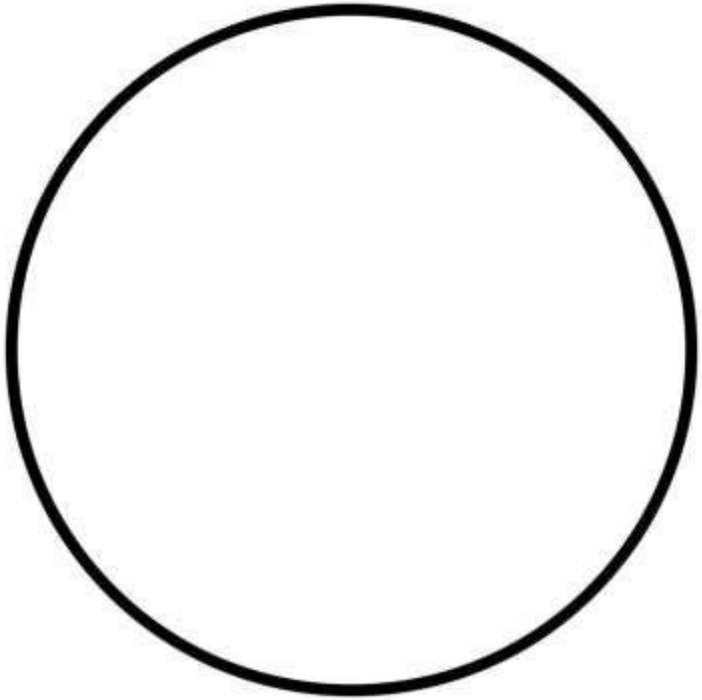
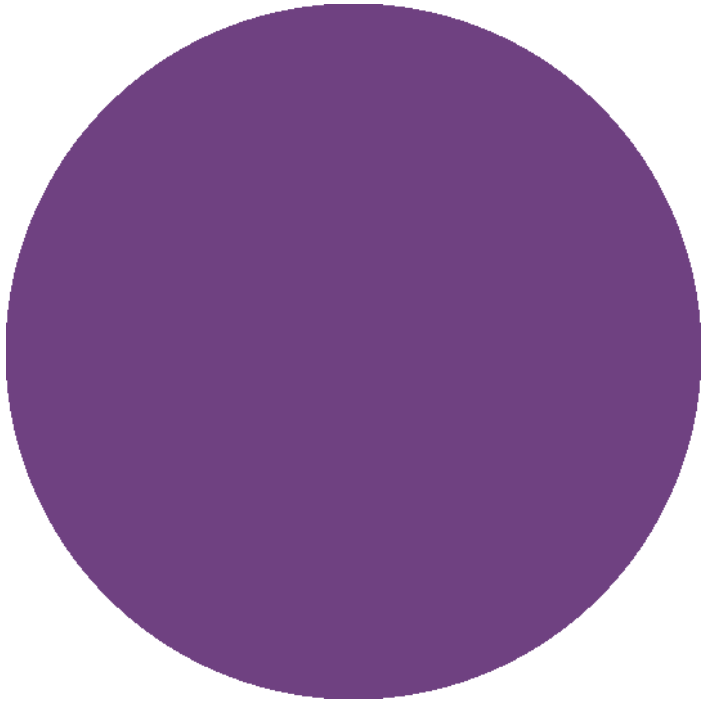
By: Swarn Singh

Geometric Shapes

Geometric Shapes

Circle

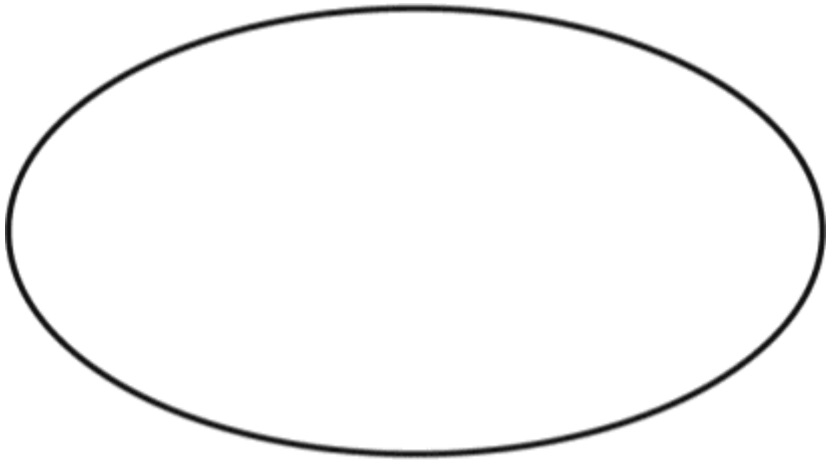


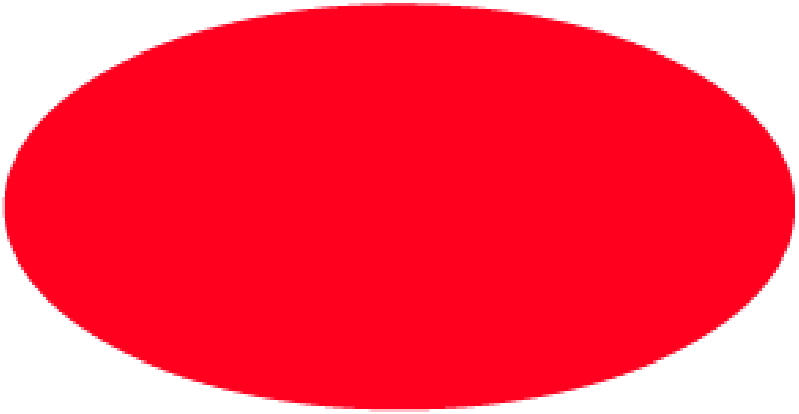


A **Circle** is the set of all points in a plane that are at a given distance from a given point, the centre; equivalently it is the curve traced out by a point that moves so that its distance from a given point is constant.

Geometric Shapes

Ellipse

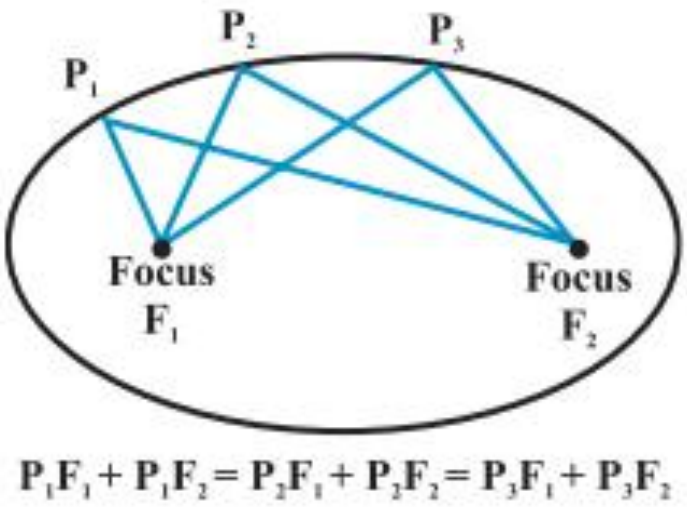




An **Ellipse** is a curve on a plane surrounding two focal points such that the sum of the distances to the two focal points is constant for every point on the curve.

Geometric Shapes

Ellipse



$P_1F_1 + P_1F_2 = P_2F_1 + P_2F_2 = P_3F_1 + P_3F_2$

Fig. 1

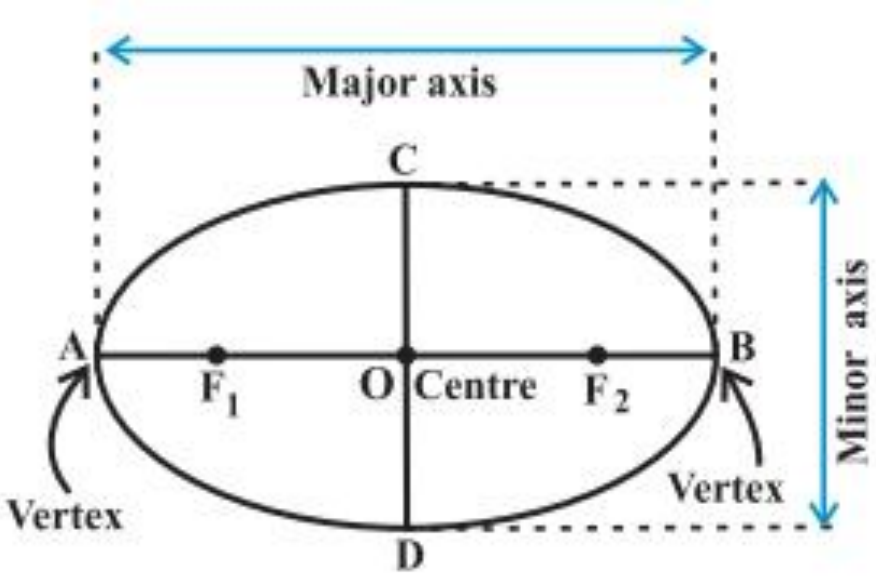
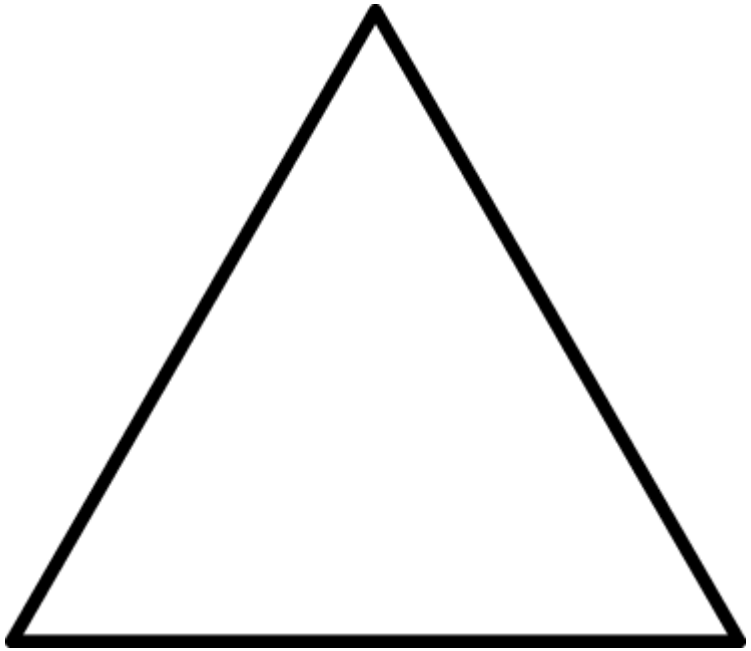


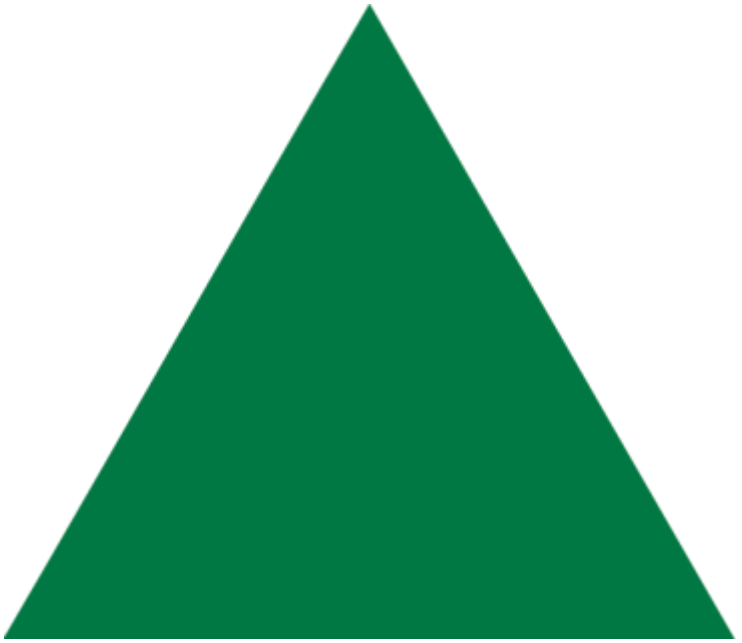
Fig. 2

An **Ellipse** is a curve on a plane surrounding two focal points such that the sum of the distances to the two focal points is constant for every point on the curve.

Geometric Shapes

Triangle

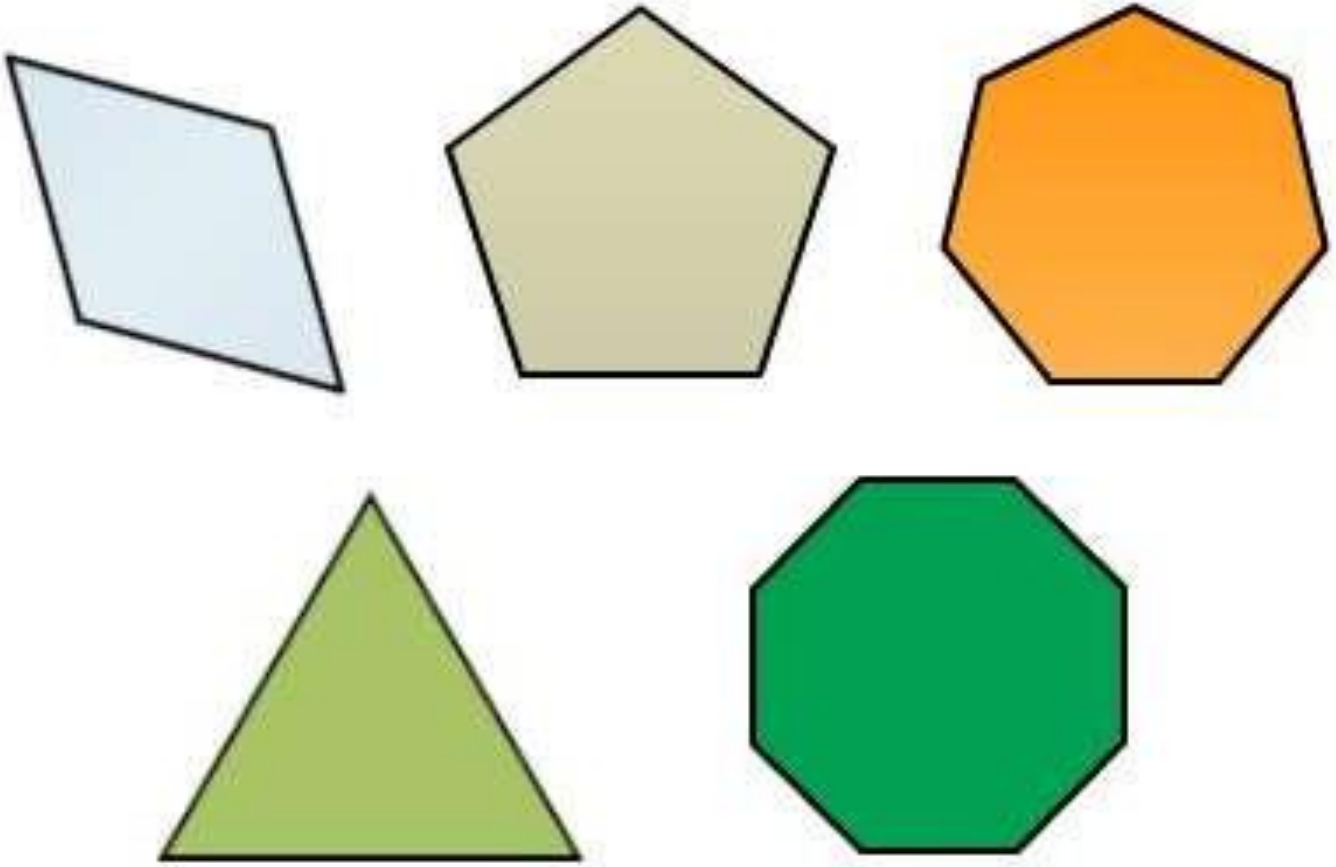




A **Triangle** is a polygon with three edges and three vertices.
It is one of the basic shapes in geometry.

Geometric Shapes

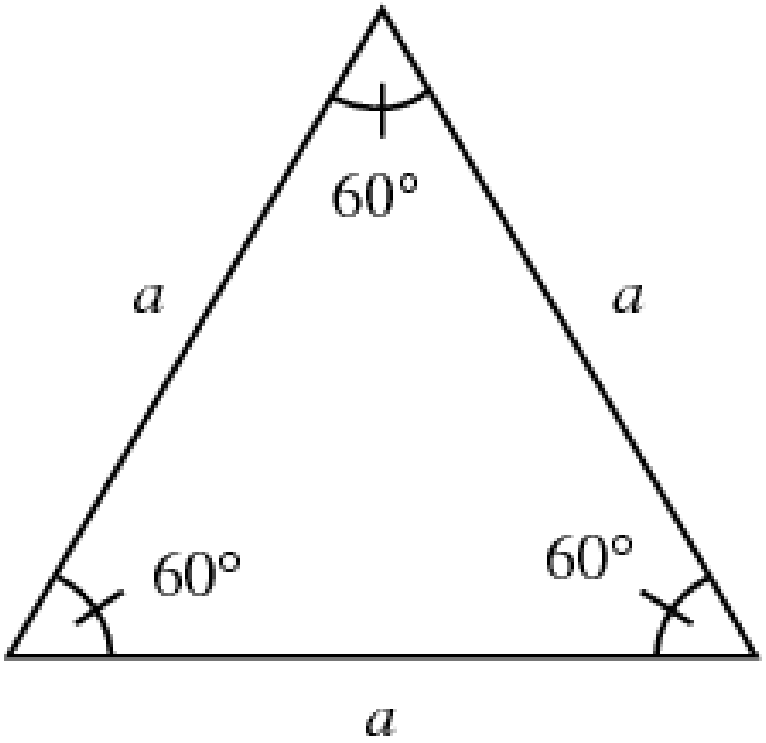
Polygon

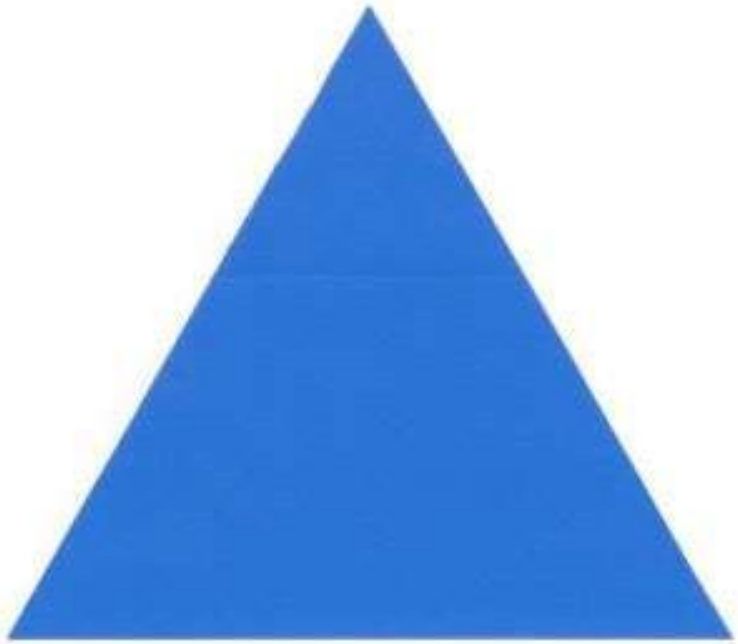


A **Polygon** is a plane figure that is bound by a finite chain of straight line segments closing in a loop to form a closed chain or circuit. These segments are called its edges or sides, and the points where two edges meet are the polygon's vertices.

