-dimensional objects and 3D planes. These are the two types of geometry. What Is The Difference Between Solid and Plane Geometry? The study of shapes and objects that have length, width, and height is called the solid geometry, whereas the study of the shapes that have no thickness and can be represented only on a two-dimensional plane surface is called plane geometry. What is Elliptic Geometry Used For? Elliptic geometry studies the geometric structures that have curved surfaces. We use elliptic geometry to find the distance between the heavenly bodies in space, to calculate the distance between the places on the earth. How do you Teach Geometry? Teaching geometry is not an easy task that can be done with a textbook and showing some shapes on the board. It requires a range of activities that demand learners' involvement to understand this concept with much more clarity. Some of the teaching-learning activities are listed below: Visualization- It involves learning through real-life experiences. We can make learners outside the classroom and help them to observe different shapes of objects, x-axis, and y-axis on the floor or any other flat surface, etc. Demonstration: It includes bringing some real-life objects to represent a concept in geometry. For example, it is always better to bring dice or any other object that represents a cubical shape to make learners understand the properties of a cube. DIY activities- We can make learners to participate in some Do-It-Yourself activities that help them to work and play around with shapes and other concepts in geometry. Introducing Scientific Concepts- After all these activities, we can introduce the names and properties used in geometry using scientific terms. It includes introducing the terms like a cartesian plane, polyhedrons, quadrilaterals, etc. What is Geometry Divided Into? Geometry is the branch in mathematics that is further divided into two-types that is Plane Geometry and Solid Geometry. Euclid's Geometry Lines Angles Plane Shapes Solid Shapes Coordinate Geometry Vectors What are the Basics of Geometry? The basics of geometry are the proper understanding of points, lines, and planes. It helps in building all other concepts in geometry that are based on these basic concepts. Q1: If an exterior angle of a triangle is 140 degrees and its opposite interior angles are equal to each other, which of the following is the measure of the equal angles of the triangle?70 degrees80 degrees50 degrees90 degree40 degreesQ2: In a right-angled triangle, the measure of an angle is 40°. Find the measure of other angles of the triangle in degrees.$40°$ and $60°$$$$50°$ and $30°$$$$90°$ and $50°$$$Q3: What is the supplementary angle of 30 degrees?60 degrees90 degrees120 degrees150 degreesQ4: How many sides does a hexagon has?10746Q5: A triangle has the measure of its angles as 70 degrees, 60 degrees, and 70 degrees. What is the type of triangle?ScaleneEquilateralIsoscelesThe triangle does not exist