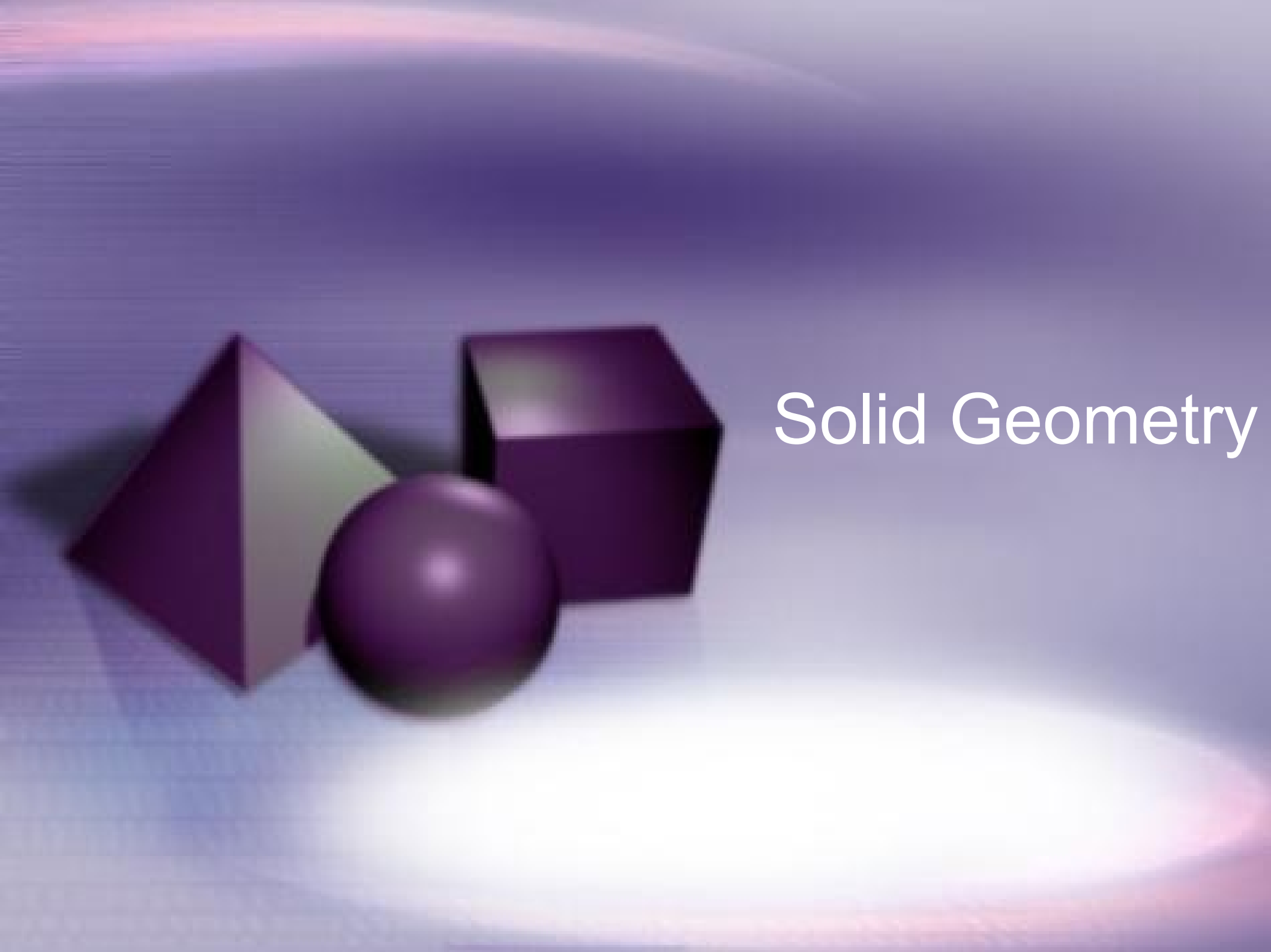

Solid Geometry

- Solid geometry deals with the study of three dimensional figures.
- Some of the three dimensional figures are :