Geometric Shapes

Equilateral Triangle

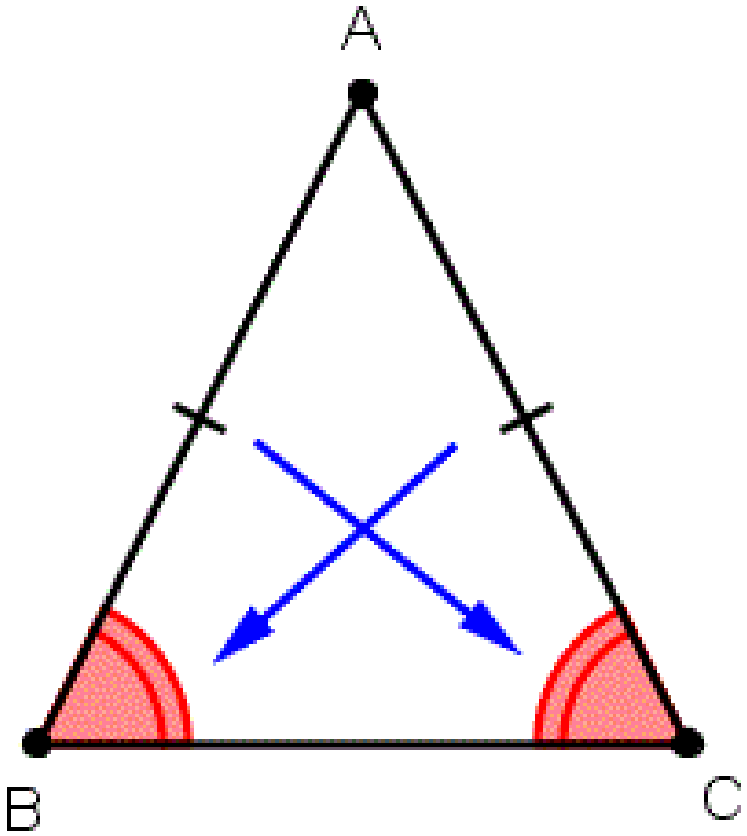




An **Equilateral Triangle** is a triangle in which all three sides are equal. Equilateral triangles are also equiangular; that is, all three internal angles are also congruent to each other and are each 60°.

Geometric Shapes

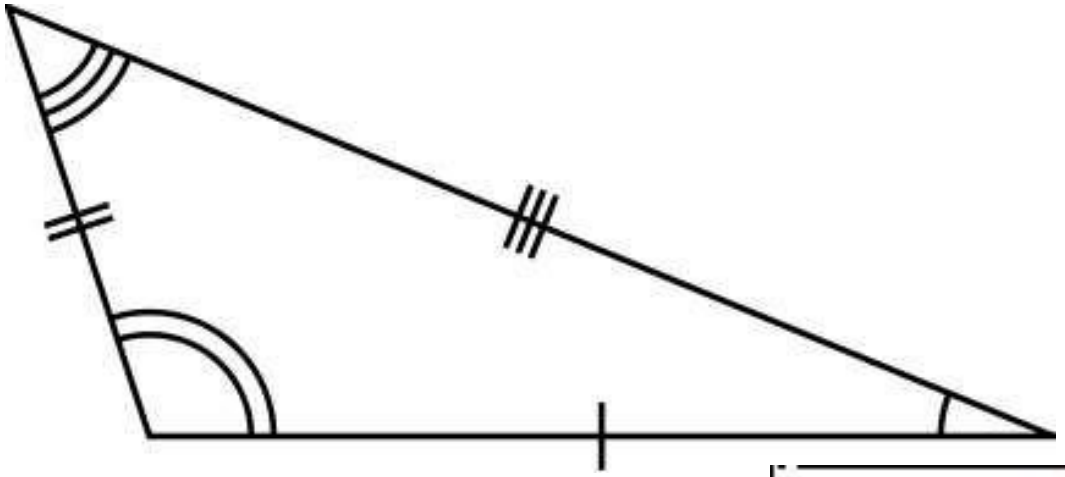
Isosceles Triangle

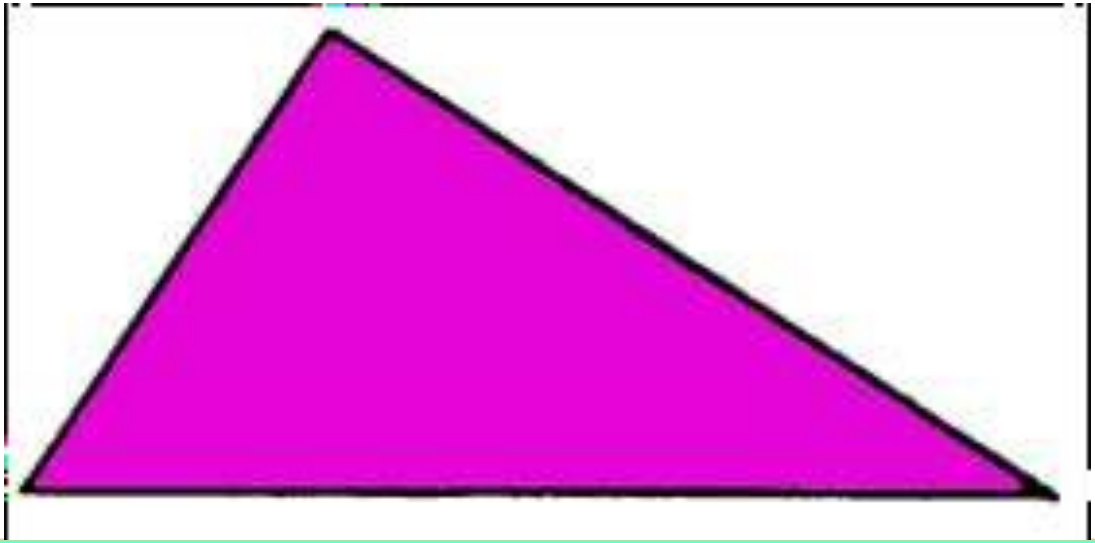


An **Isosceles Triangle** is a triangle that has two sides of equal length.

Geometric Shapes

Scalene Triangle

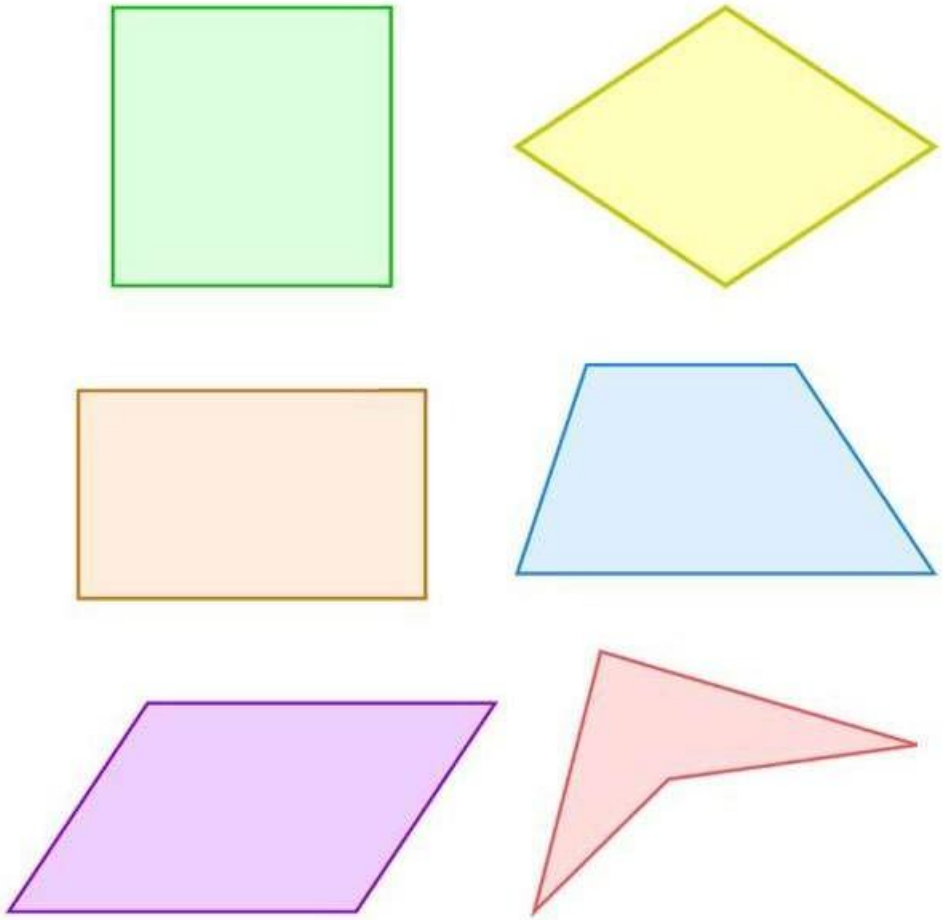




A **Scalene Triangle** is a triangle that has three unequal sides.

Geometric Shapes

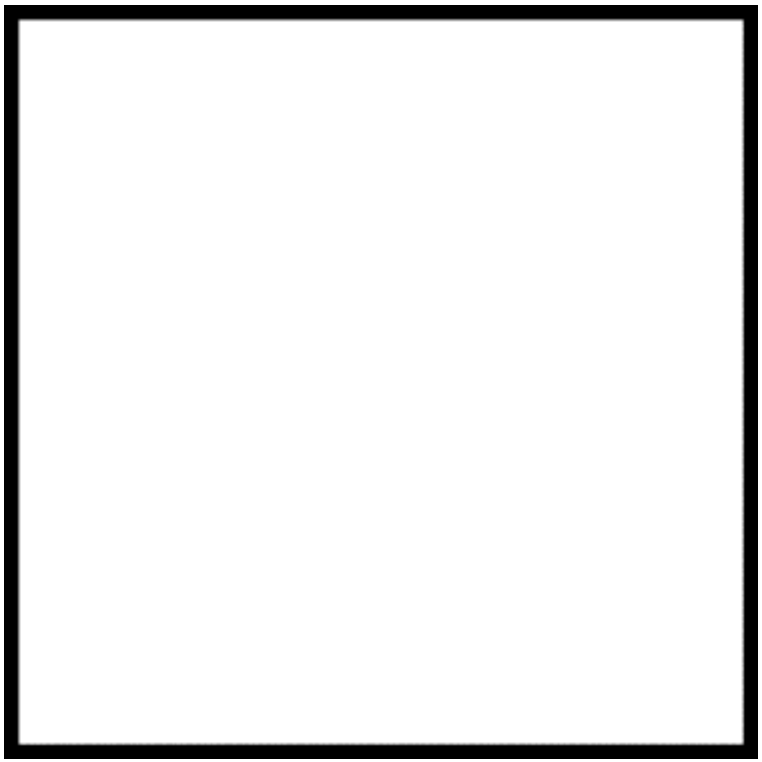
Quadrilateral

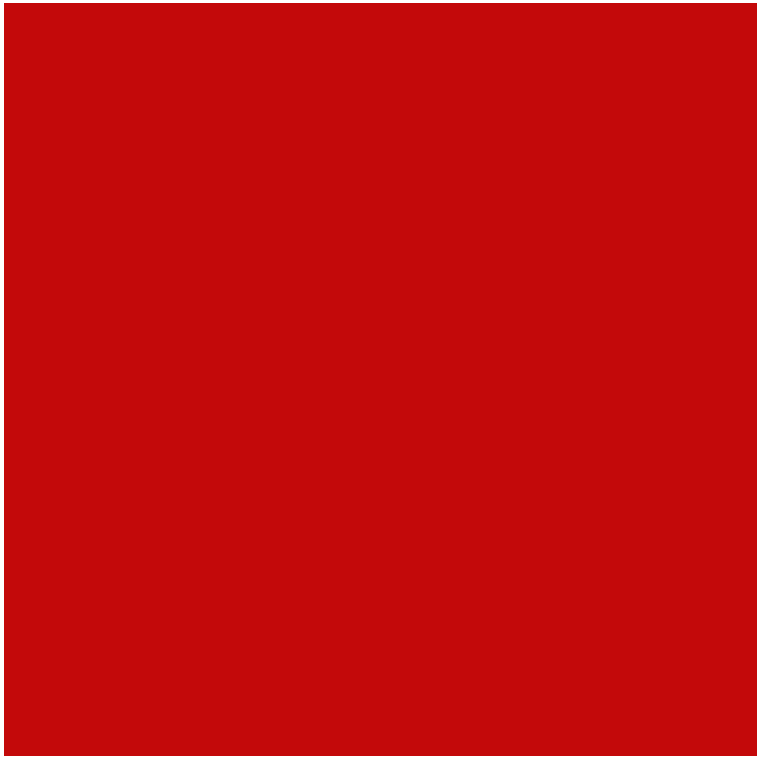


A **Quadrilateral** is a polygon with four sides (or edges) and four vertices or corners.

Geometric Shapes

Square

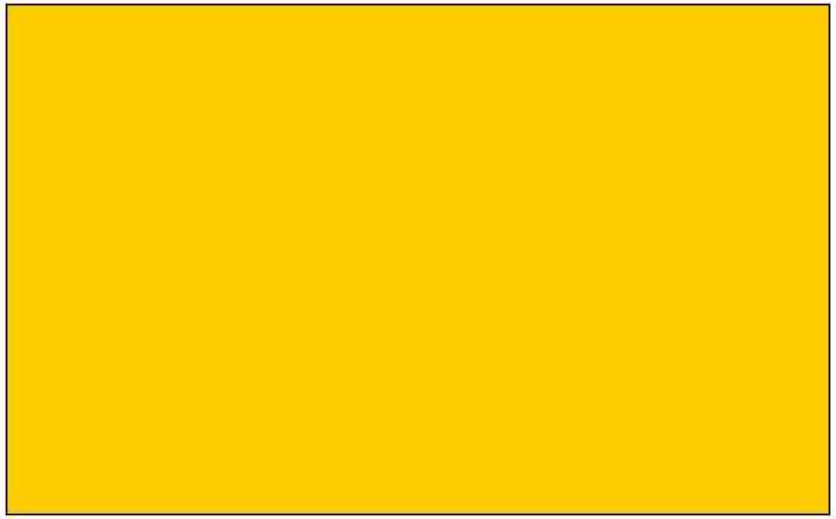




In geometry, a **Square** is a regular quadrilateral, which means that it has four equal sides and four equal angles (90-degree angles, or right angles). It can also be defined as a rectangle in which two adjacent sides have equal length.

Geometric Shapes

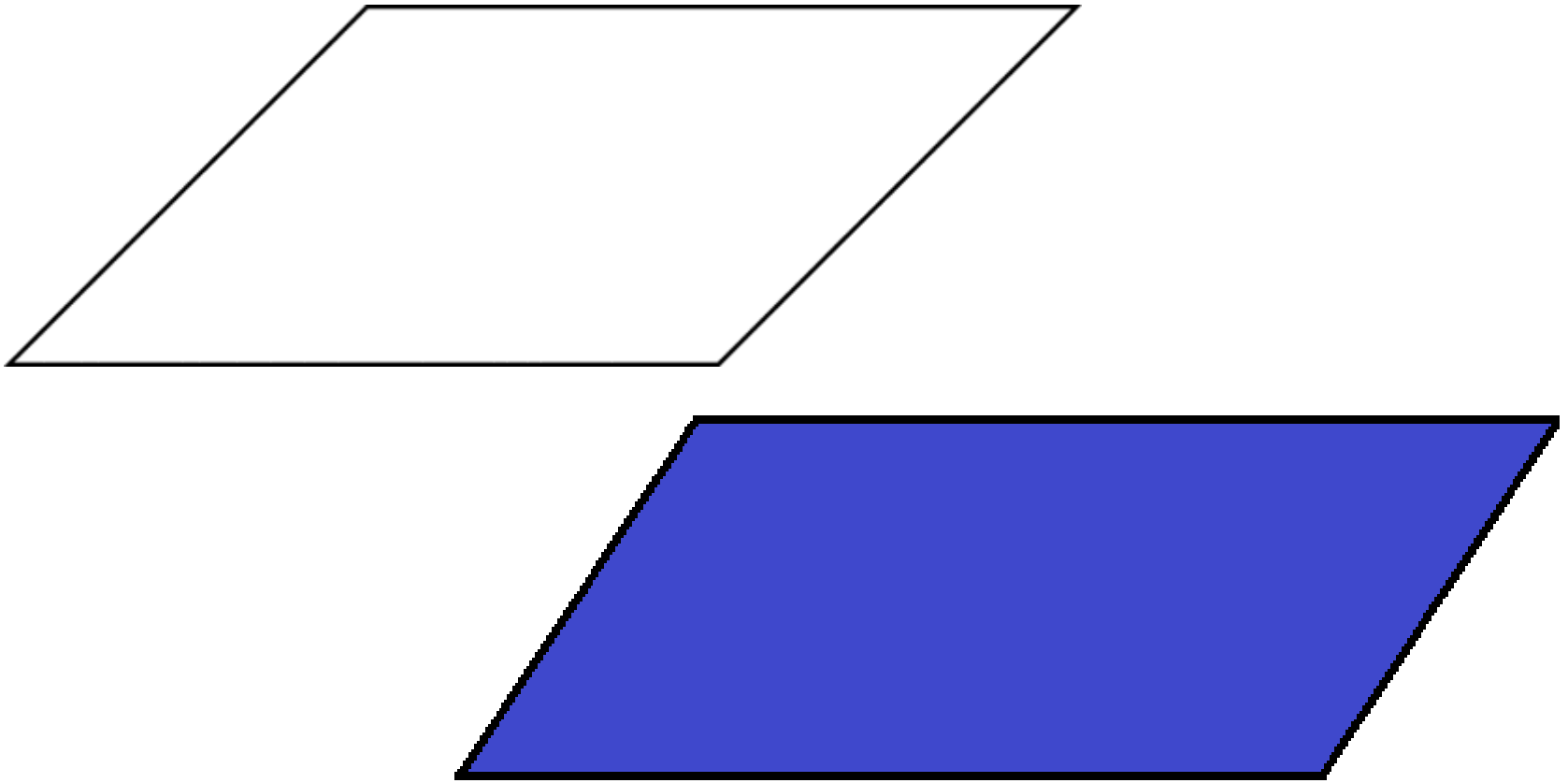
Rectangle



A **Rectangle** is any quadrilateral with four right angles. It can also be defined as an equiangular quadrilateral, since equiangular means that all of its angles are equal (360°/4 = 90°). It can also be defined as a parallelogram containing a right angle.

