THREE DIMENSIONAL SHAPES

Objects with fixed shape, size, and occupying fixed space are called solids. Solid figures have three dimensions - length, breadth and height.
e.g. A ball, a brick, an ice cream cone and a can.

Face
The flat surface of a solid shape is called a face.

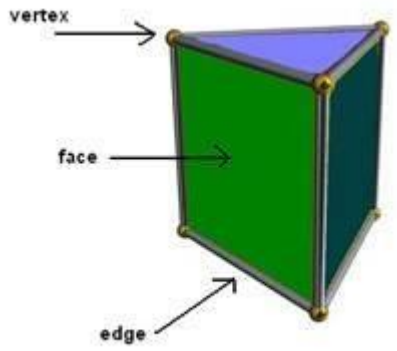
Edge
Any two adjacent faces of a solid shape meet on a line segment called an edge.

Vertex
A vertex of a solid shape is a point where three or more edges meet.

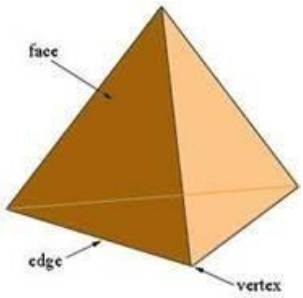
A solid bounded by six rectangular faces is called a **cuboid**. A cuboid has 6 faces, 12 edges and 8 vertices.
A solid bounded by six square faces is called a **cube.**

A solid whose bases are parallel plane polygons and the lateral faces are rectangles is called a **prism.** A **pyramid** is a solid whose base is a plane rectilinear figure whose lateral faces are triangles with a common vertex, called the vertex of the pyramid**.** Prisms and pyramids are named after their bases. The base of a prism can be of any polygonal shape such as triangle and square.

A prism with two congruent triangles as bases which are parallel to each other and three lateral rectangular faces is a Triangular prism. There are 5 faces, 9 edges and 6 vertices in a triangular prism.



There are 4 faces, 6 edges and 4 vertices in a triangular pyramid.

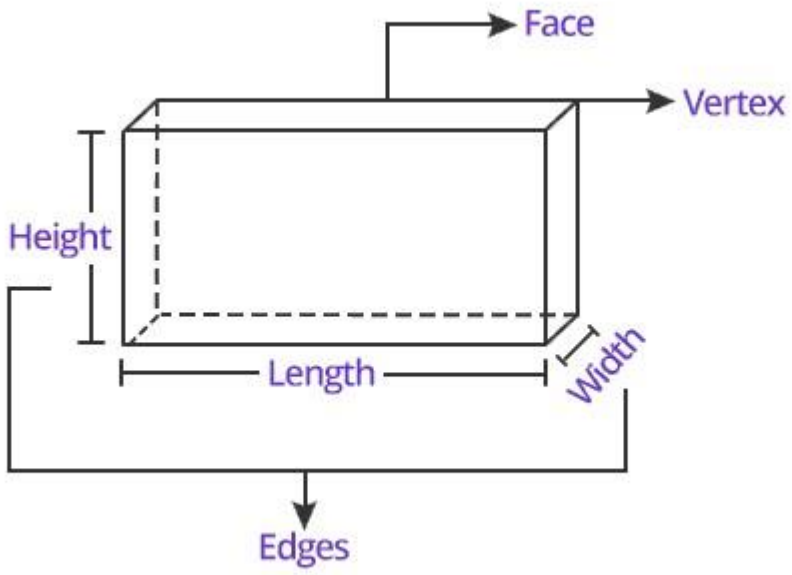


A cylinder has two circular plane surfaces at its base and top. It has a curved surface in the middle. A cylinder has 2 flat faces, 1 curved surface and 2 edges. There are no vertices in a cylinder.