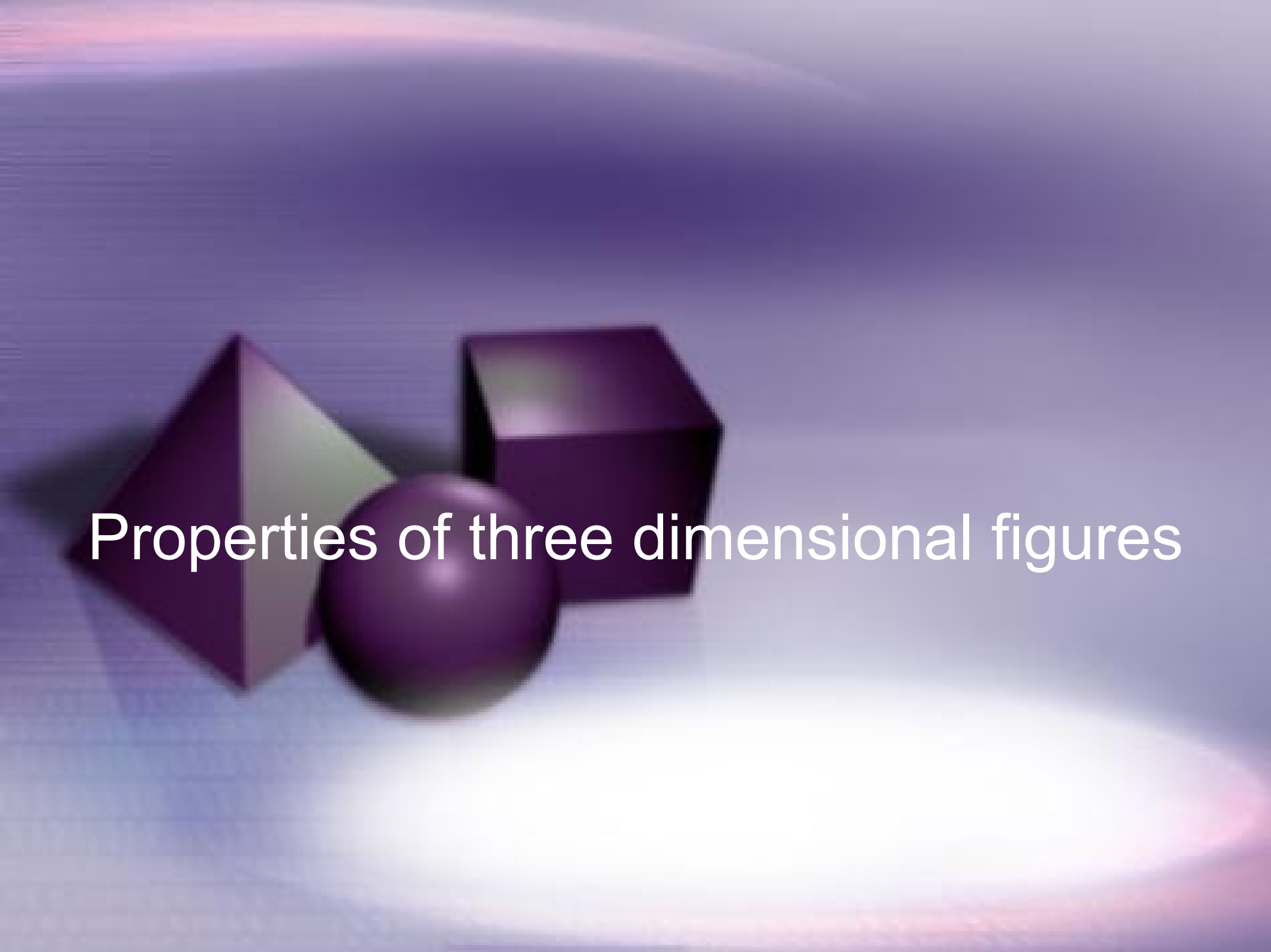
➔ Cube

➔ Cuboid

➔ Sphere

➔ Cylinder

➔ Cone


Properties of three dimensional figures

Properties of cube

FACE

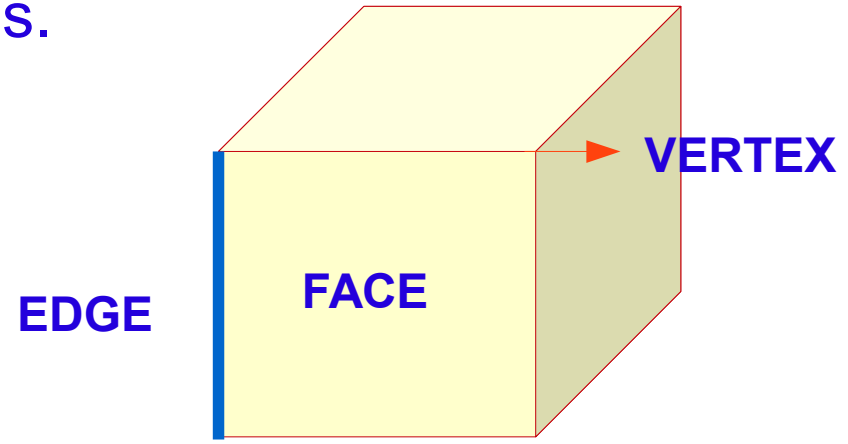
Cube has 6 facets or sides
All sides are square
So, each face have 4 equal sides and
4 interior angles are right angle.

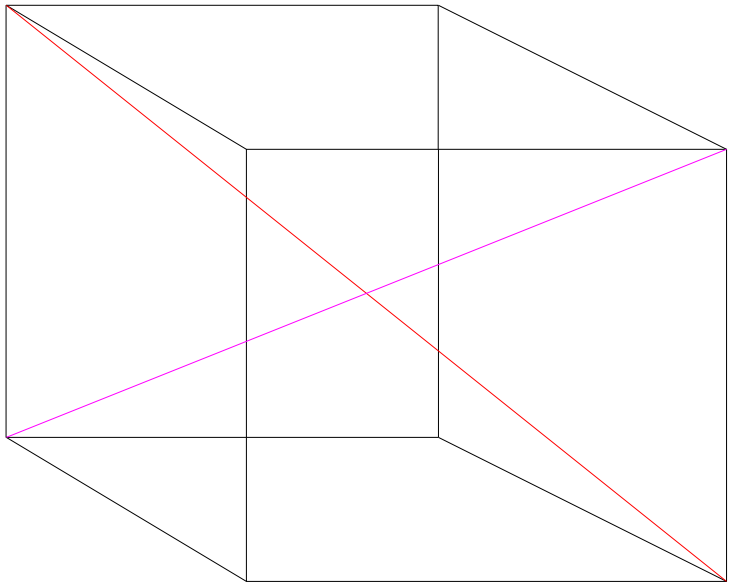
EDGE

It is the line segment formed between two vertices.
There are 12 edges in a cube

VERTEX

It is the point where three edges meet.
A cube has 8 vertices.

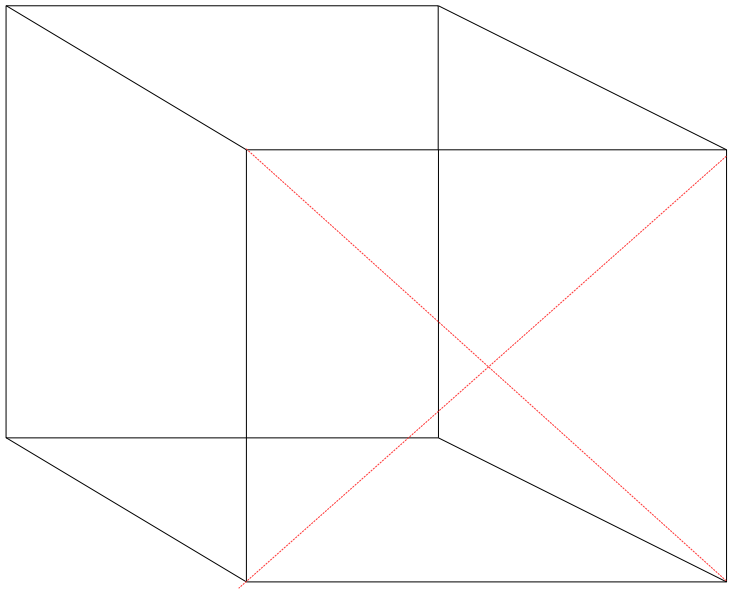




Body Diagonal :

*It is the line segment joining the opposite corners of the cube.

* A cube has 4 body diagonals.



Face Diagonal:

* It is the line segments joining the opposite corners of a face.

* Each face has 2 diagonals

* Therefore for a cube,we have (6*2) = 12 face diagonals.

Properties of cuboid

→ A cuboid is a box shaped object.