Geometric Shapes

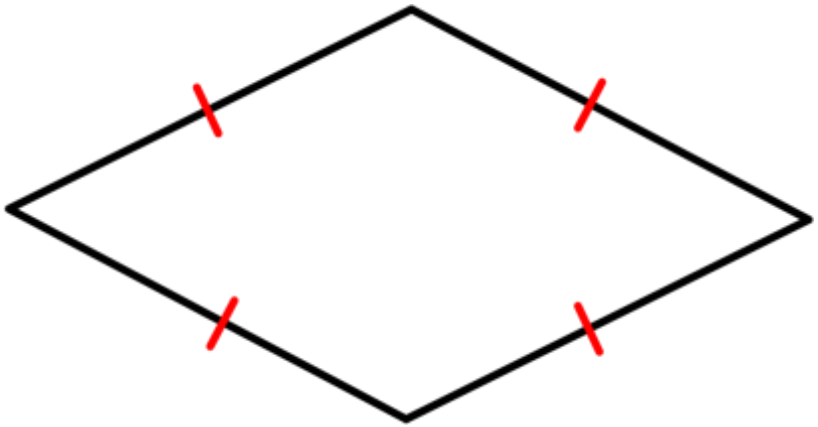
Parallelogram

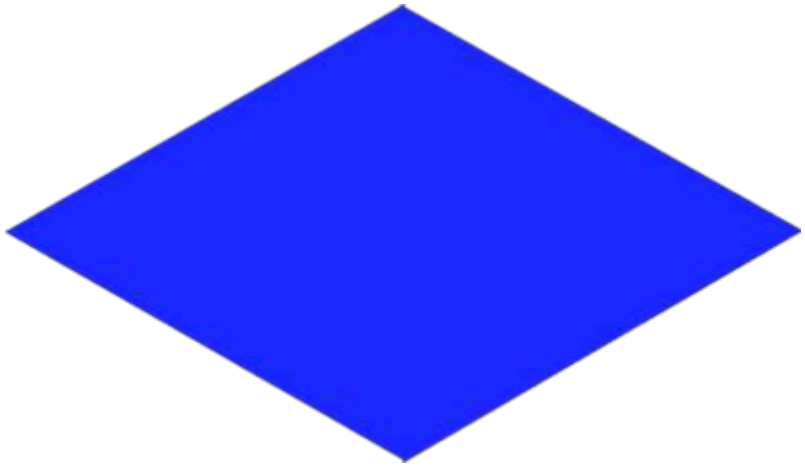


A **Parallelogram** is a quadrilateral with opposite sides parallel (and therefore opposite angles equal).

Geometric Shapes

Rhombus

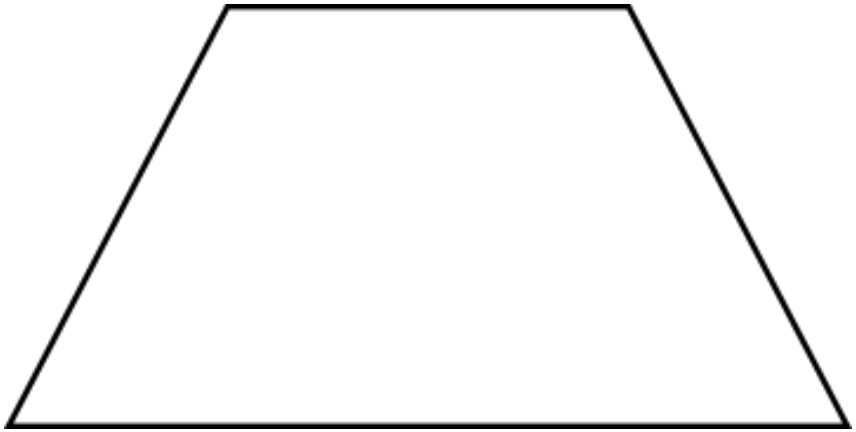




A **Rhombus** is a flat shape with four equal straight sides. Opposite sides are parallel, and opposite angles are equal (it is a Parallelogram).

Geometric Shapes

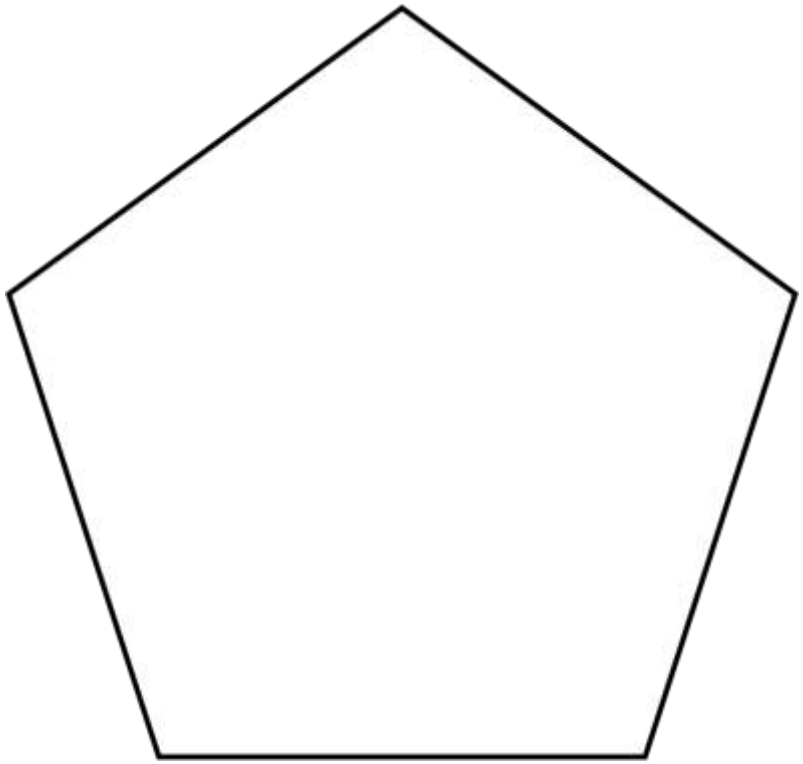
Trapezium

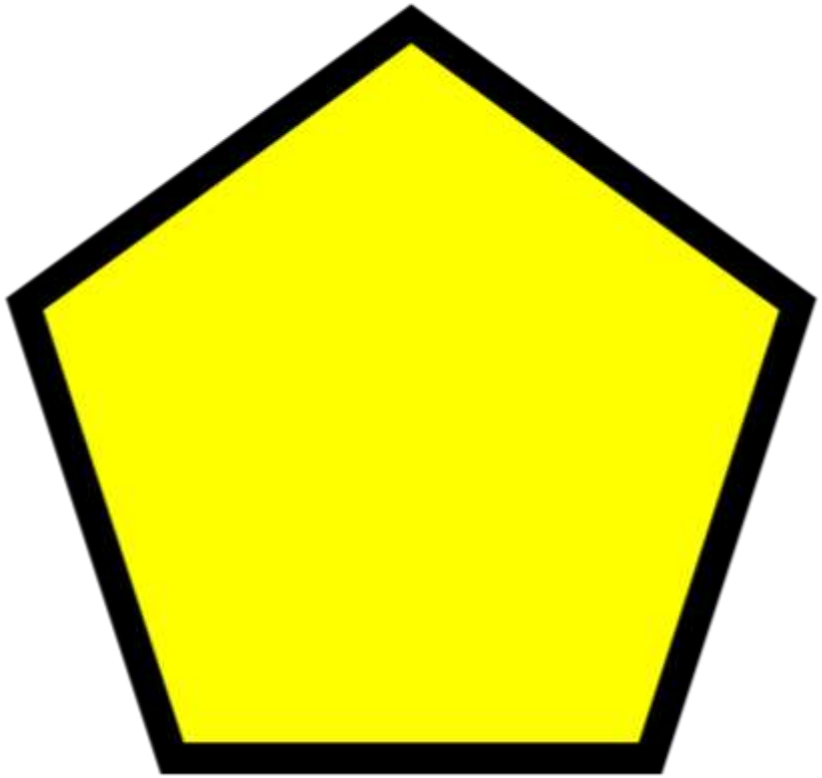


A **Trapezium** is a quadrilateral with one pair of parallel sides.

Geometric Shapes

Pentagon

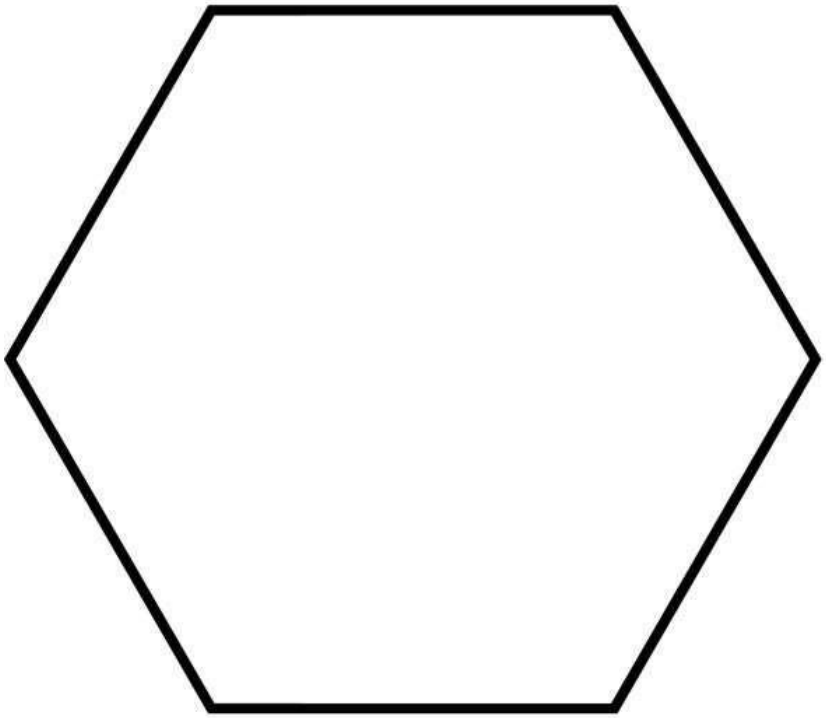


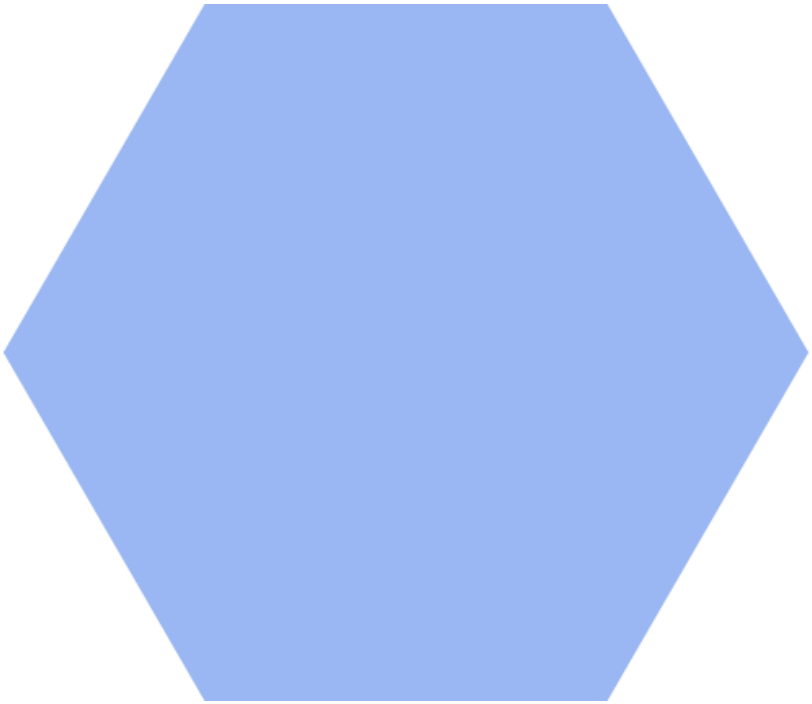


A **Pentagon** is any five-sided polygon. Internal angle between two sides of the Pentagon is 108°

Geometric Shapes

Hexagon

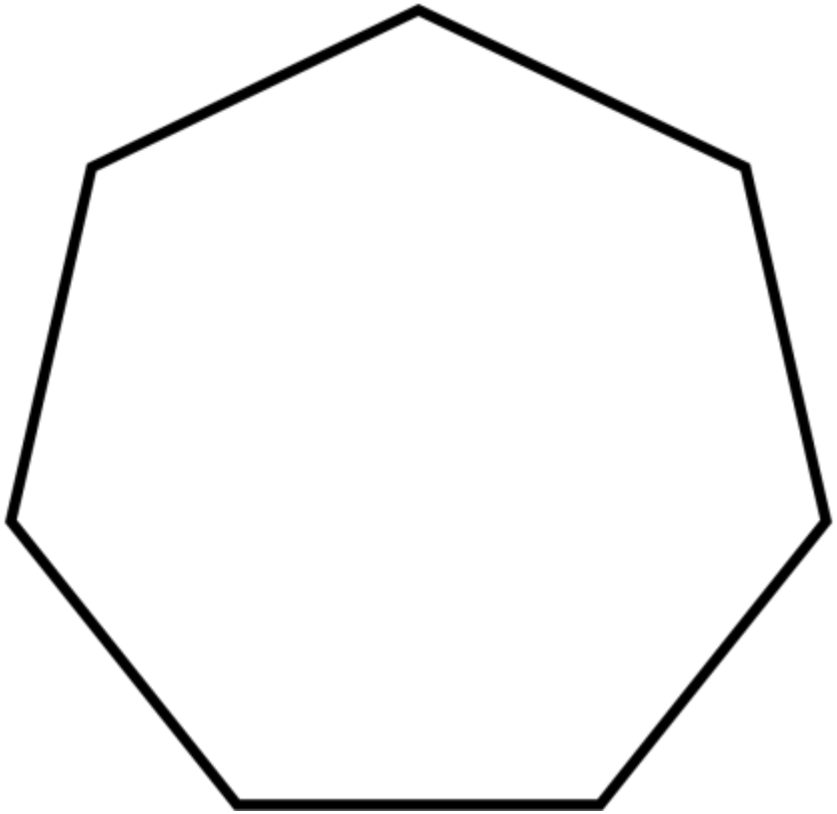


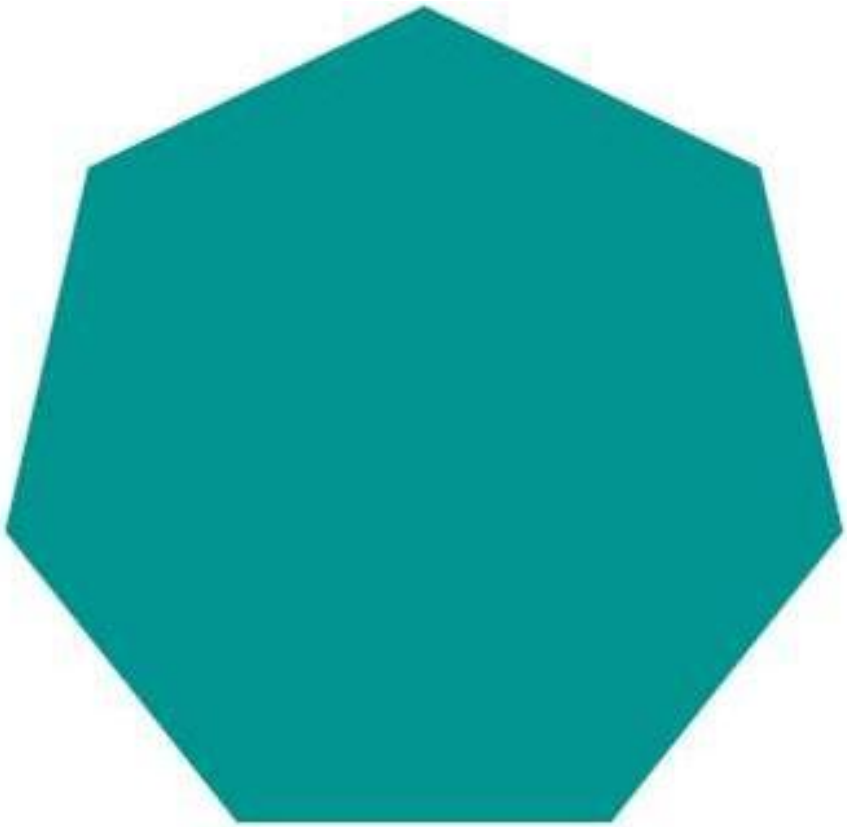


A **Hexagon** is a polygon with six edges and six vertices. Internal angle between two sides of the Hexagon is 120°