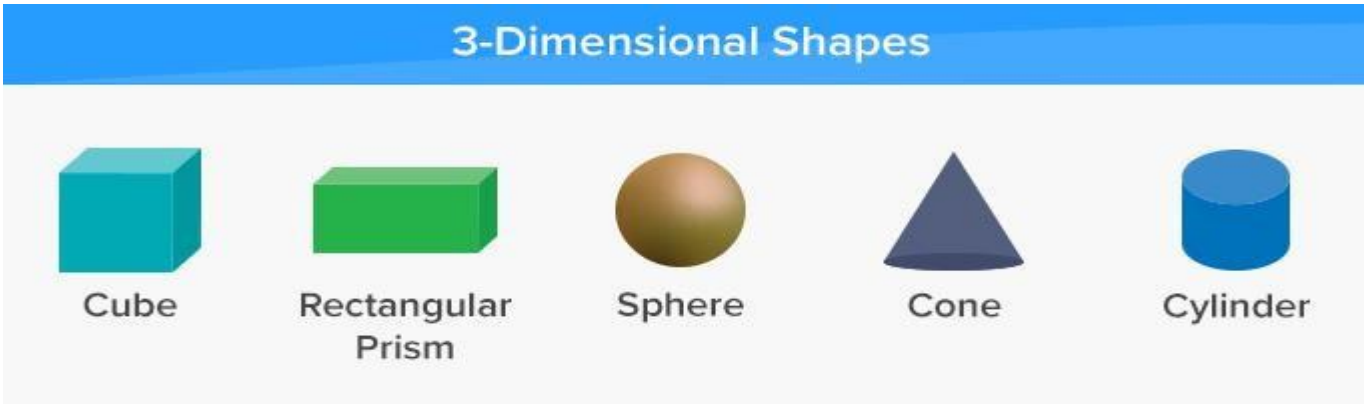
A cone has 1 flat face and 1 curved surface. There are 1 edge and 1 vertex.

The ball-like shape is called a sphere. A sphere has one curved surface, no edge and no vertex. The attributes of a three-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.

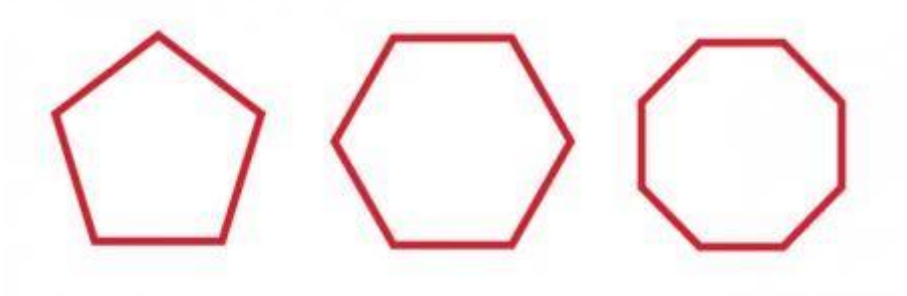


Here's a list of the 3-D or three-dimensional shapes with their name, pictures and attributes.

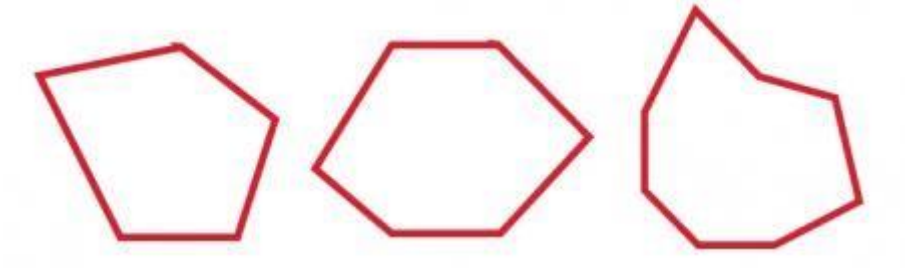
Name of 3D shape:	**Picture of 3D shape**:	**Attributes**:
Cube		Faces - 6 Edges - 12 Vertices - 8
Rectangular Prism or Cuboid		Faces - 6 Edges - 12 Vertices - 8
Sphere		Curved Face - 1 Edges - 0 Vertices - 0
Cone		Flat Face - 1 Curved Face - 1 Edges - 1 Vertices - 1
Cylinder		Flat Face - 2 Curved Face - 1 Edges - 2 Vertices - 0

REGULAR AND IRREGULAR SHAPES

Regular shapes have **sides that are all equal and interior (inside) angles that are all equal.**
Irregular shapes have **sides and angles of any length and size**. Here are various different shapes in regular and irregular forms:



Regular pentagon, regular hexagon, regular octagon



Irregular pentagon, irregular hexagon, irregular octagon

What are regular shapes?

Regular means ordered or predictable. Children are taught the names of shapes (or polygons) from a very early age and usually shown the regular version of the shapes to help with easy recognition. Here are the most common ones:

What are irregular shapes?

Irregular means not even or balanced. Irregular shapes (or polygons) are often much harder for children to name because they don't look like the more conventional regular shapes. In fact, they can be any straight-sided shape. Their name is often determined by the number of straight sides that they have, although some irregular polygons have special names like parallelograms, rhombus or kite.