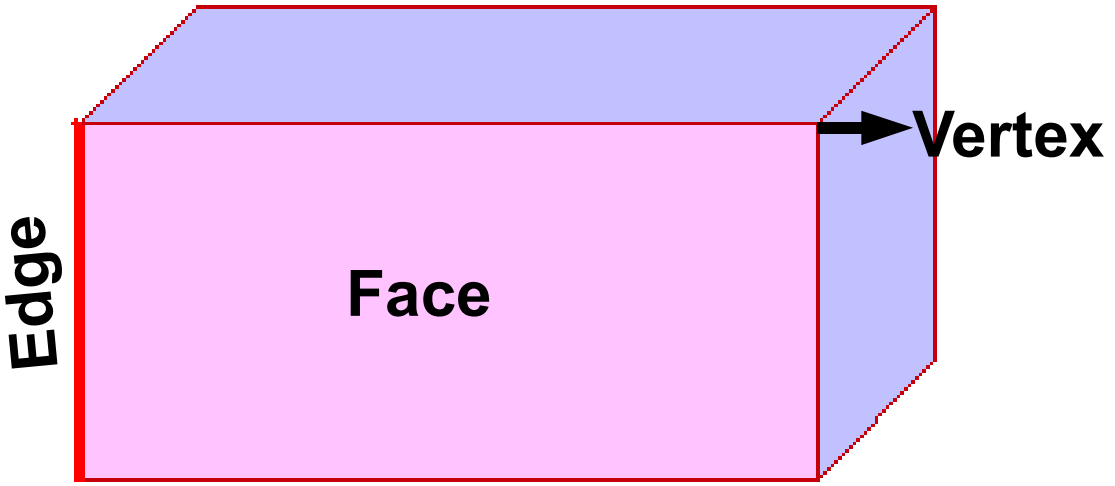
→ It has flat faces.

→ Angles formed in the cuboid are right angles.

→ Cuboid has 6 facets

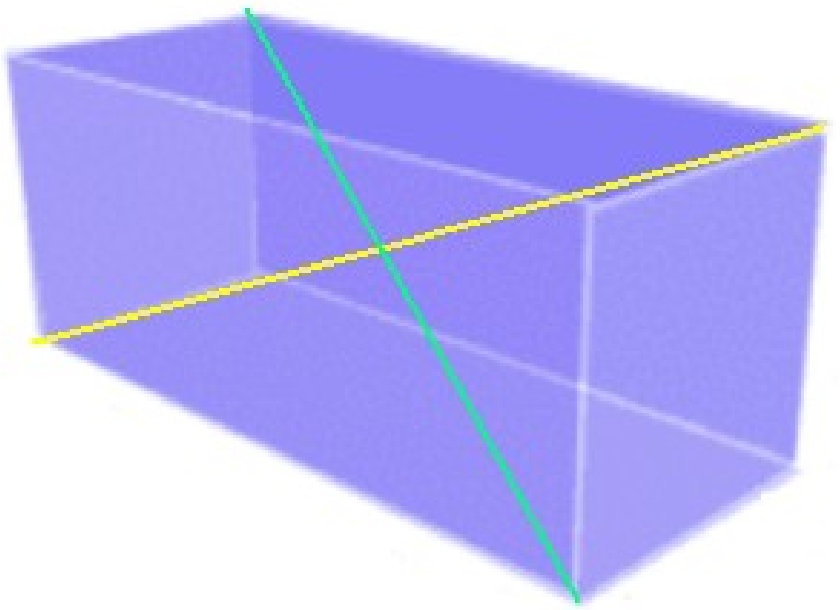
→ 12 edges

→ 8 vertices



Body Diagonals :

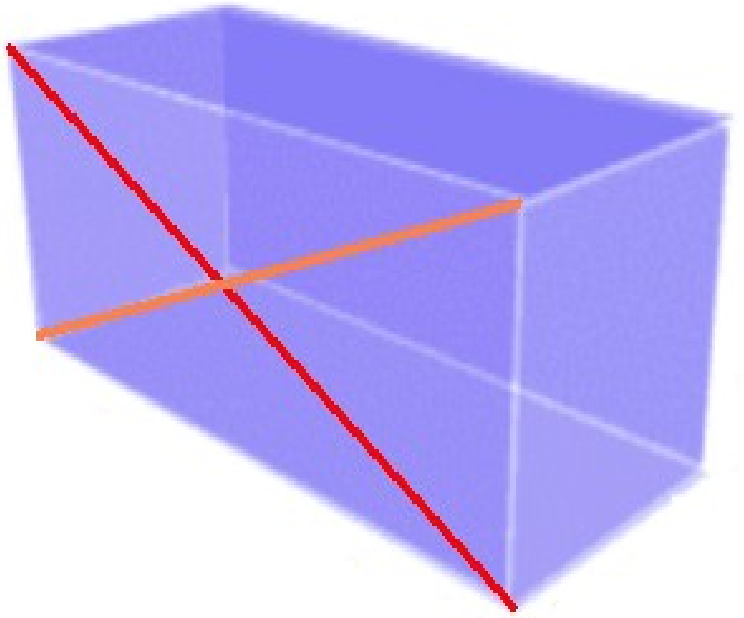
* A cuboid have 4 body diagonals.



Face Diagonal :

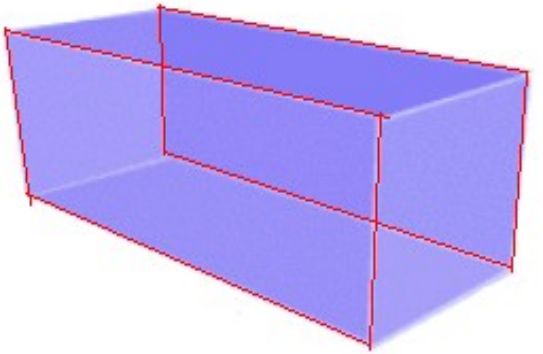
* Each face has 2 diagonals

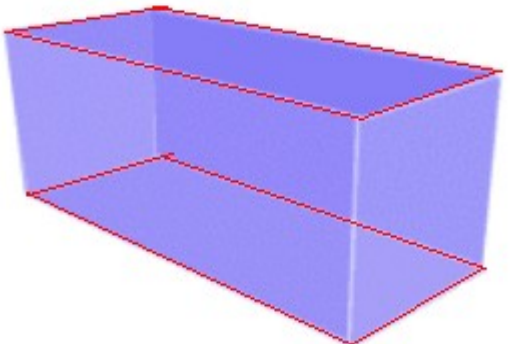
* Therefore for a cuboid ,we have (6*2) = 12 face diagonals.

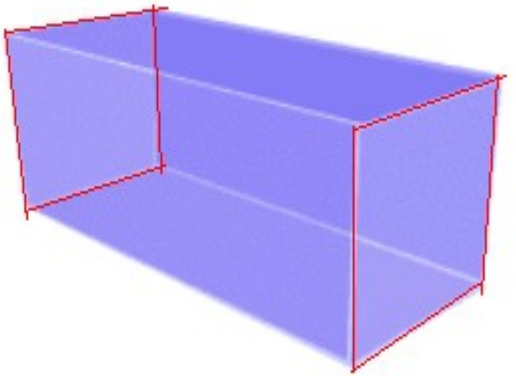


→ Opposite faces of a cuboid are parallel .