Geometric Shapes

Heptagon

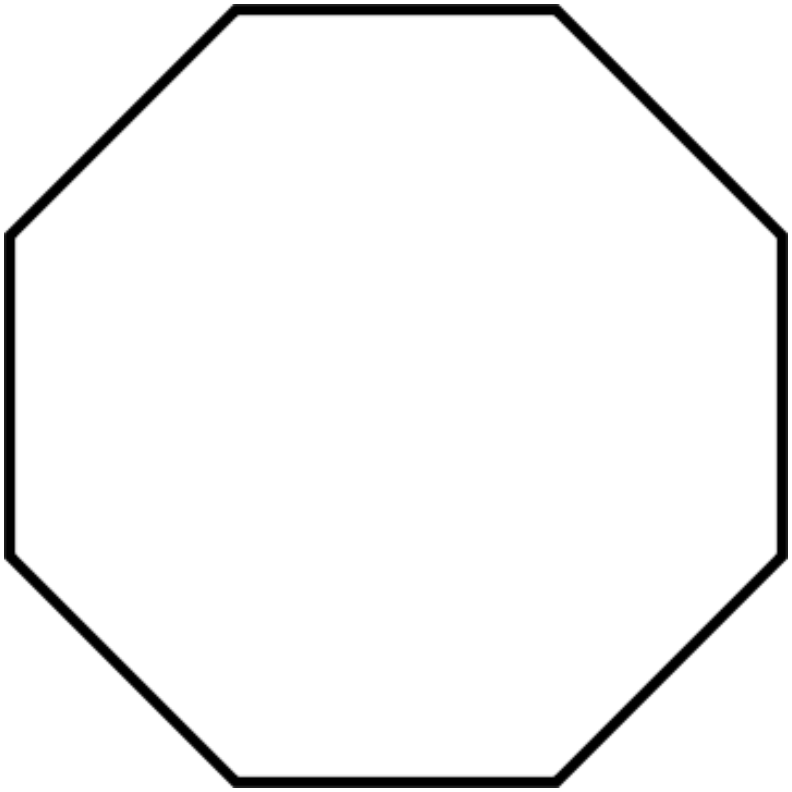


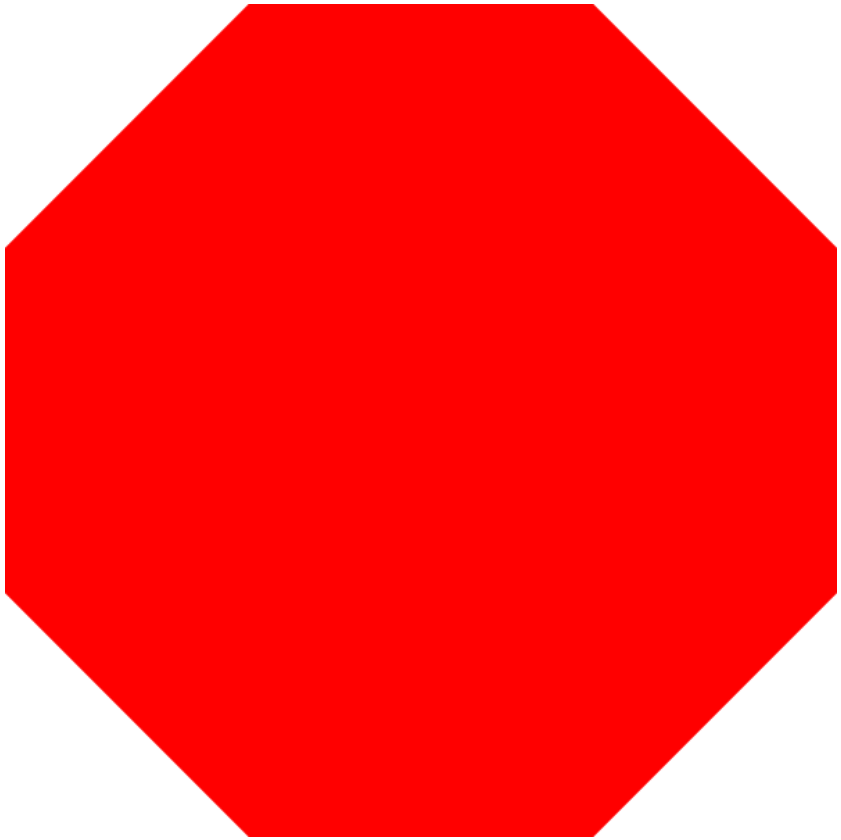


A **Heptagon** is a seven-sided polygon. Internal angle between two sides of any polygon can be calculated by formula:- **[(n-2)x180]/n .** Where n= Number of sides of the polygon

Geometric Shapes

Octagon

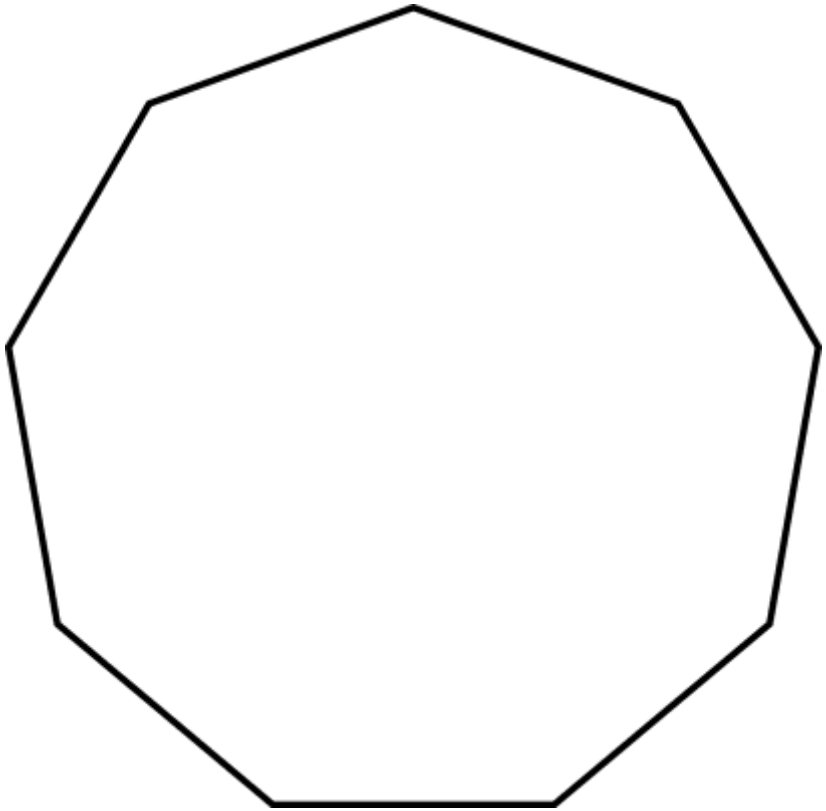


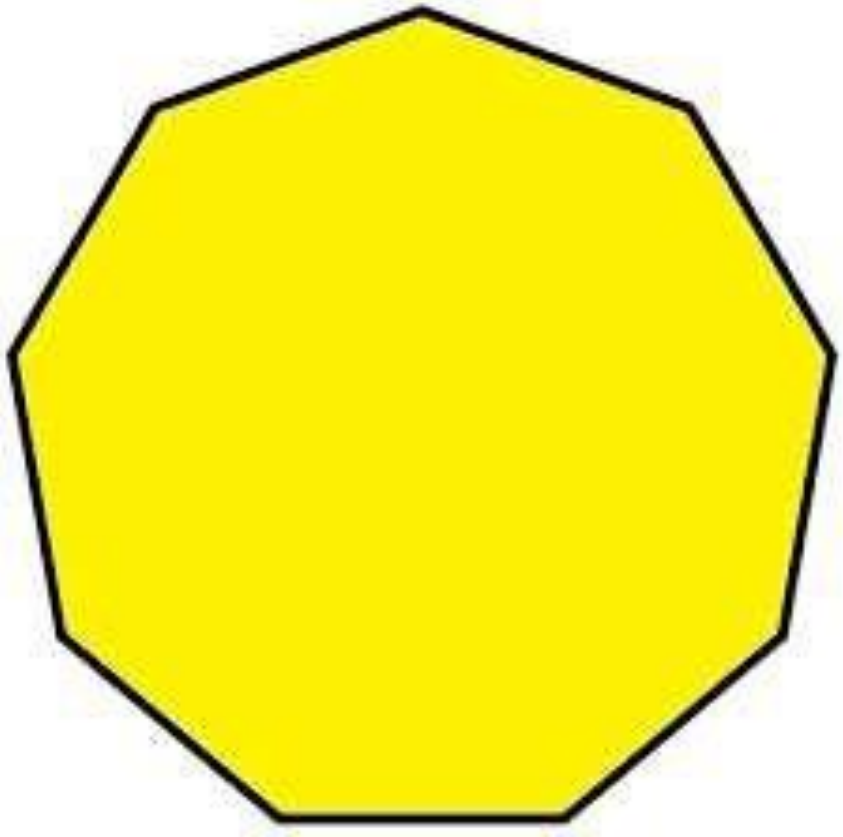


An **Octagon** is a polygon that has eight sides. External angle between two sides of any polygon can be calculated by formula:- **360/n.** Where n= Number of sides of the polygon.

Geometric Shapes

Nonagon

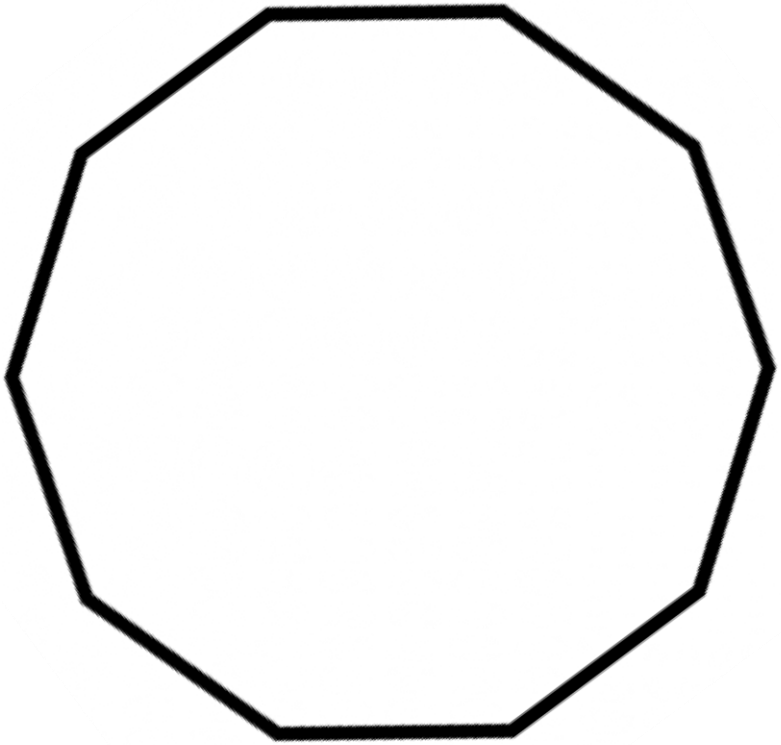


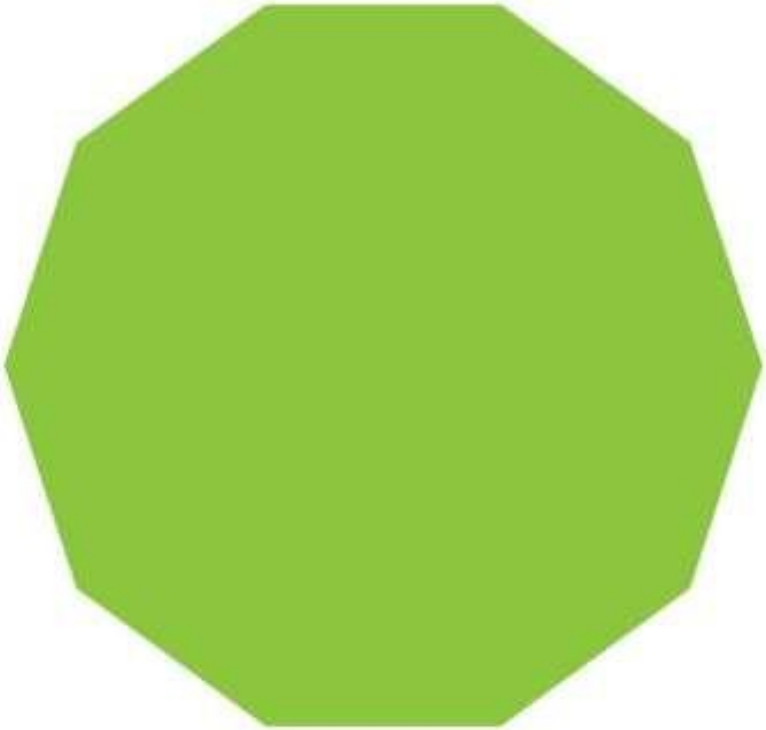


A **Nonagon** is a nine-sided polygon.

Geometric Shapes

Decagon



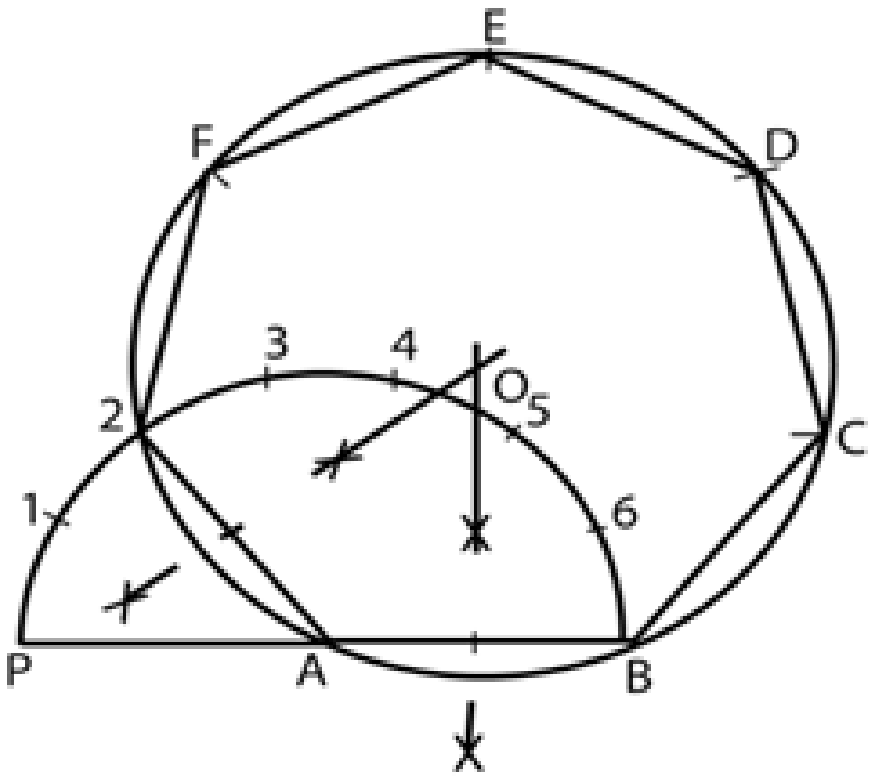


A **Decagon** is any polygon with ten sides and ten angles.

Construction of Regular Polygon of given length AB

Procedure:

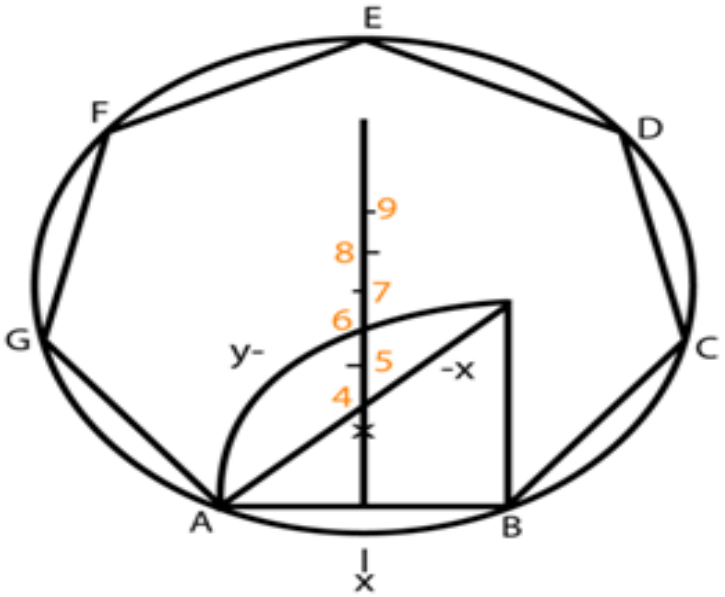
1. Draw a line of length AB. With A as centre and radius AB, draw a semicircle.
2. With the divider, divide the semicircle into the number of sides (example of number of side 7 is shown in figure 1) of the polygon.
3. Draw a line joining A with the second division-point 2.
4. The perpendicular bisectors of A2 and AB meet at O. Draw a circle with centre O and radius OA.
5. With length A2, mark points F, E, D & C on the circumferences starting from 2 (*circumscribed circle method*)

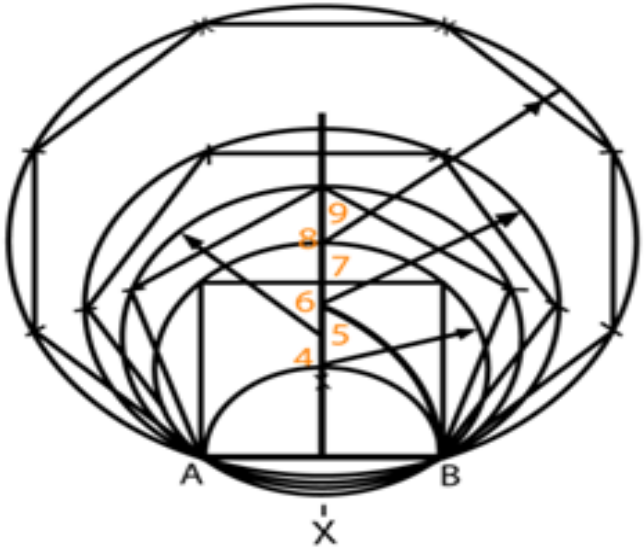


General method of drawing any polygon

Procedure:

1. Draw AB = given length of polygon
2. At B, Draw BP perpendicular & = AB
3. Draw Straight line AP
4. With center B and radius AB, draw arc AP.
5. The perpendicular bisector of AB meets the line AP and arc AP in 4 and 6 respectively.
6. Draw circles with centers as 4, 5,&6 and radii as 4B, 5B, & 6B and inscribe a square, pentagon, & hexagon in the respective circles.
7. Mark point 7, 8, etc with 6-7,7-8,etc. = 4-5 to get the centers of circles of heptagon and octagon, etc.