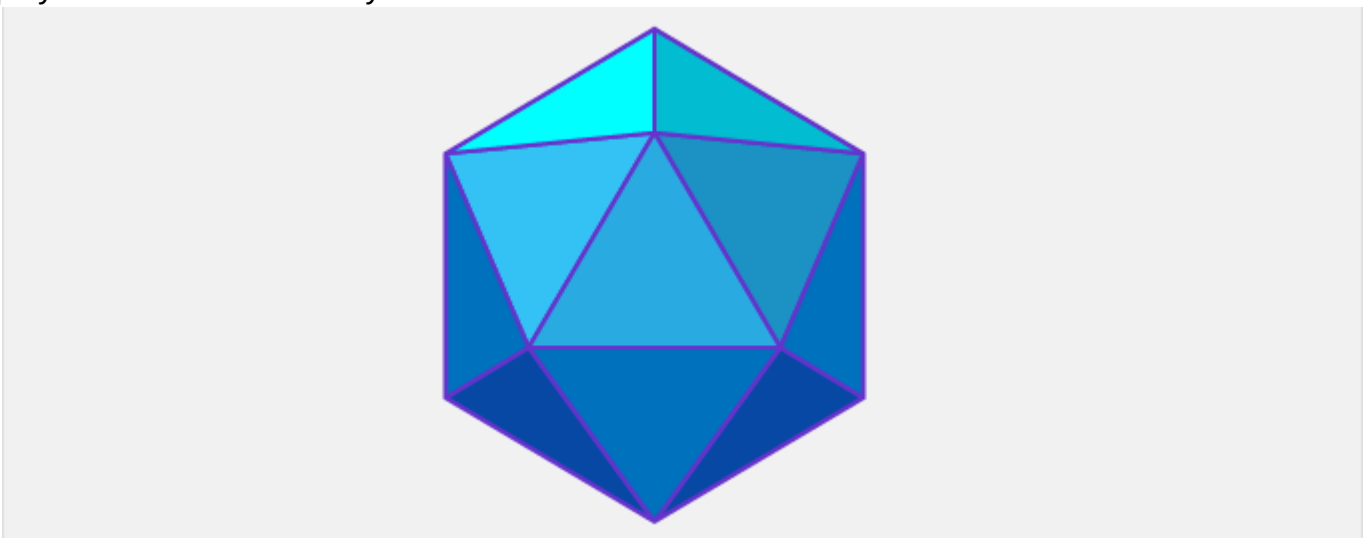
LINK OF SOME OF THE VIDEOS

https://www.youtube.com/watch?v=f6DZoX5dKbE

https://www.youtube.com/watch?v=-uci89ZlbnM

Polyhedron

A polyhedron is a 3-dimensional solid made by joining together polygons.
The word 'polyhedron' comes from two Greek words, poly meaning many, and hedron referring to surface.
The polyhedrons are defined by the number of faces it has.

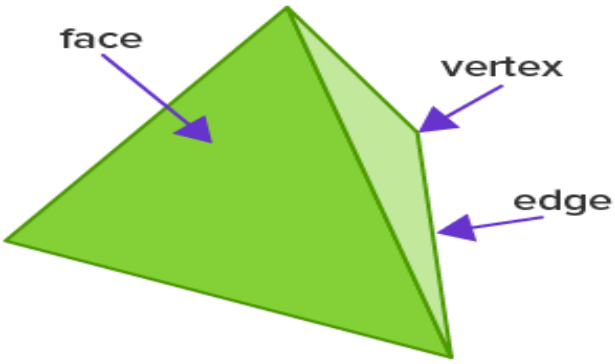


An example of a polyhedron

Parts of a polyhedron

Every polyhedron has three parts:

