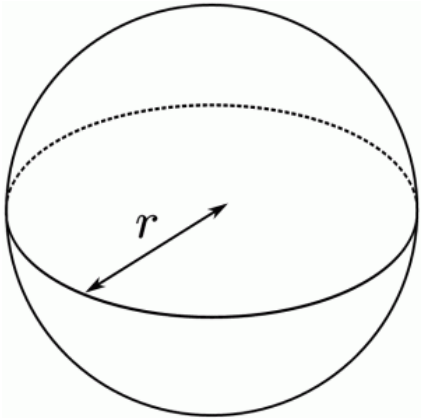
N 5

Solid Geometry II

SOLIDS OF REVOLUTION

Sphere

A sphere is the set of all points in three-dimensional space that are located at a same distance from a given point.



The surface area of a sphere is given by

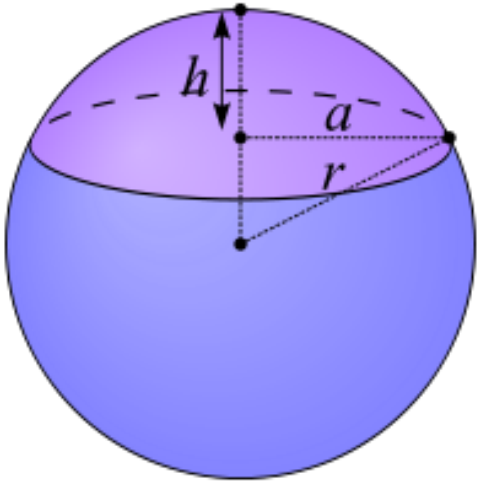
$$S = 4\pi r^2$$

The volume of the ball of radius R is given by

$$V = \frac{4}{3}\pi r^3$$

Parts of sphere (I)

A spherical cap is the region of a sphere which lies above (or below) a given plane.

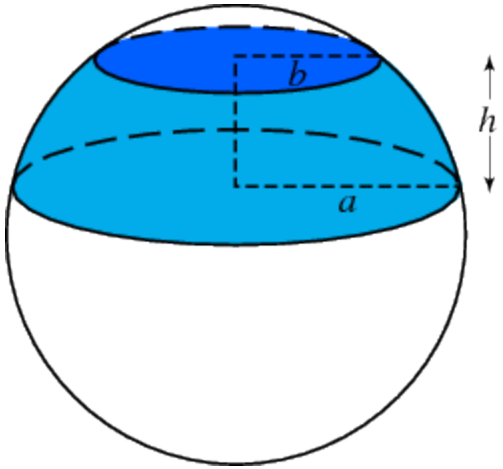


$$S = 2\pi rh$$

$$V = \pi h^2 (r - \frac{h}{3})$$

Parts of sphere (II)

A spherical segment is the solid defined by cutting a sphere with a pair of parallel planes.

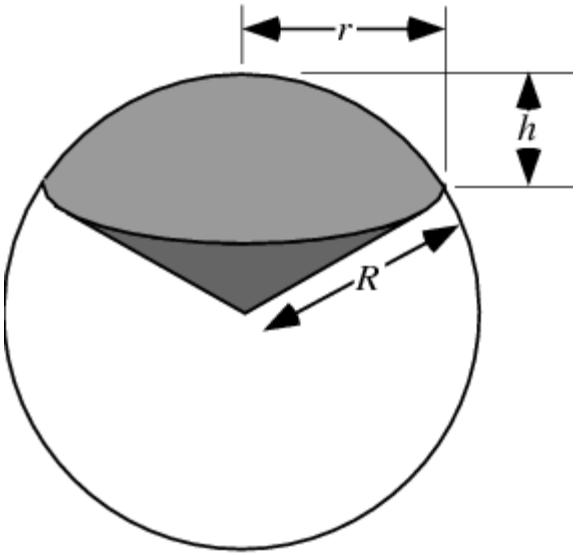


$$S = 2\pi r h$$

$$V = \frac{\pi h}{6}(3a^2 + 3b^2 + h^2)$$

Parts of sphere (III)