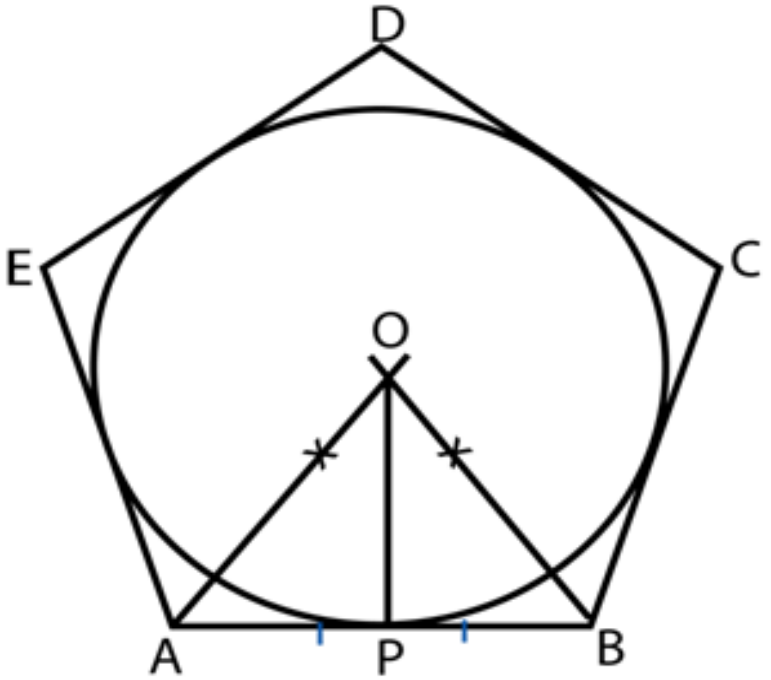


Polygon

Inscribe a circle inside a regular polygon

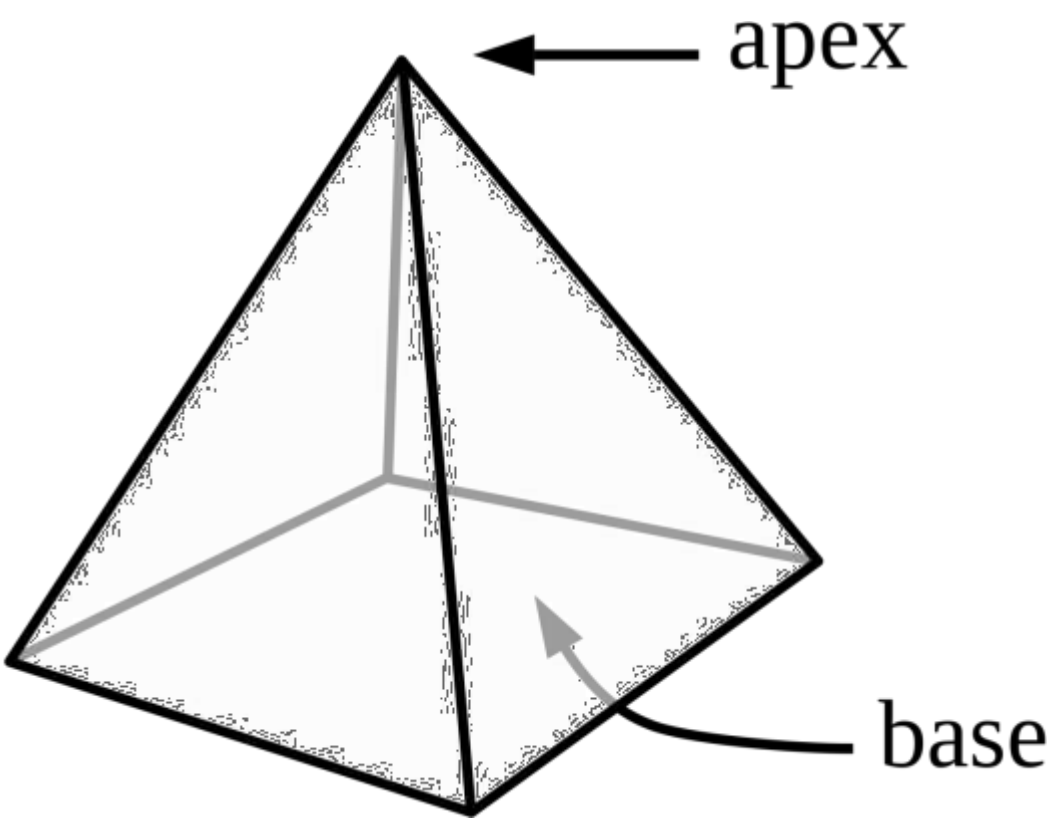
Procedure:

1. Bisect any two adjacent internal angles of the polygon.
2. From the intersection of these lines, draw a perpendicular to any one side of the polygon (say OP).
3. With OP as radius, draw the circle with O as center



Geometric Shapes

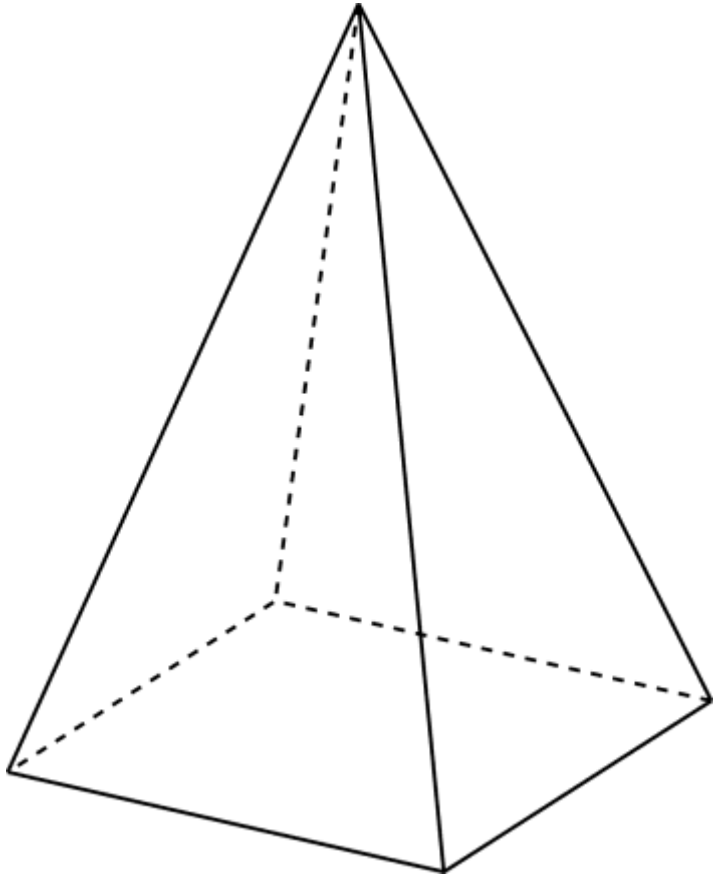
Pyramid

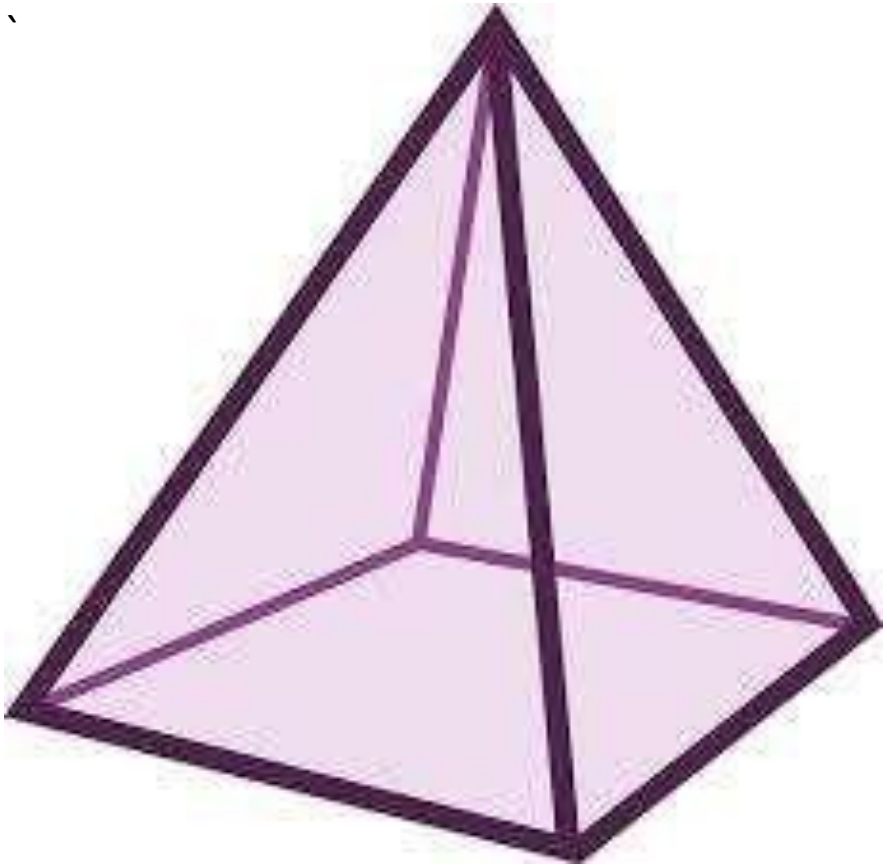


A **Pyramid** is a polyhedron formed by connecting a polygonal base and a point, called the apex. Each base edge and apex form a triangle, called a lateral face. It is a conic solid with polygonal base.

Geometric Shapes

Square Pyramid

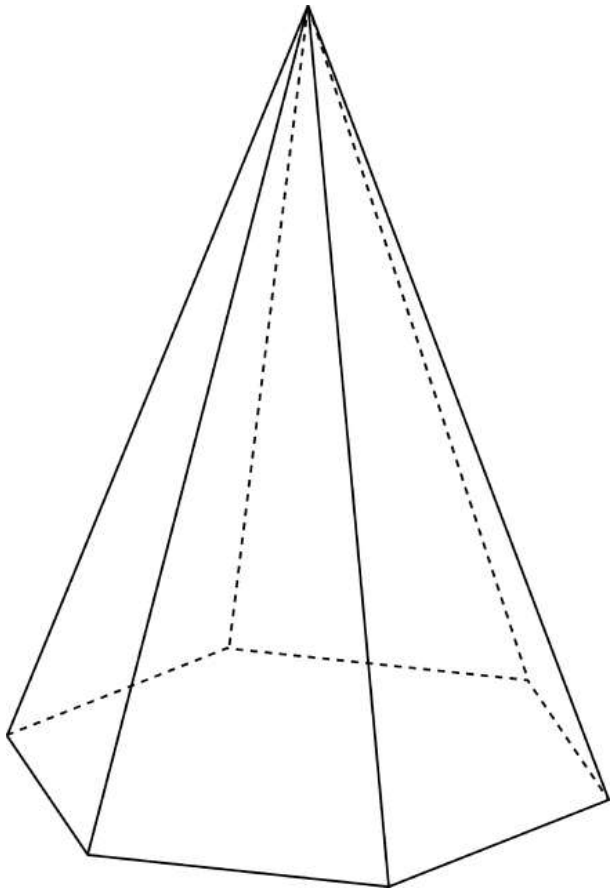


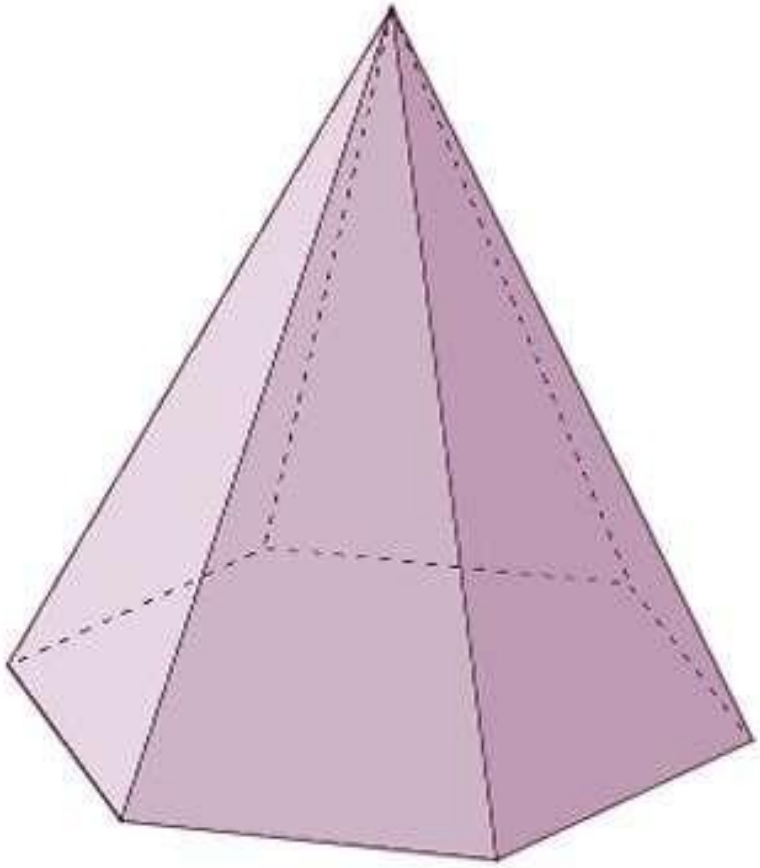


A **Square Pyramid** is a pyramid with a square base. It is a pentahedron. If the four triangles of the square pyramid are equilateral, so that all edges of the square pyramid have the same lengths, then the right square pyramid is the polyhedron known as Johnson solid .

Geometric Shapes

Hexagonal Pyramid

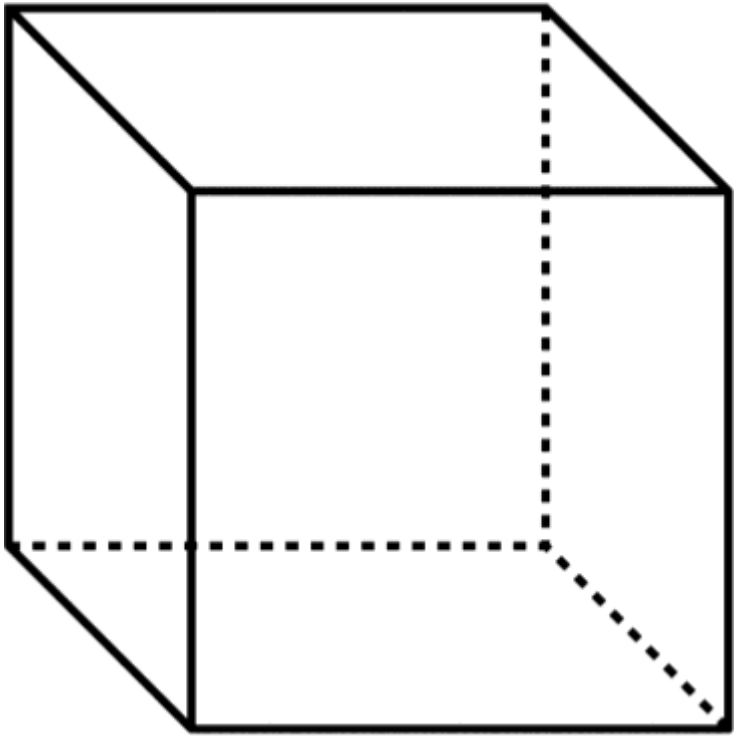


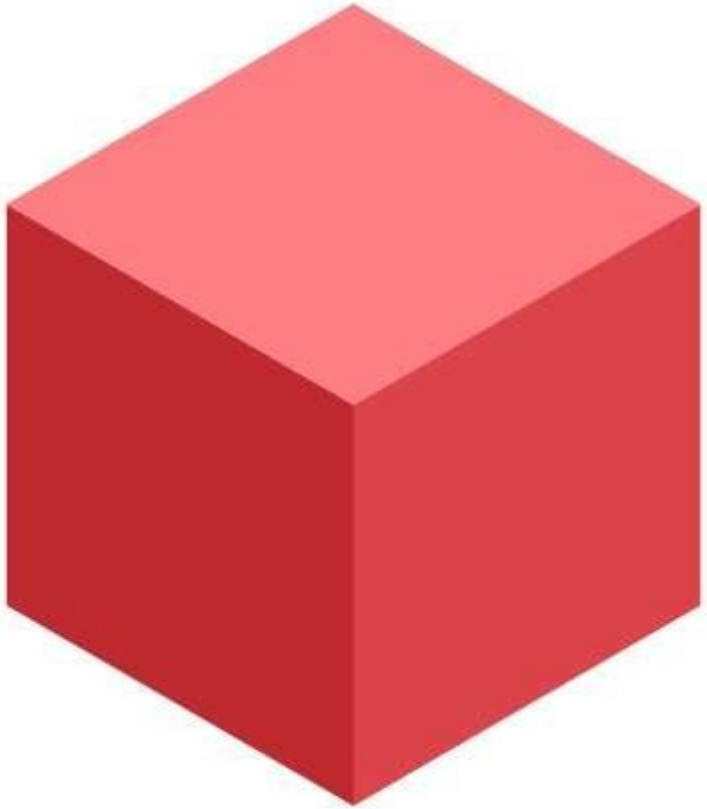


A **Hexagonal Pyramid** is a pyramid with a hexagonal base upon which are erected six triangular faces that meet at a point.