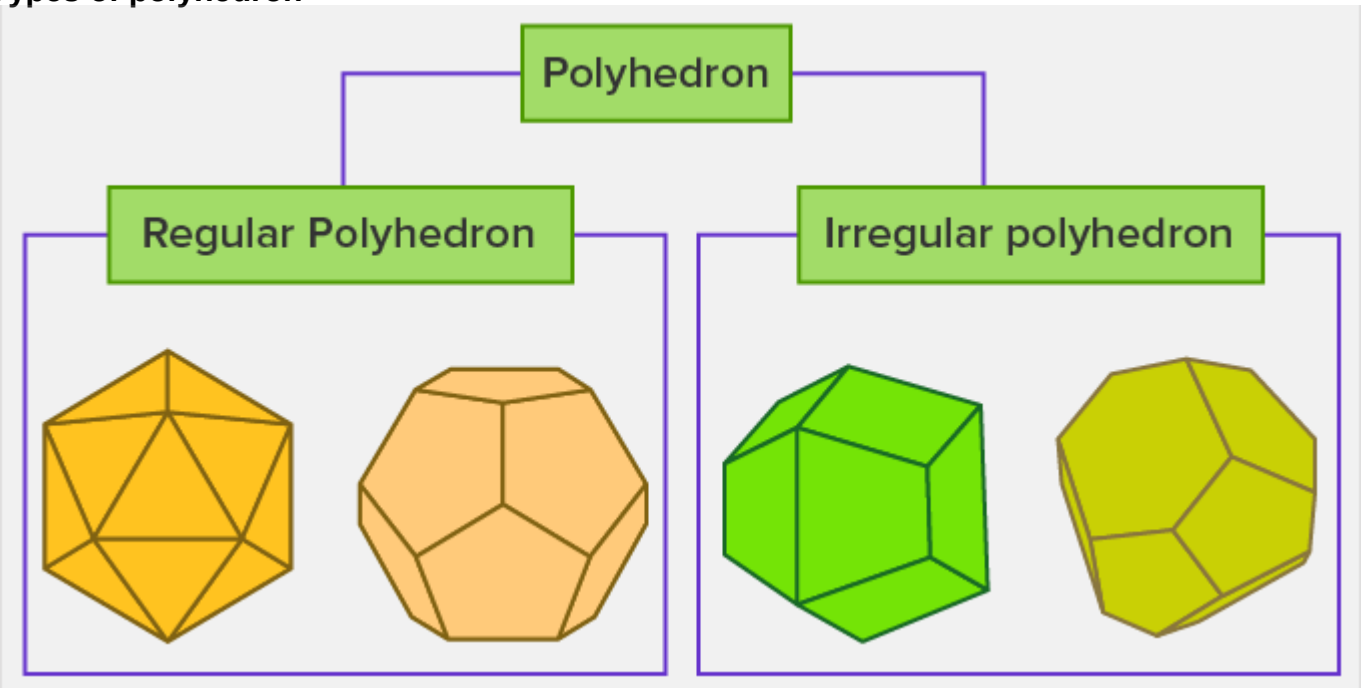
- **Face**: the flat surfaces that make up a polyhedron are called its faces. These faces are regular polygons.
- **Edge**: the regions where the two flat surfaces meet to form a line segment are known as the edges.
- **Vertex**: It is the point of intersection of the edges of the polyhedron. A vertex is also known as the corner of a polyhedron. The plural of vertex is called vertices.



The names of the polyhedrons are derived from the number of faces they have:

Name	No. of faces
Tetrahedron	A polyhedron with 4 faces.
Pentahedron	A polyhedron with 5 faces.
Hexahedron	A polyhedron with 6 faces.
Heptahedron	A polyhedron with 7 faces.
Octahedron	A polyhedron with 8 faces.
Nonahedron	A polyhedron with 9 faces.
Decahedron	A polyhedron with 10 faces

Types of polyhedron



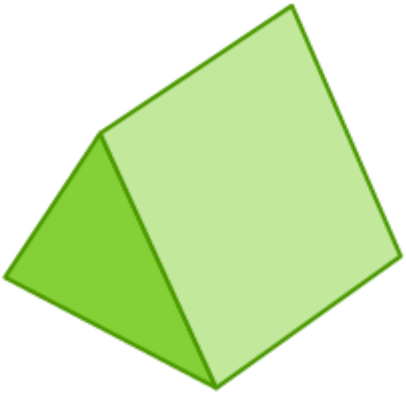
Regular Polyhedron

A regular polyhedron is made up of regular polygons. Such solids are also known as ‘platonic solids’

Irregular polyhedron

An irregular polyhedron is formed by polygons of different shapes where all the components are not the same. This means that all the sides of an irregular polyhedron are not equal. Some of the regular polygons are described in the table below:

Polyhedrons in everyday life

Examples	Images
Houses/Buildings: Most of the houses around us are polyhedrons as they are made of flat surfaces.	
A prism: A prism is made of three rectangles joined together with triangular bases	
A football or a soccer ball	
Pyramids: A polyhedron with four sides is a tetrahedron and is also called a pyramid.	

Eulers Relationship:

1. It states that in any polyhedron, we have $V + F - E = 2$
   V = Number of vertices in the polyhedron.
   F = Number of faces in the polyhedron
   E = Number of edges in the polyhedron.

Project :

1. **Verify eulers relationship for cuboid ,tetrahedron , triangular pyramid and Prism with hexagonal base.**

2. **Solve the given worksheet.**

Name: _____ Grade: VIII

Visualising Solid Shapes

1. Draw the top, side and front views of the following.

2. Name the following solid shapes.

3. State the Euler's formula for polyhedrons.

4. Using Euler's formula, find the unknown.

Faces	6	5	20	14
Vertices	x	y	36	w
Edges	12	9	z	36