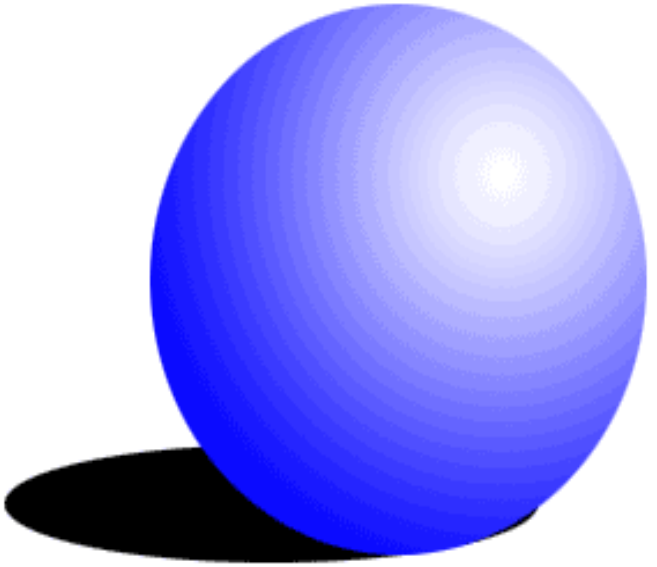
→ They are equal in area.







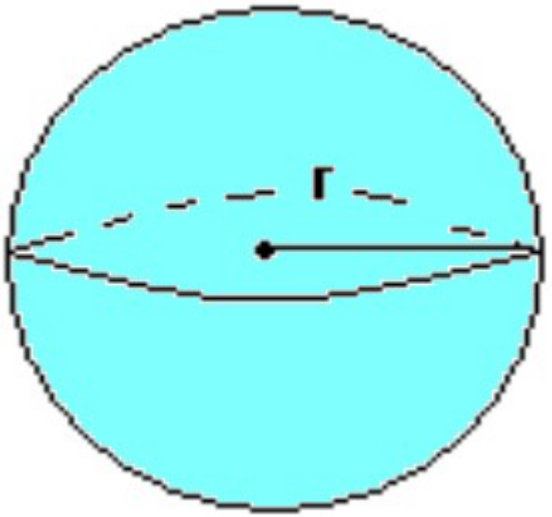
Properties of sphere



→ Sphere is a round ball.

→ All points in the sphere are of same distance from the center.

→ Distance from the center to any point in the sphere is known as “radius”.



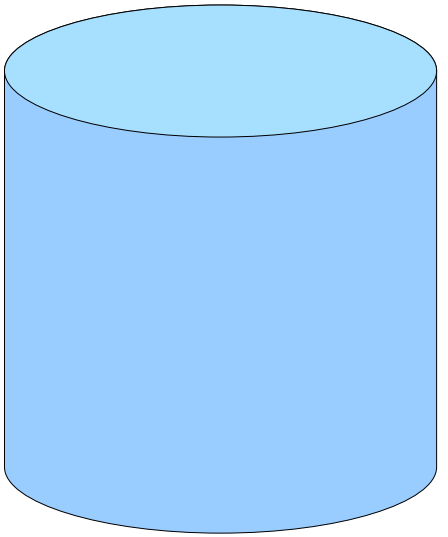
Properties of cylinder

→ A cylinder has a flat base and a flat top.

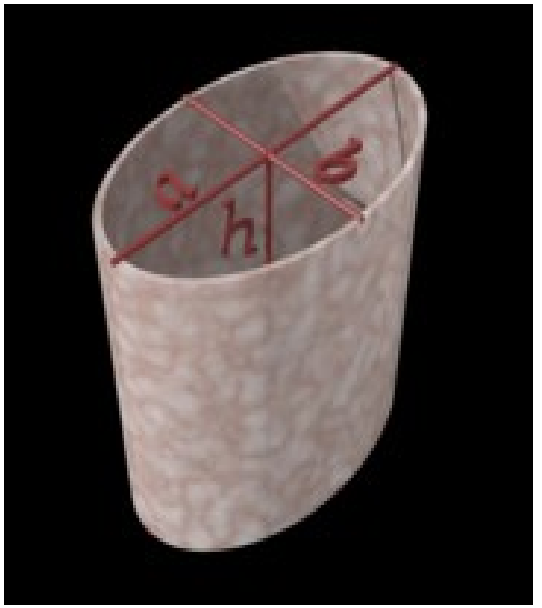
→ The base is same as the top.

→ Usually when we say Cylinder we mean a Circular Cylinder.

→ But we can also have Elliptical Cylinders.



Circular cylinder

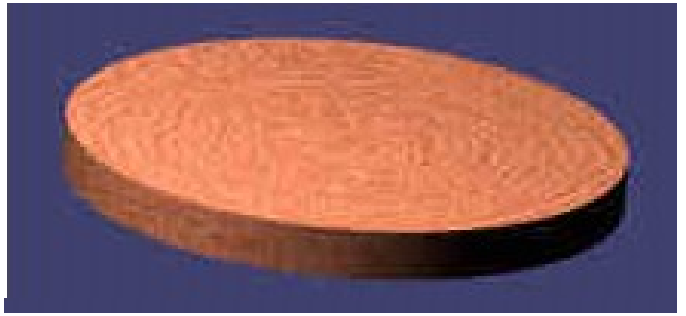


Elliptical Cylinder

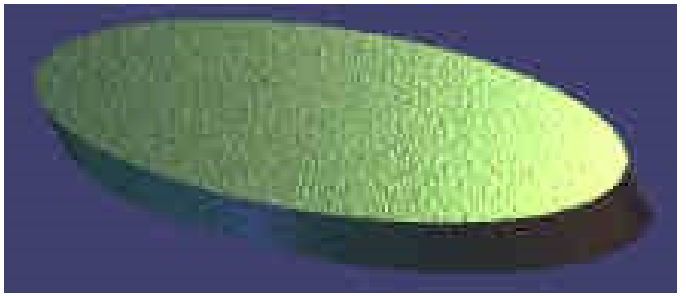
→ The classification is done on the basis of their base.

→ If the base is circular, then it is a circular cylinder.

→ If the base is elliptical, then it is known as elliptical cylinder.