Geometric Shapes

Cube

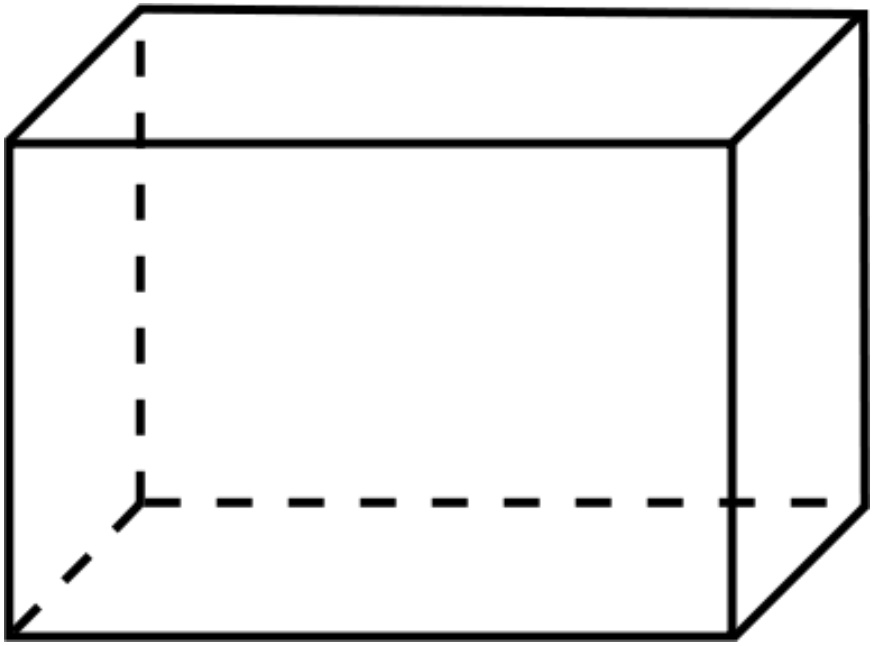


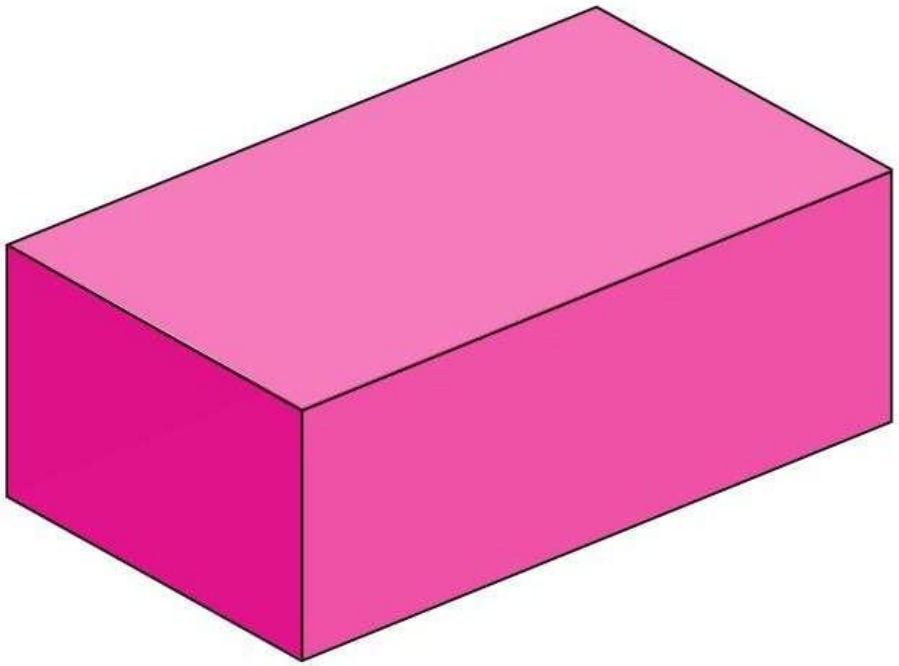


A **Cube** is a three-dimensional solid object bound by six square faces, facets or sides, with three meeting at each vertex.

Geometric Shapes

Cuboid

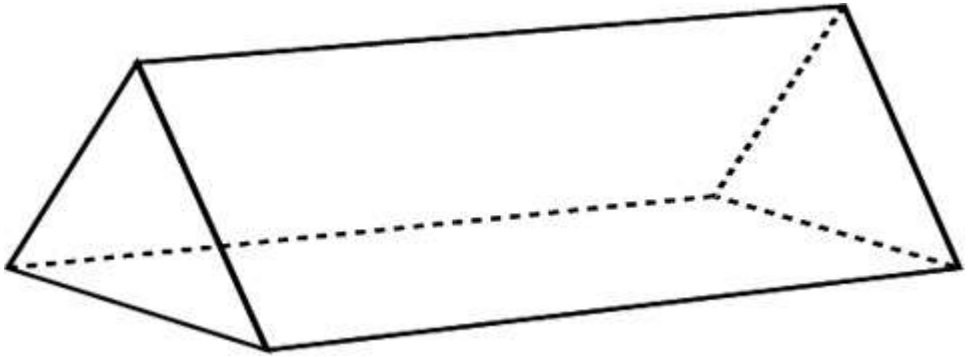


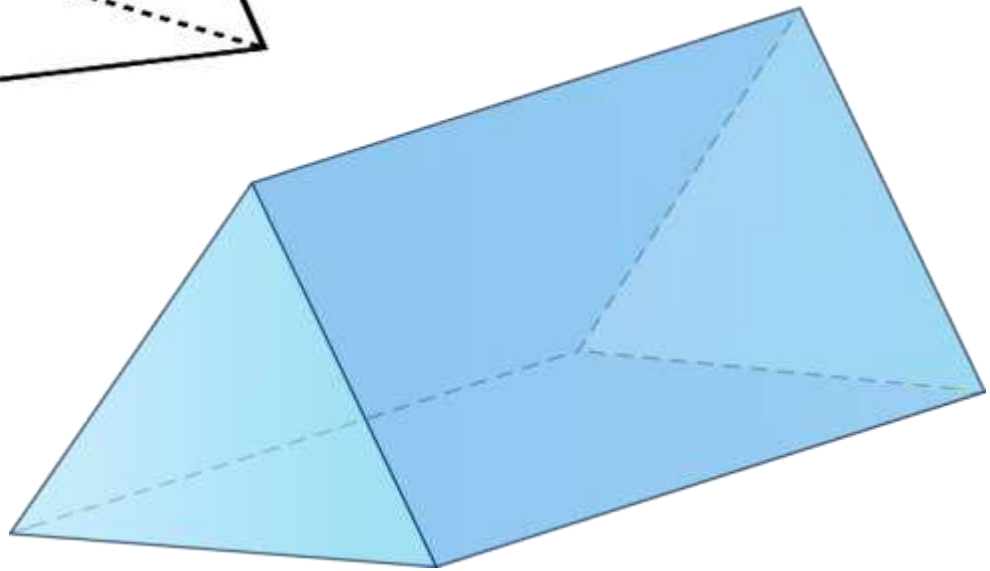


A **Cuboid** is a convex polyhedron bound by six quadrilateral faces. In a rectangular cuboid, all angles are right angles, and opposite faces of a cuboid are equal.

Geometric Shapes

Triangular Prism

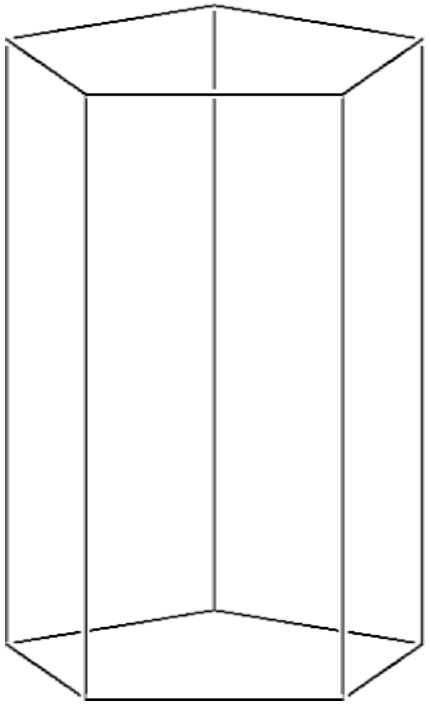


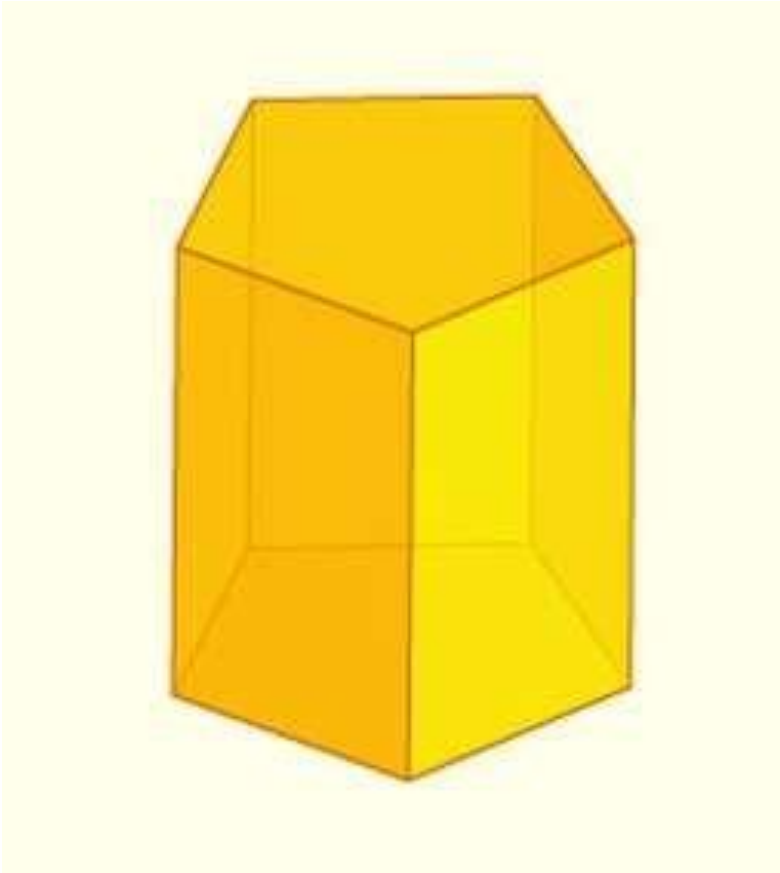


A **Triangular Prism** is a three-sided prism; it is a polyhedron made of a triangular base, a translated copy, and 3 faces joining corresponding sides.

Geometric Shapes

Pentagonal Prism

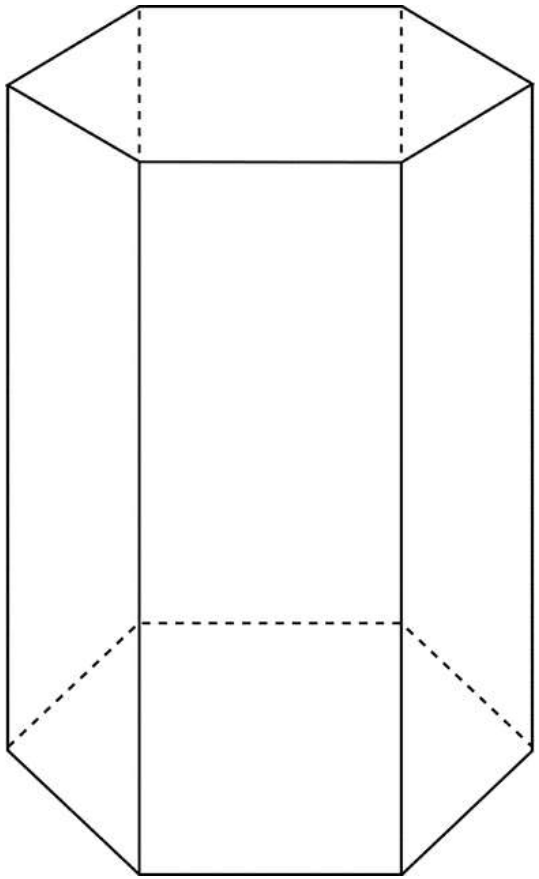


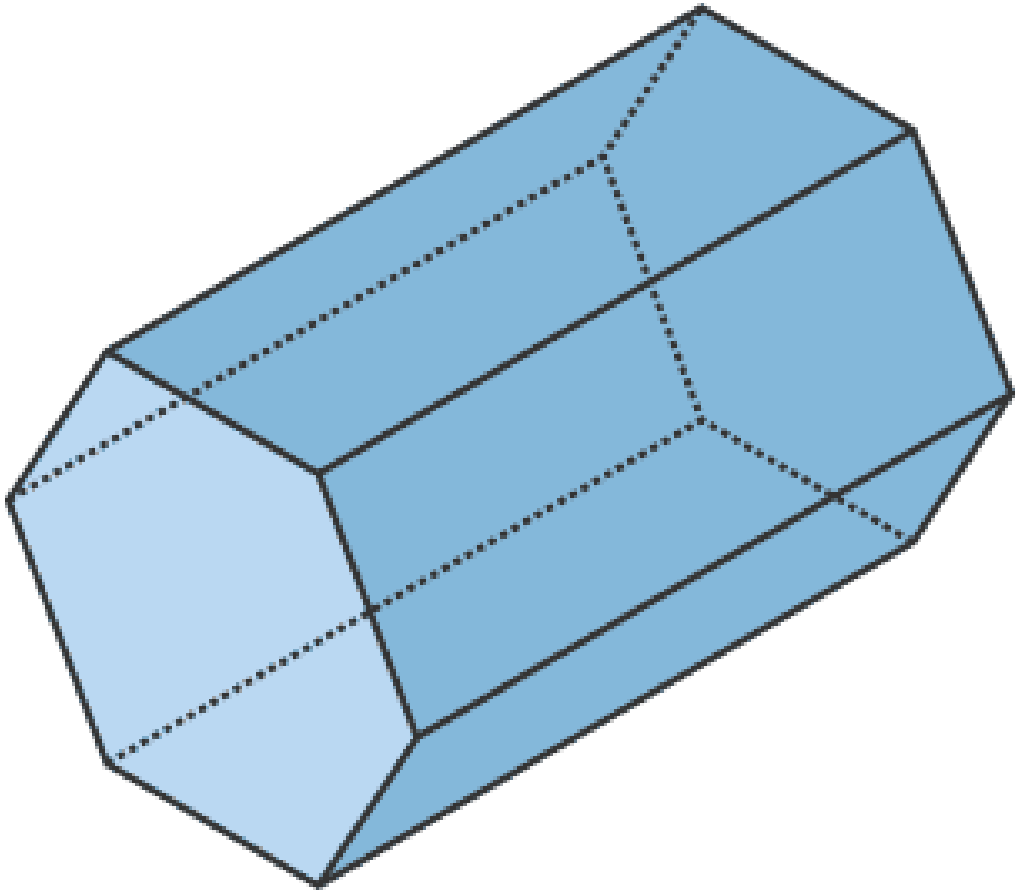


A **Pentagonal Prism** is a prism with a pentagonal base. It is a type of heptahedron with 7 faces, 15 edges, and 10 vertices.

Geometric Shapes

Hexagonal Prism

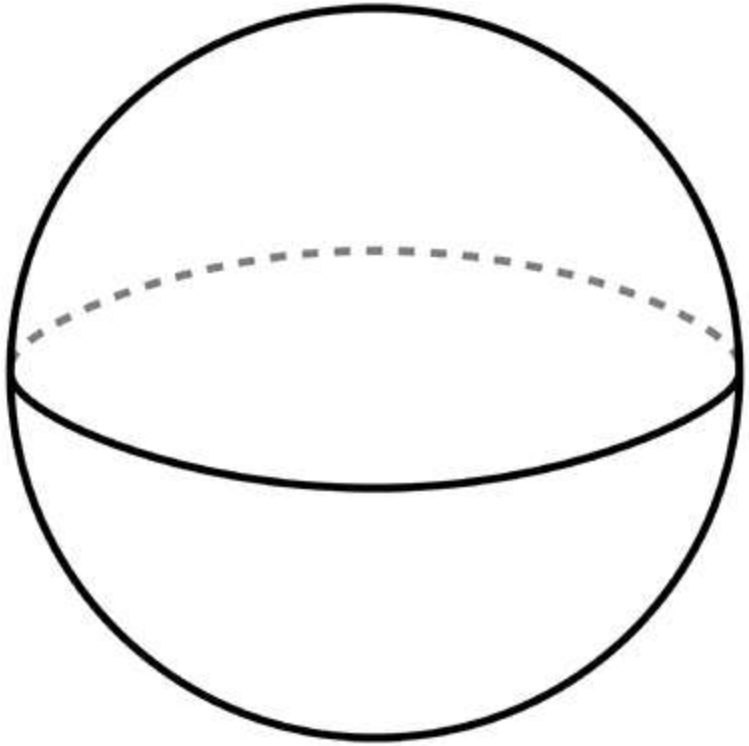


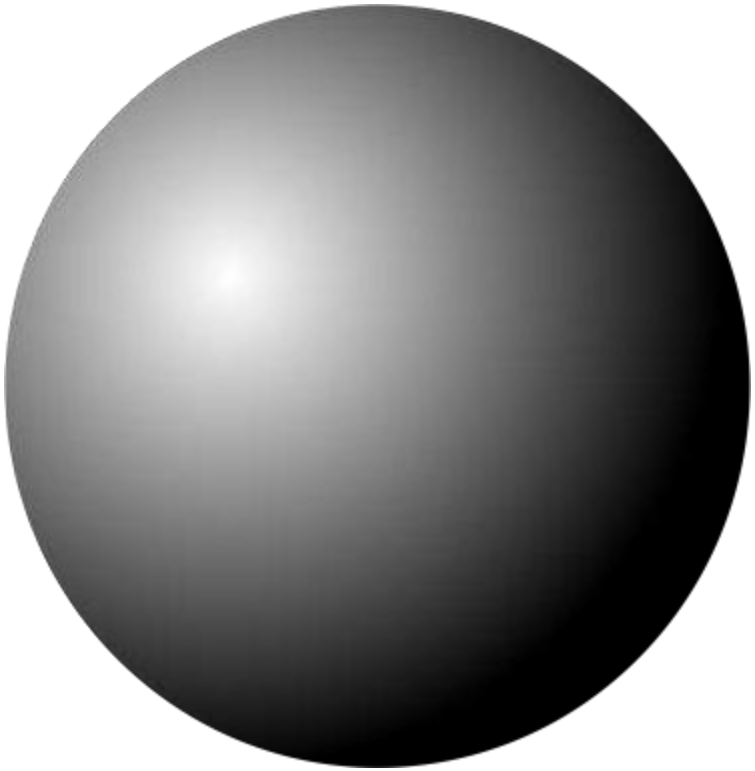


A **Hexagonal Prism** is a prism with a hexagonal base. This polyhedron has 8 faces, 18 edges, and 12 vertices.