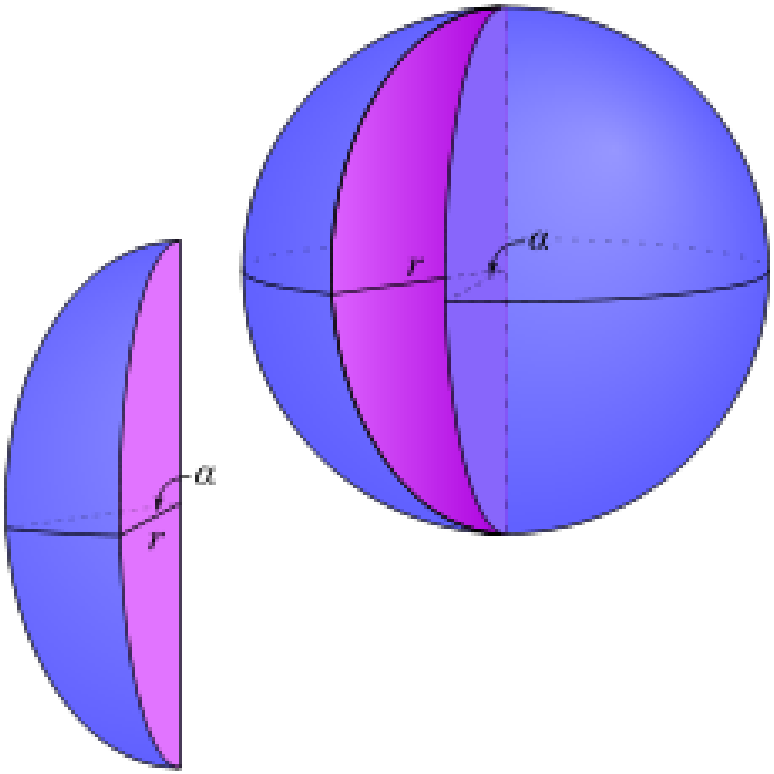
A spherical sector is a solid of revolution enclosed by two radii from the center of a sphere.



$$V = \frac{2}{3}\pi R^2 h$$

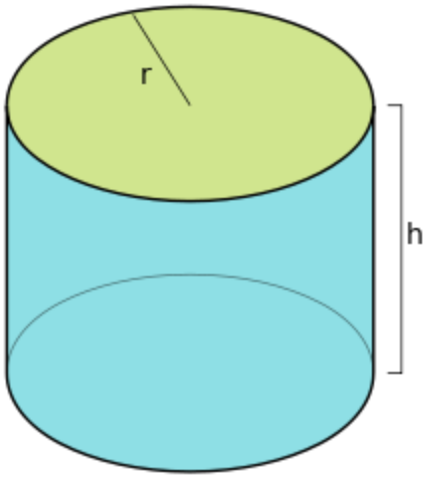
Parts of sphere (IV)

A spherical wedge is a solid formed by revolving a semi-circle about its diameter by less than 360°.



Cylinder

A cylinder is a closed solid that has two parallel (usually circular) bases connected by a curved surface.

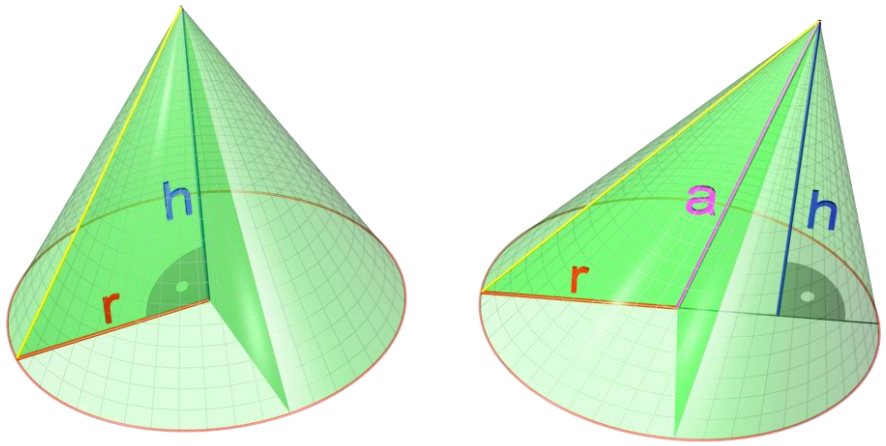


$$S = 2\pi rh + 2\pi r^2 \qquad V = \pi r^2 h$$

Cone

A cone is a solid that has a circular base and a single vertex.

If the vertex is over the center of the base, it is called ***a right cone***. If it is not, it is called ***an oblique cone***.



$$S = \pi r l + \pi r^2 \qquad V = \frac{1}{3}\pi r^2 h$$

Conic sections

The three types of conics are the ellipse, parabola, and hyperbola. The circle can be considered as a fourth type or as a kind of ellipse.