Base of a circular cylinder



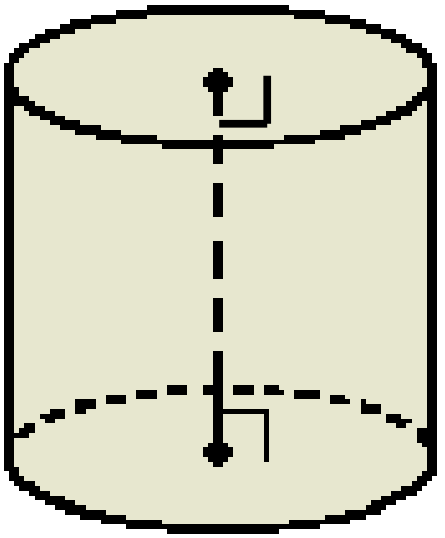
Base of an elliptical cylinder

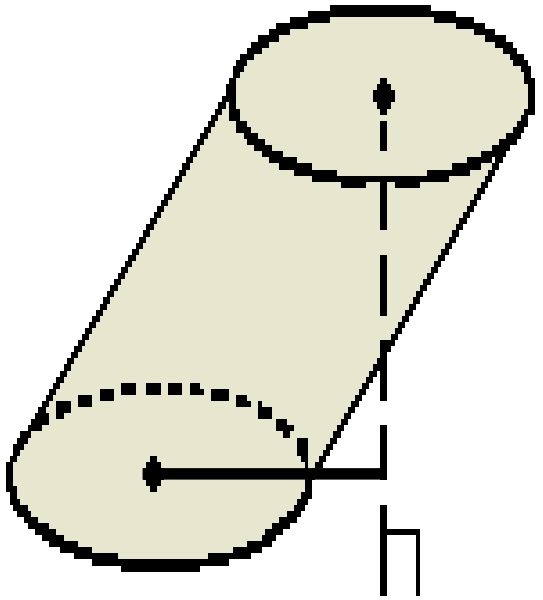
→ Cylinder can also be classified as Right circular cylinder and oblique circular cylinder.

→ **Right Circular Cylinder :**

* Base of the right circular cylinder is a circle.

*If the segment joining the centers of the circles of a cylinder is perpendicular to the bases, the cylinder is a right circular cylinder.





→ **Oblique Circular Cylinder :**

*Base of the Oblique Circular Cylinder is a circle.

*If the segment joining the centers of the circles of a cylinder is not perpendicular to the bases, then the cylinder is a oblique circular cylinder.

Properties of cone

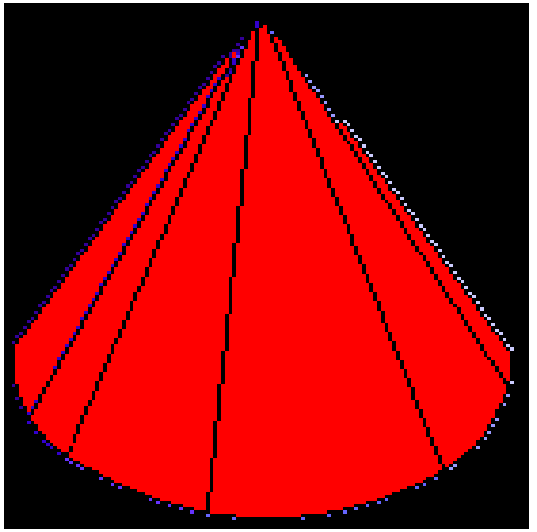
→ Cone is a pyramid

→ One side of the cone will have a flat base.

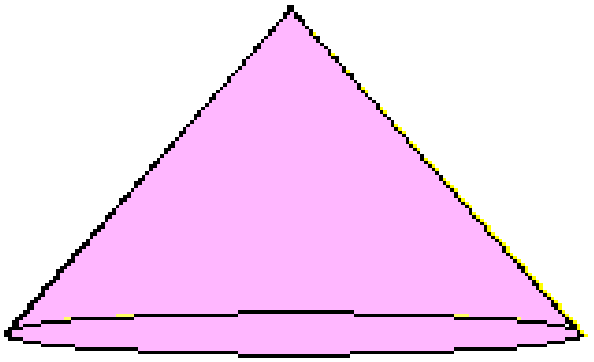
→ The other side will be pointed, which is known as apex or vertex.

→ Cones can be classified with respect to its base.

→ It can be circular cone or elliptical cone.



Circular Cone



Elliptical Cone

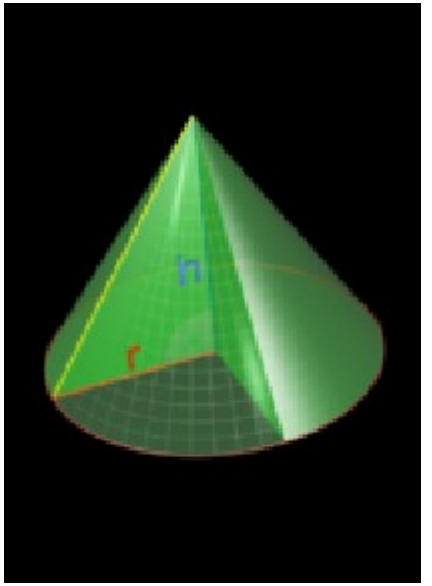
→ Circular cones and elliptical cones have circular and elliptical bases, respectively.

→ A pyramid is a special type of cone with a polygonal base.

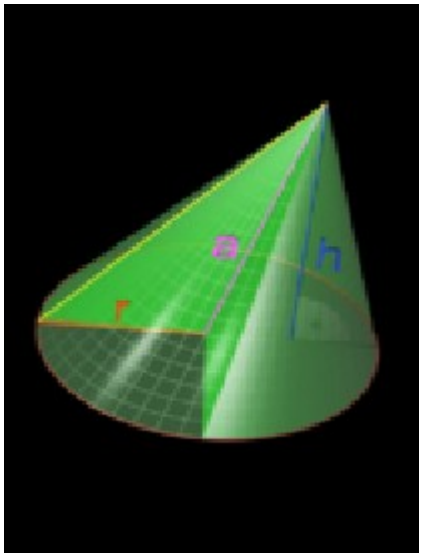
→ Another classification of cone will be based on its axis and base.

→ It can be a right cone or oblique cone.