Geometric Shapes

Sphere

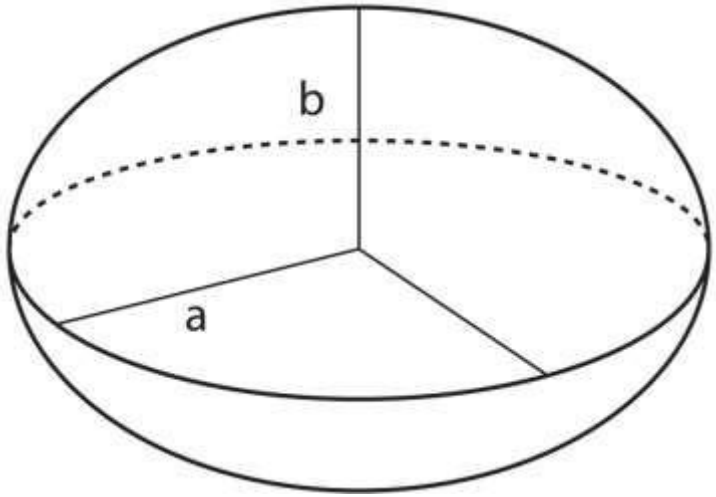


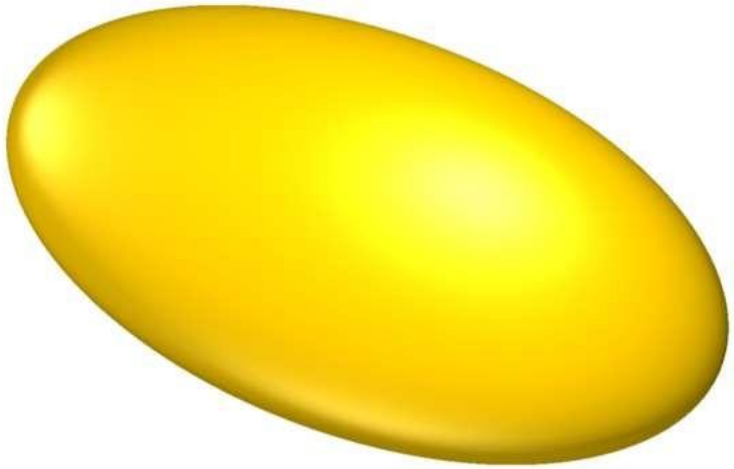


A **Sphere** is a perfectly round geometrical object in three-dimensional space that is the surface of a completely round ball.

Geometric Shapes

Ellipsoid

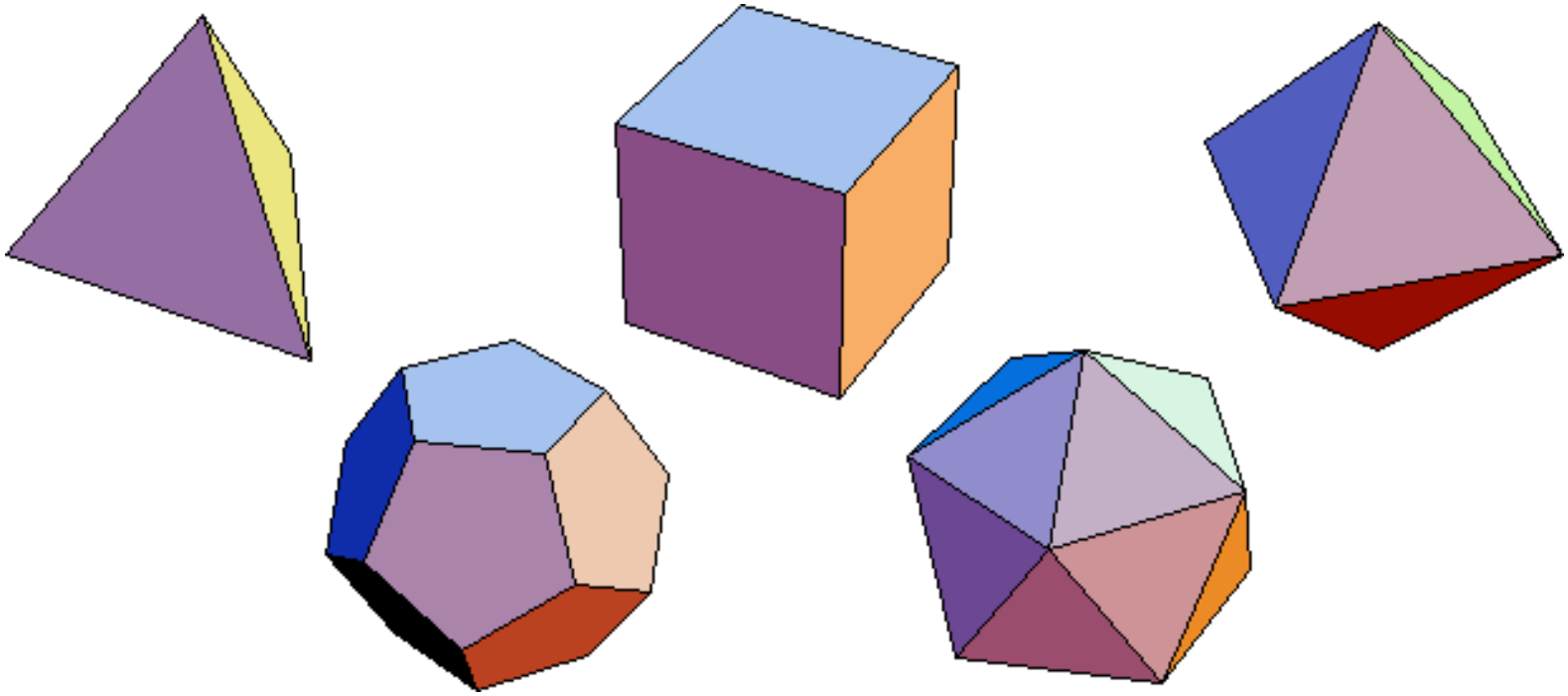




In geodesy, a reference **Ellipsoid** is a mathematically defined surface that approximates the geoid, the truer figure of the Earth, or other planetary body. It is a geometric surface, all of whose plane sections are either ellipses or circles.

Geometric Shapes

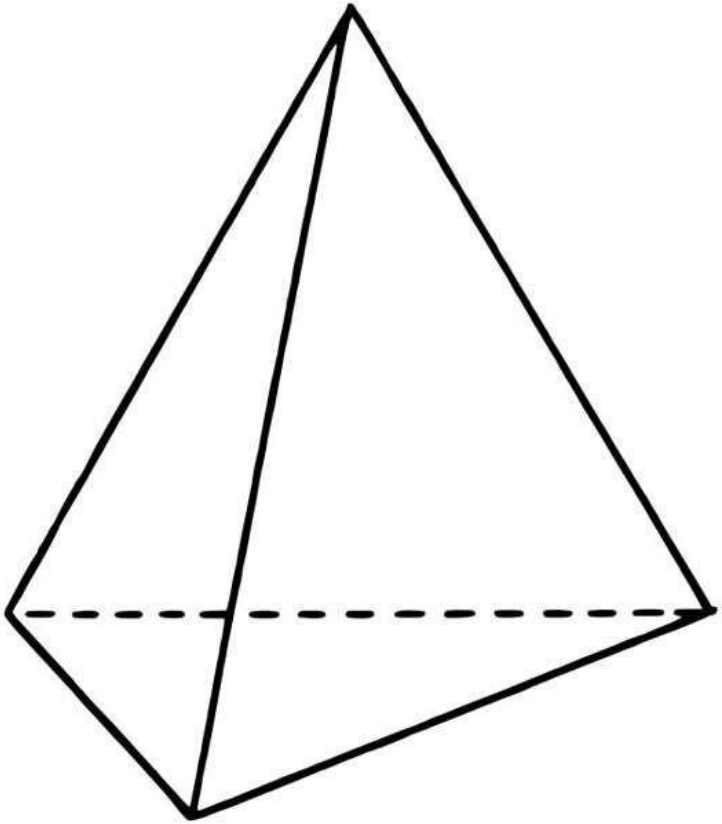
Polyhedron

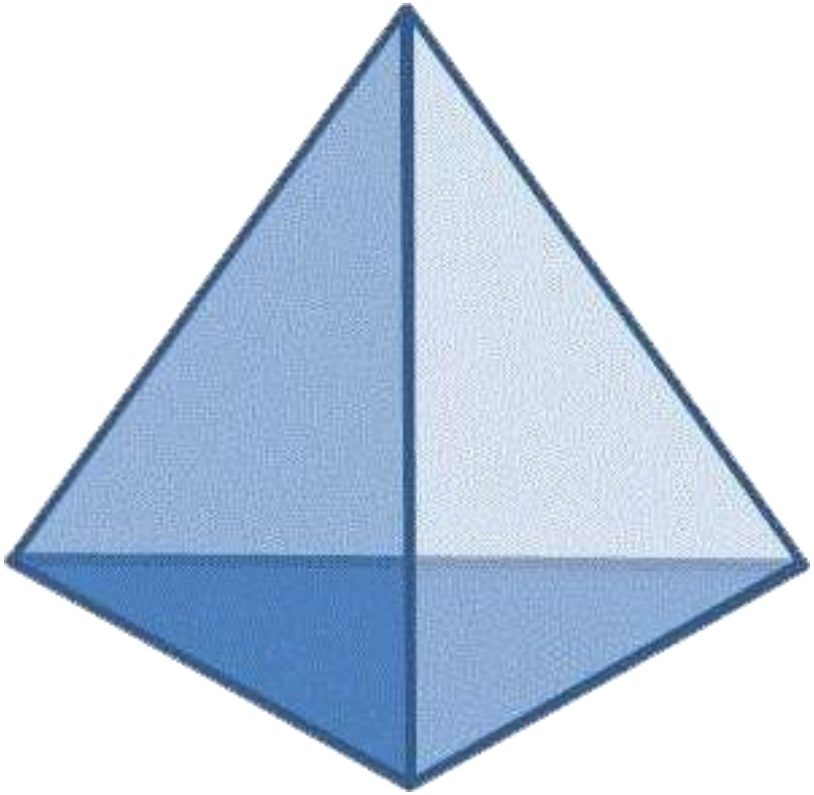


A **Polyhedron** is simply a three-dimensional solid which consists of a collection of polygons, usually joined at their edges.

Geometric Shapes

Tetrahedron

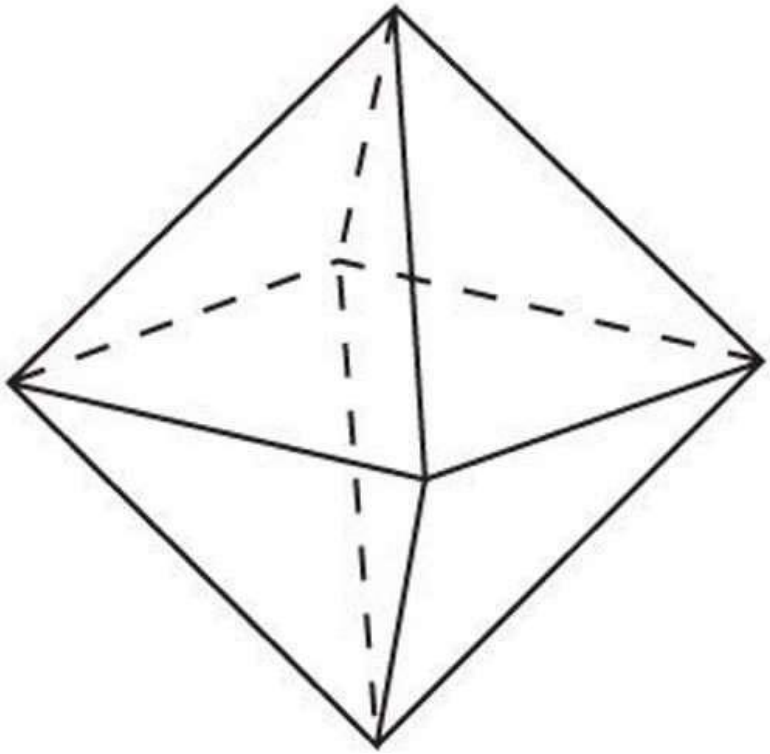


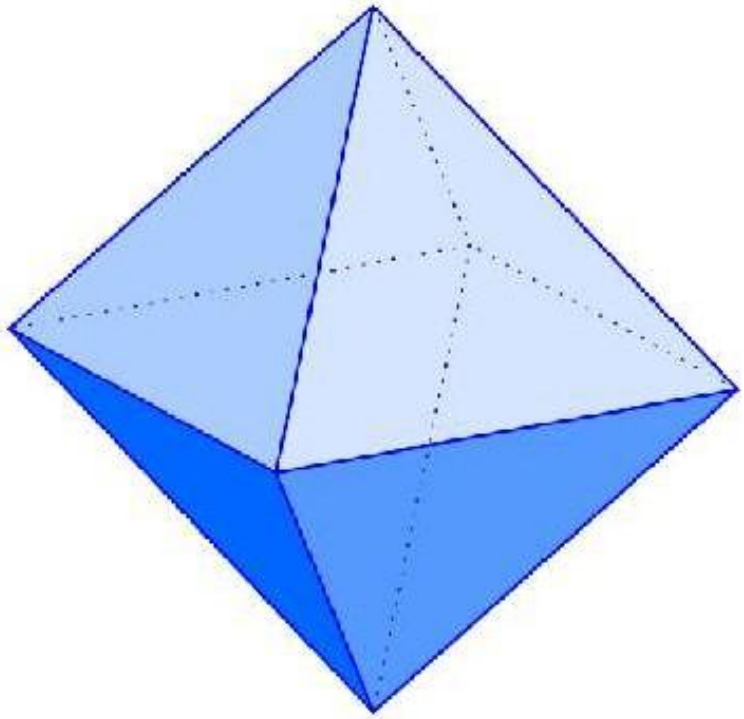


A **Tetrahedron** is a polyhedron composed of four triangular faces, three of which meet at each corner or vertex. It has six edges and four vertices.

Geometric Shapes

Octahedron

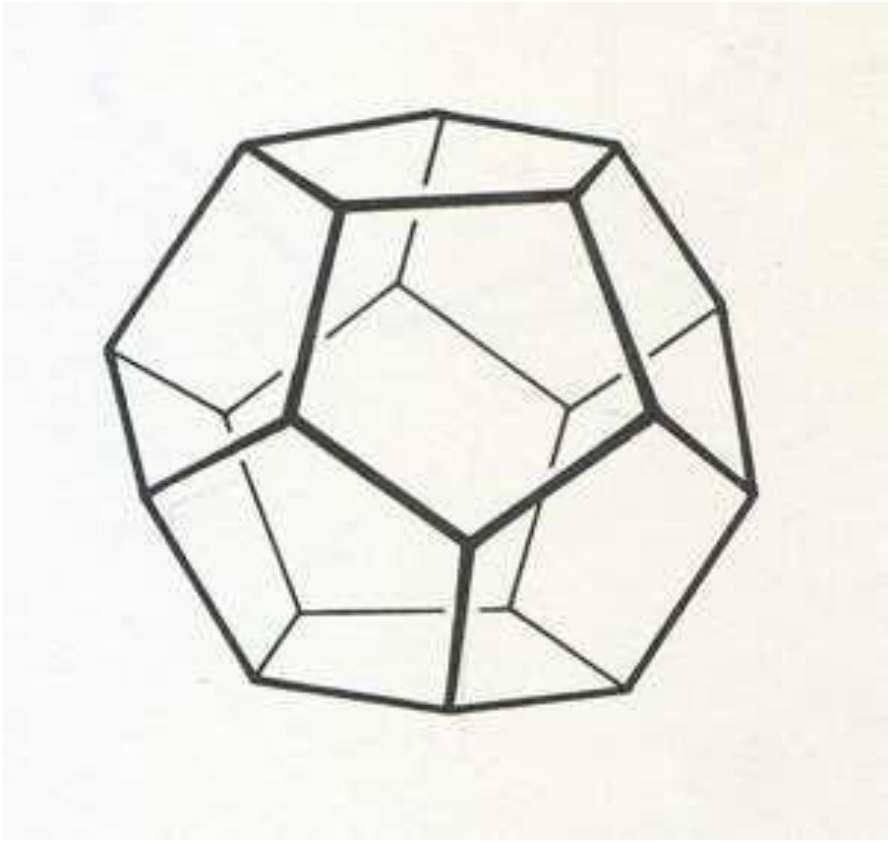


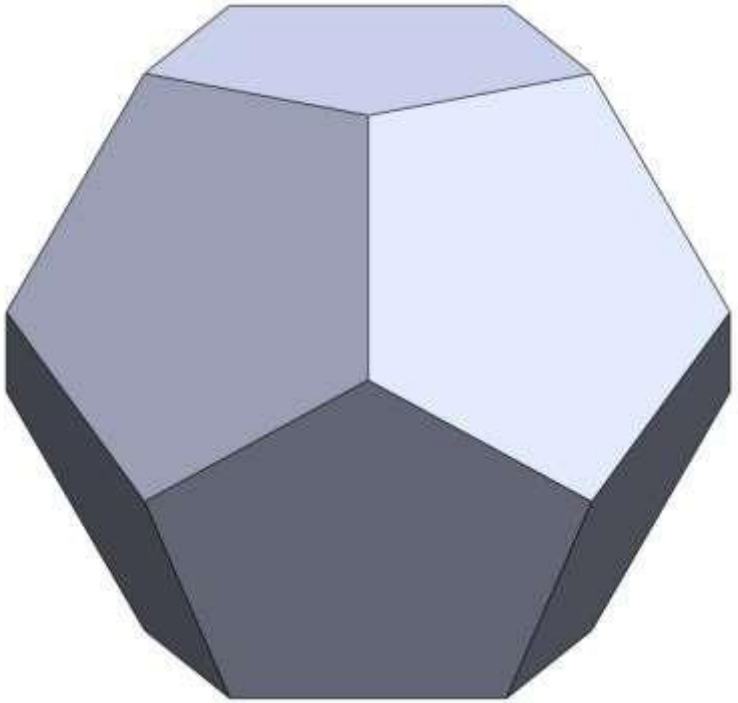


An **Octahedron** is a polyhedron with eight faces. A regular octahedron is a Platonic solid composed of eight equilateral triangles, four of which meet at each vertex. A regular octahedron is the dual polyhedron of a cube. It is a rectified tetrahedron.

Geometric Shapes

Dodecahedron

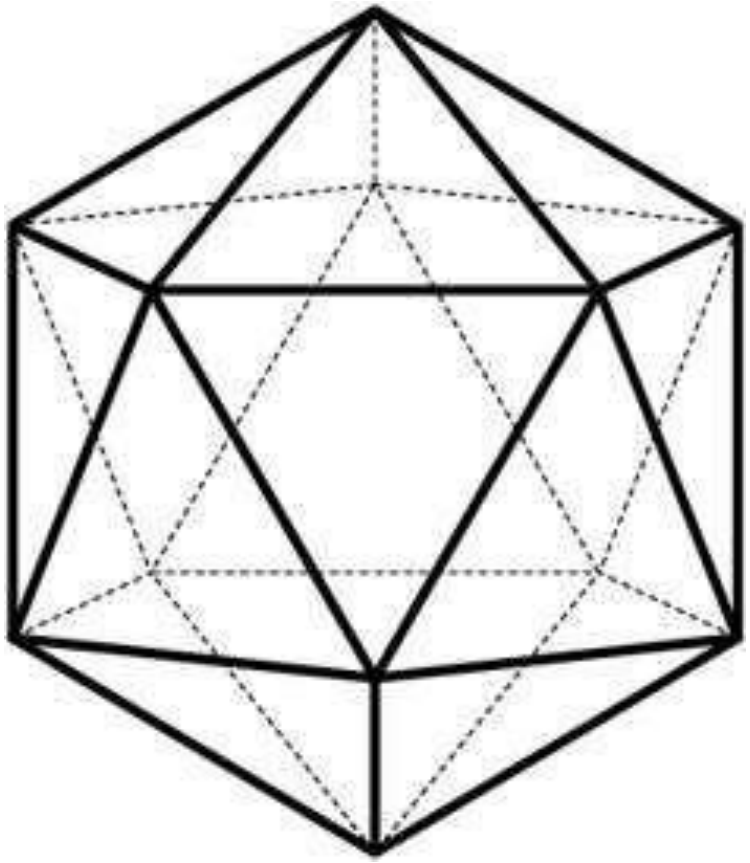




A **Dodecahedron** is any polyhedron with twelve flat faces. It has 30 edges and 20 vertices.

Geometric Shapes

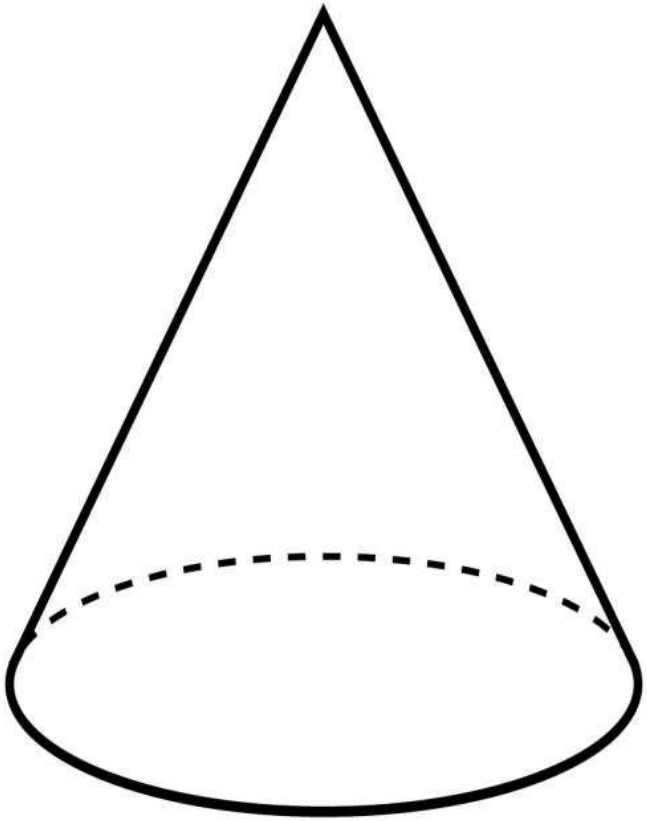
Icosahedron

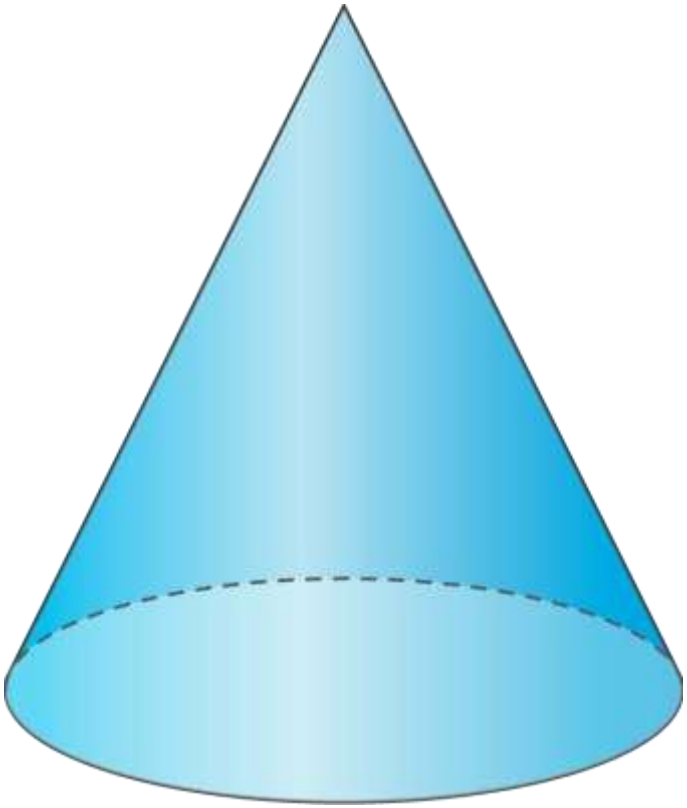


An **Icosahedron** is a polyhedron with 20 faces. It has 30 edges and 12 vertices.

Geometric Shapes

Cone

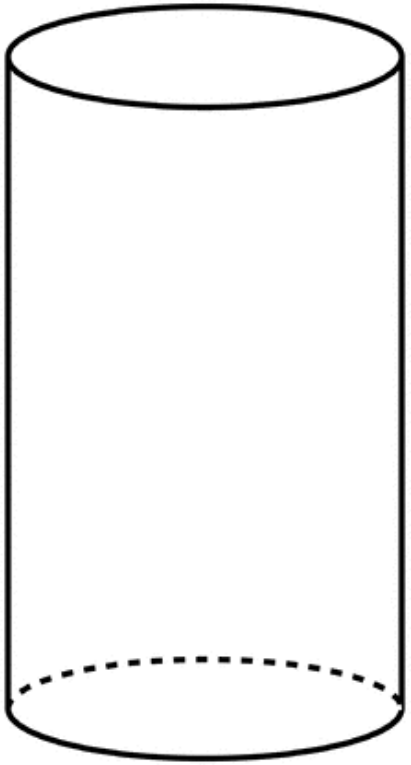


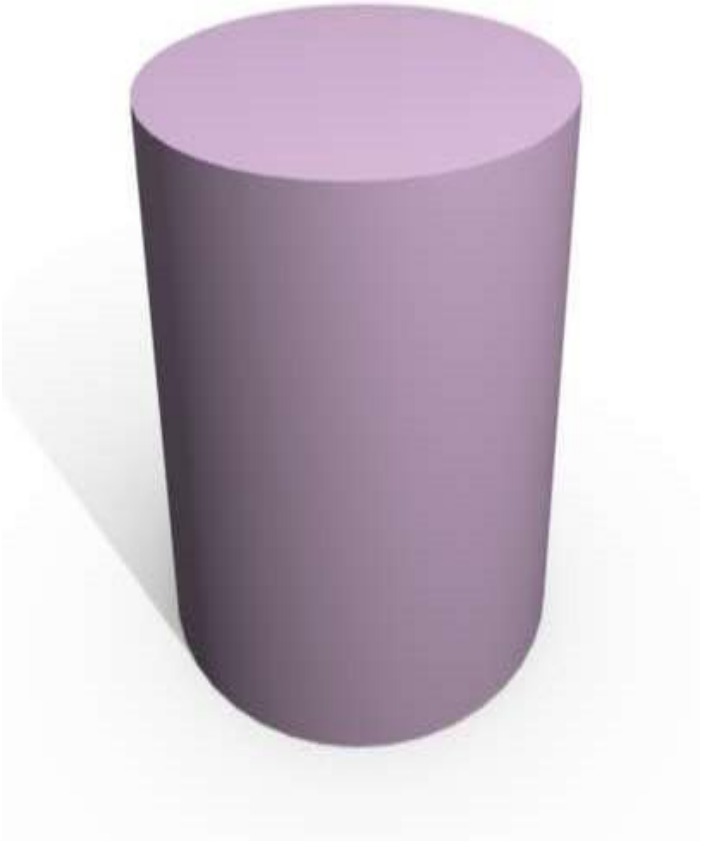


A **Cone** is a three-dimensional geometric shape that tapers smoothly from a flat base (frequently, though not necessarily, circular) to a point called the apex or vertex.

Geometric Shapes

Cylinder

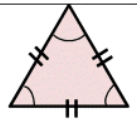
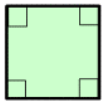
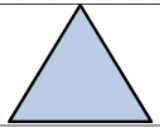
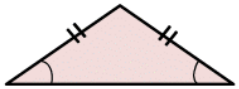
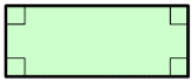
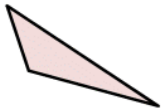
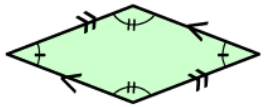
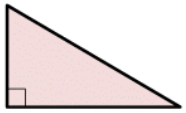
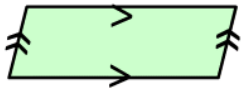
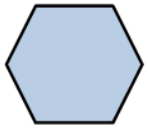
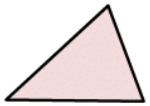
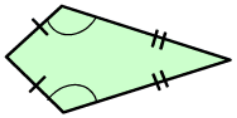
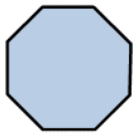
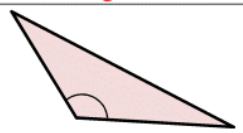
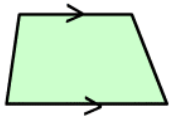
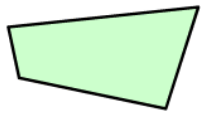
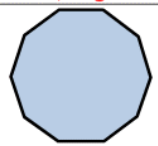




A **Cylinder** is one of the most basic curvilinear geometric shapes, the surface formed by the points at a fixed distance from a given straight line, the axis of the cylinder. It has a flat base and a flat top. The base is the same as the top, and also in-between. It has one curved side.

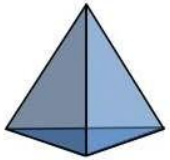
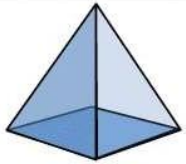
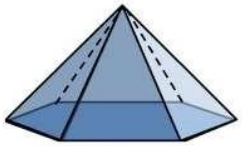
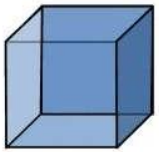
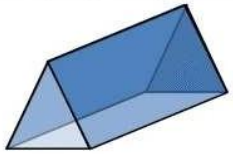
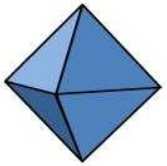
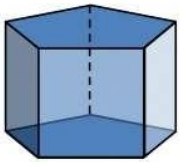
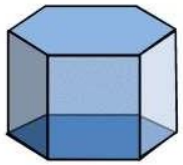
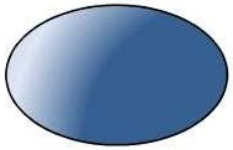
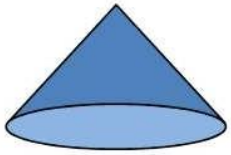
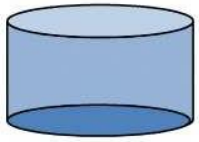
Name Date

GEOMETRY QUICK GUIDE 2: 2D SHAPES (UK)

TRIANGLES	QUADRILATERALS		REGULAR POLYGONS
			
Equilateral triangle All sides equal; interior angles 60°	**Square** All sides equal; all angles 90°		**Equilateral triangle** 3 sides; angle 60°
			
Isosceles triangle 2 sides equal; 2 congruent angles	**Rectangle** Opposite sides equal, all angles 90°		**Square** 4 sides; angle 90°
			
Scalene triangle No sides or angles equal	**Rhombus** All sides equal; 2 pairs of parallel lines; opposite angles equal		**Regular Pentagon** 5 sides; angle 108°
			
Right triangle 1 right angle	**Parallelogram** Opposite sides equal, 2 pairs of parallel lines		**Regular Hexagon** 6 sides; angle 120°
			
Acute triangle All angles acute	**Kite** Adjacent sides equal; 2 congruent angles		**Regular Octagon** 8 sides; angle 135°
			
Obtuse triangle 1 obtuse angle	**Trapezium** 1 pair of parallel sides	**Trapezoid** No pairs of parallel sides	**Regular Decagon** 10 sides; angle 144°

Name Date

GEOMETRY QUICK GUIDE 3: 3D SHAPES

		
Tetrahedron Faces: 4; Edges: 6; Vertices: 4	Square pyramid Faces: 5; Edges: 8; Vertices: 5	Hexagonal pyramid Faces: 7; Edges: 12; Vertices: 7
		
Cube Faces: 6; Edges: 12; Vertices: 8	Cuboid Faces: 6; Edges: 12; Vertices: 8	Triangular prism Faces: 5; Edges: 9; Vertices: 6
		
Octahedron Faces: 8; Edges: 12; Vertices: 6	Pentagonal prism Faces: 7; Edges: 15; Vertices: 10	Hexagonal prism Faces: 8; Edges: 18; Vertices: 12
		
Dodecahedron Faces: 12; Edges: 30; Vertices 20	Sphere Faces: 1; Edges: 0; Vertices 0	Ellipsoid Faces: 1; Edges: 0; Vertices 0
		
Icosahedron Faces: 20; Edges: 30; Vertices: 12	Cone Faces: 2; Edges: 1; Vertices: 0 or 1	Cylinder Faces: 3; Edges: 2; Vertices: 0

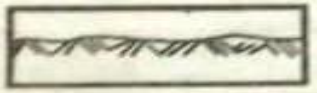
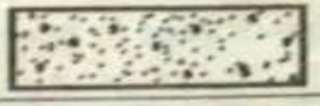
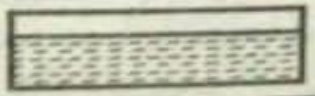
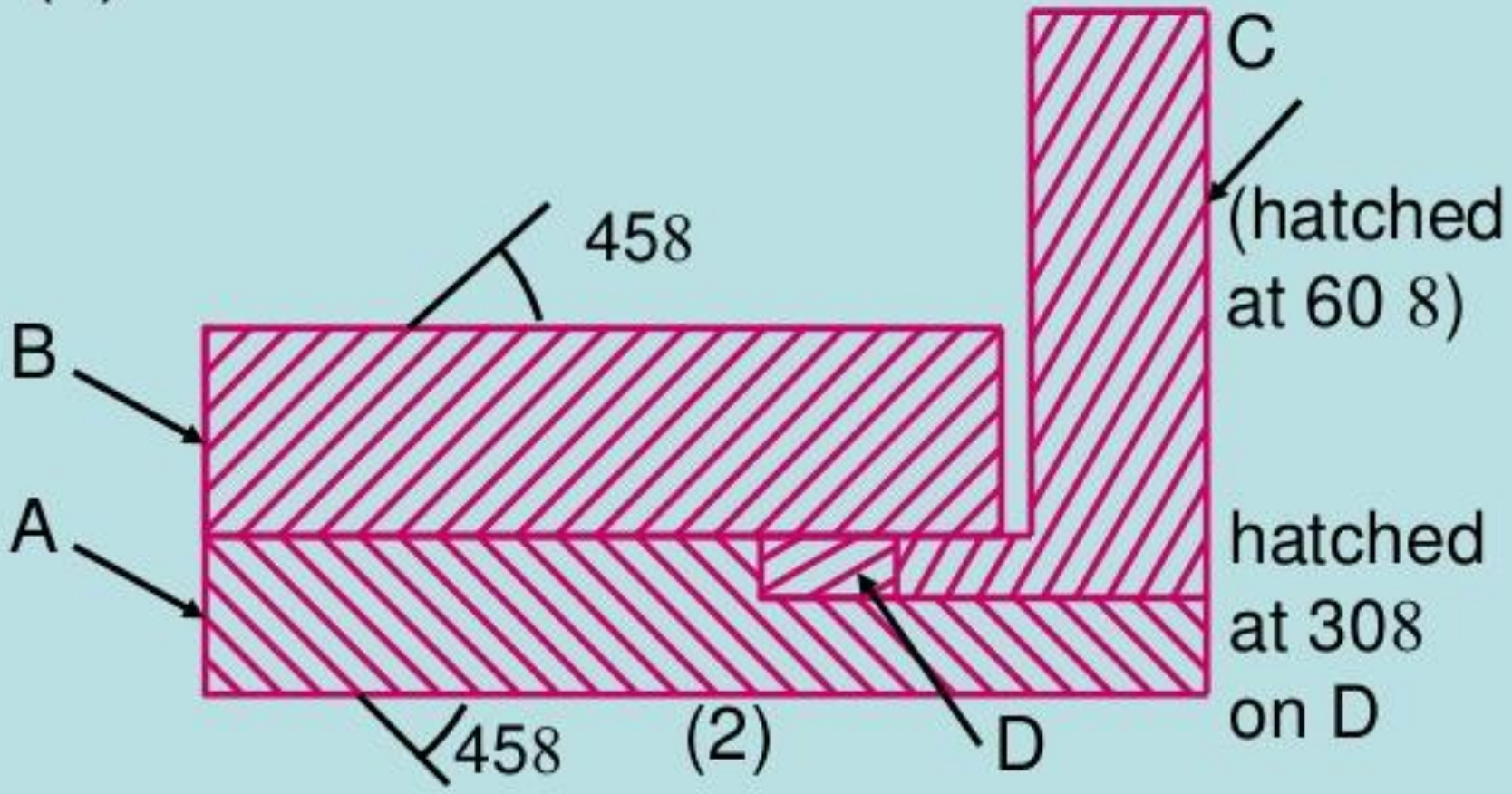
S.No.	Materials	Convention
1.	Steel, cast iron copper, aluminium and its alloys, etc.	
2.	Lead, zinc, tin, white metal, etc.	
3.	Brass, bronze, gun metal, etc.	
4.	Glass	
5.	Porcelain, stone ware, marble, slate, etc.	
6.	Asbestos, felt, paper, mica, cork, rubber, leather, wax, insulating-materials	
7.	Wood, plywood, etc.	
8.	Earth	
9.	Brick work, masonry, fire bricks, etc.	
10.	Concrete	
11.	Water, oil, petrol, kerosine, etc.	

Fig. 4.9 Conventions for various materials

SPECIAL SECTION

Hatching more than two adjacent components at (2)



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