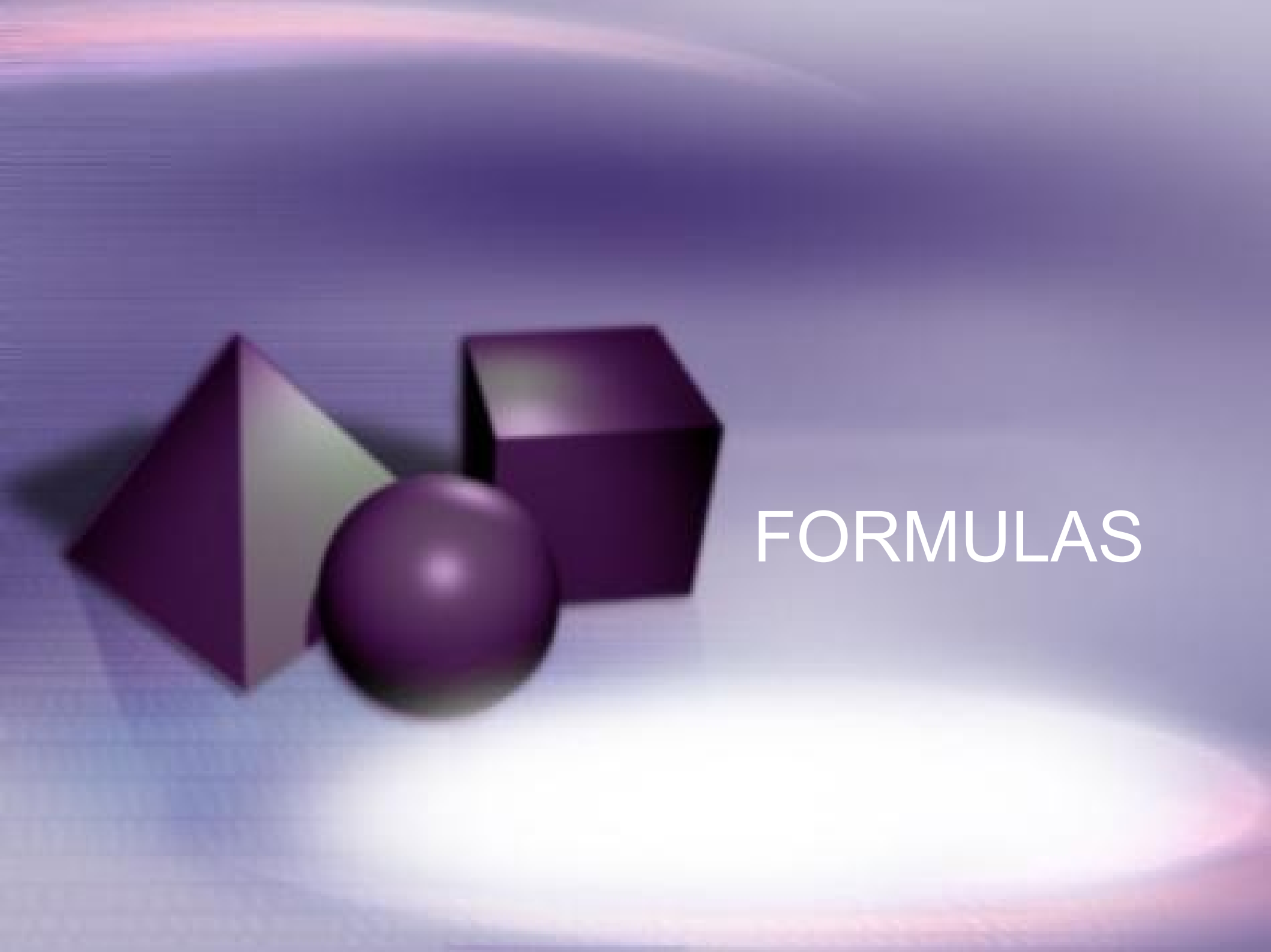
→ If the axis of the cone is at right angles to the base then it is said to be a "right cone", otherwise, it is an "oblique cone."

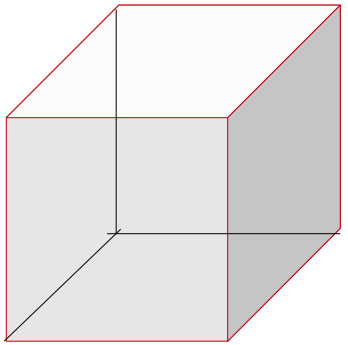
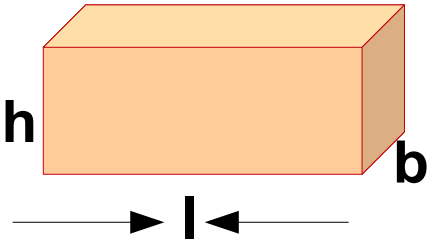


Right Cone

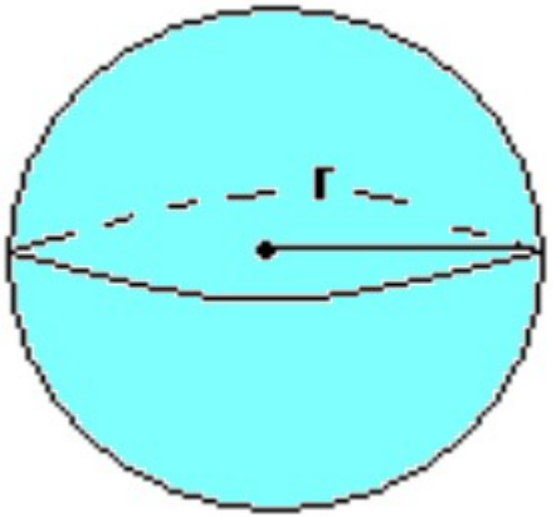


Oblique cone


FORMULAS

Type	Diagram	Surface area	volume	Face Diagonal	Body Diagonal
Cube		$6S^2$	S^3	$\sqrt{2}\ S$	$\sqrt{3}\ S$
Cuboid		2(lb+bh+hl)	lbh		

SPHERE



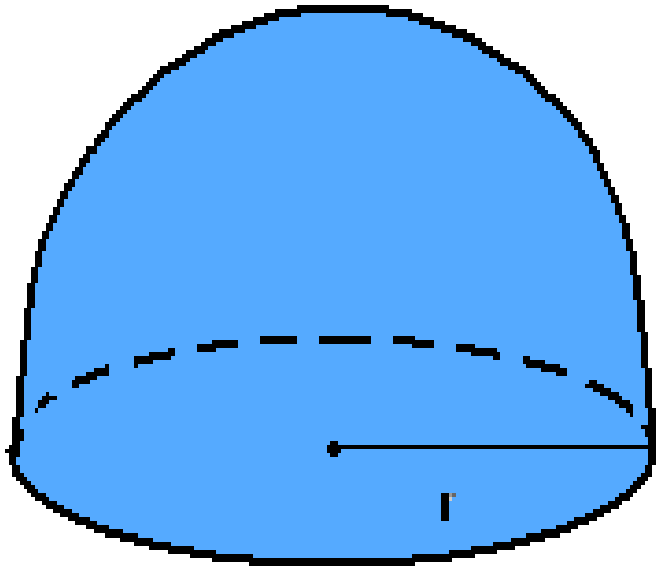
Radius = r

Diameter = 2 x radius = 2r

Surface Area → $S = 4\pi r^2$

Volume → $V = 4/3\ \pi r^3$

HEMISPHERE



Hemisphere = ½ of sphere

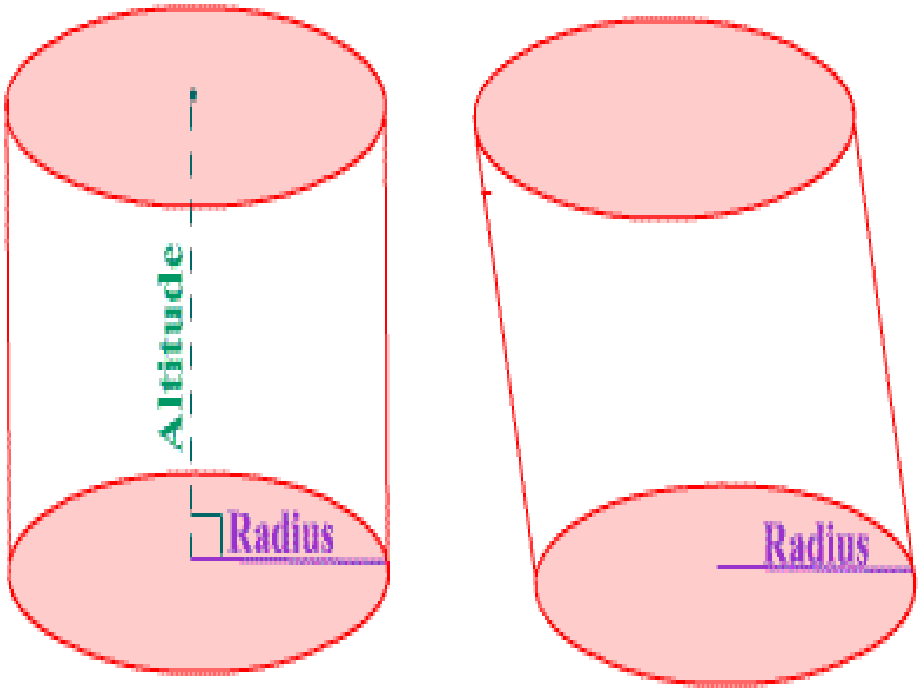
Surface Area → ½ of the surface

area of the sphere → $S = \frac{1}{2}(4\pi r^2)$

Volume → ½ of the volume of the

sphere → $V = 1/2\ (\ 4/3\ \pi r^3)$

CYLINDER



→ Radius = r

→ height or altitude = h

→ Curved Surface Area = $2\pi rh$

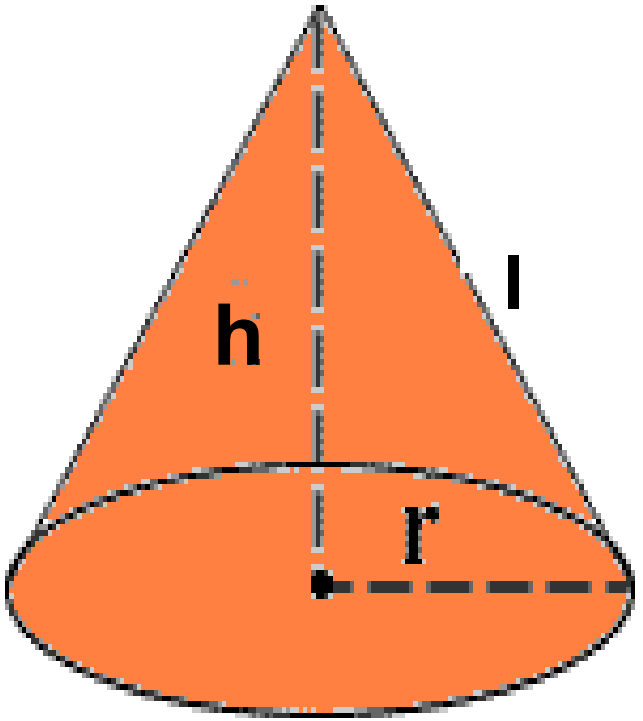
→ Flat Surface Area = $2\pi r^2$

→ Total Surface Area = Curved Surface area + Flat Surface Area = $2\pi r (r + h)$

→ Base Area for Right Cylinder = πr^2

→ Volume = $\pi r^2 h$

CONE



Base Radius = r

Vertical height = h

Slant height = $l = \sqrt{(r^2 + h^2)}$

Base Area = πr^2

curved Area = $\pi r l$

Total Surface Area = $\pi r (r + l)$

Volume = $1/3\ \pi r^2 h$

QUIZ

1) Longest diagonal in a cube is known as _____

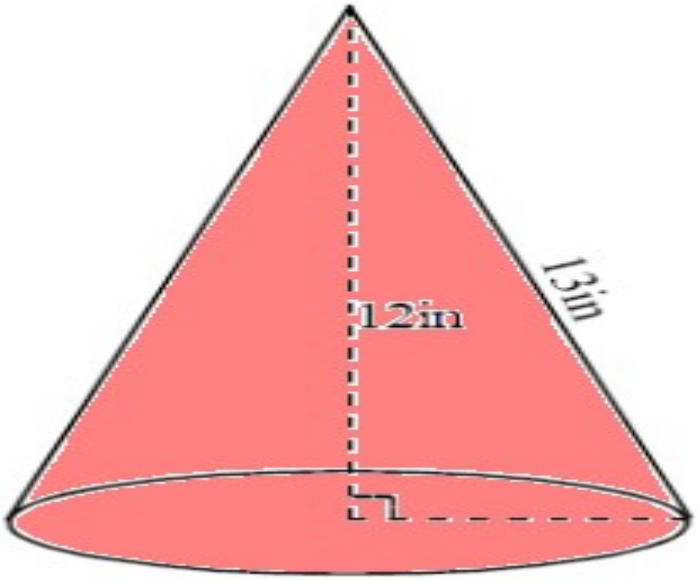
2) In a right cylinder _____ is perpendicular to _____

3) Side of a cube is 6cm, find , (I) surface are ,(ii) volume ,(iii) face diagonal and (iv)body diagonal ?

4) The volume of a sphere is equal to its surface area. What is its radius?

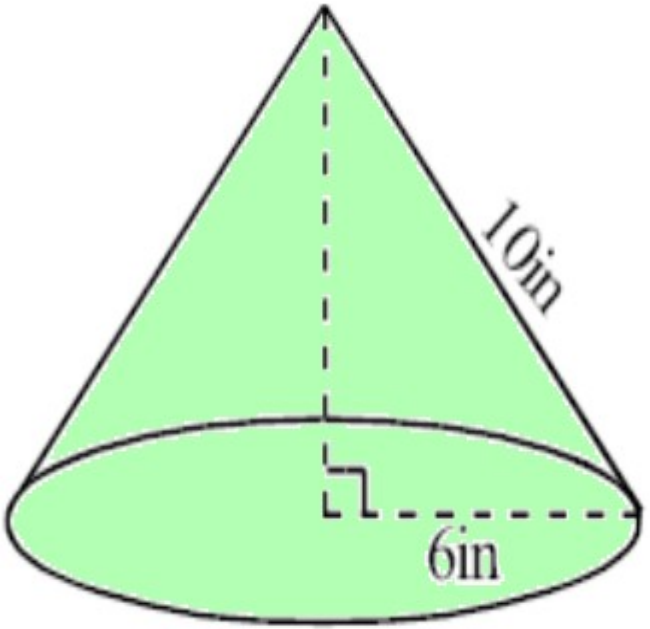
QUIZ

5)



Find the volume of the cone?

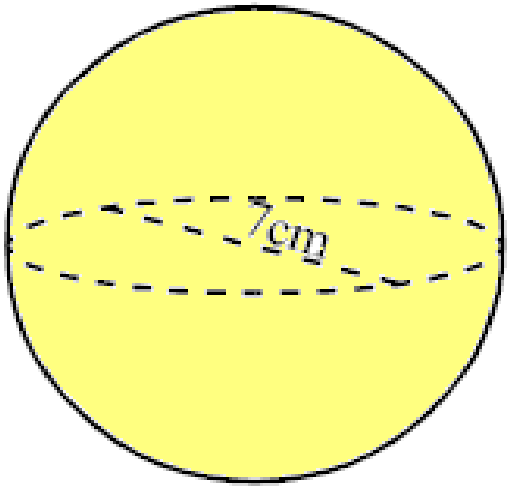
6)



Find the height of the cone ?

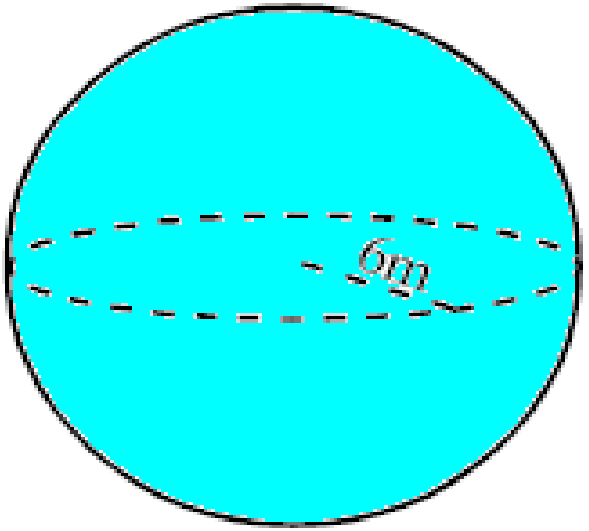
QUIZ

7)



Find the volume of the sphere and its surface area ?

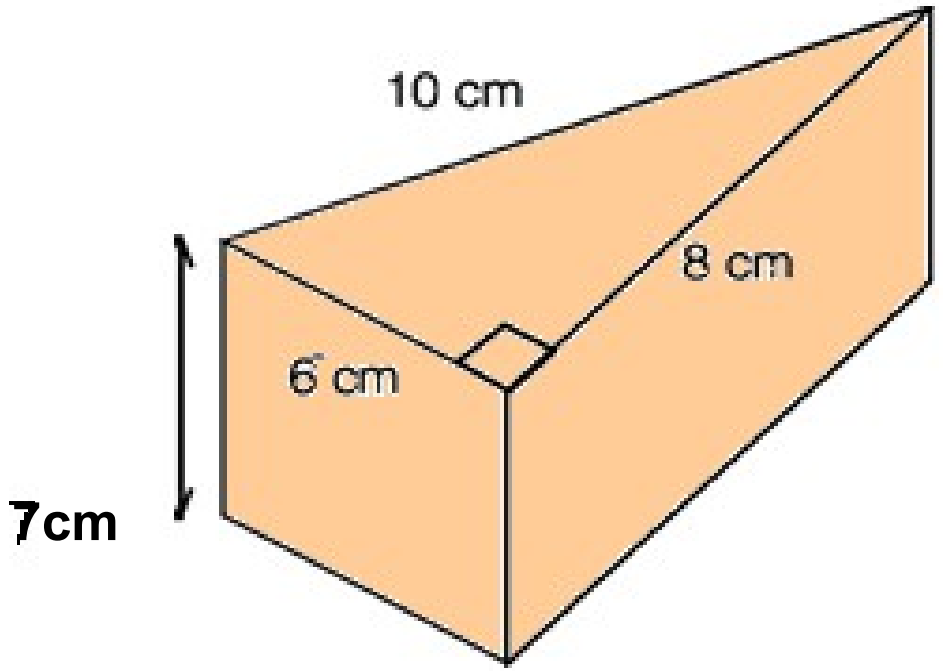
8)



Find the volume of the sphere and its surface area ?

QUIZ

9)

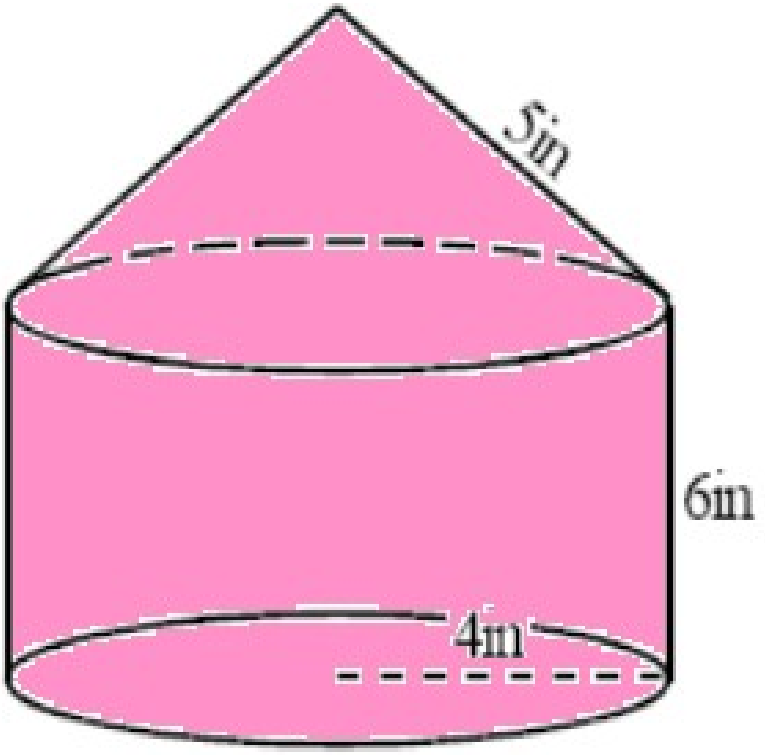


Find the volume and surface area ?

10) A sphere has a surface area of 36π cm^2. What is its volume?

QUIZ

11)



Find the volume ?

Hint : volume of the given figure = volume of the cylinder + volume of the cone

12) A cone of height 24 cm and radius of base 6 cm is made up of modeling clay. A child reshapes it in the form of a sphere. Find the radius of the sphere.

Hint : the volume of clay in the form of the cone and the sphere remains the same. Therefore, equate volume of cone and volume of sphere for finding radius of the sphere.