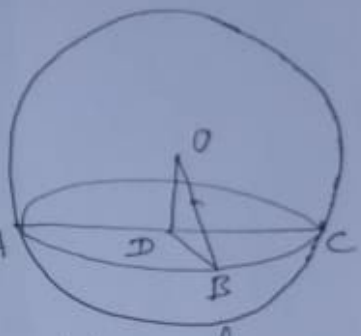
Spherical Astronomy

The section of a sphere by a plane is a circle.



Let O be the Centre of the sphere whose radius is r and ABC be the section of the sphere by any plane. Through O we draw OD perpendicular to the plane. We choose any two points A and B on the section and we join OA, OB, DA and DB. Now OD is perpendicular to the plane and as such it is perpendicular to every line lying in the plane.

$\therefore \angle ODA = \pi/2 = \angle ODB$

Or, $AD^2 = OA^2 - OD^2$ and $BD^2 = OB^2 - OD^2$

But $OA = OB$ radius of the sphere.

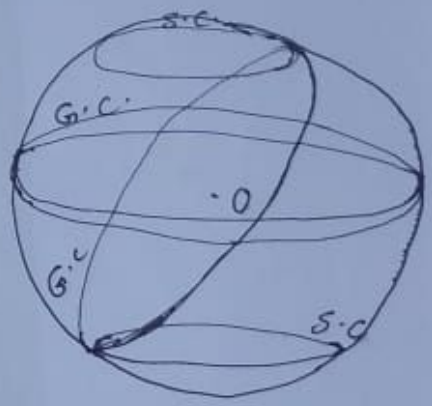
$\therefore AD = BD$, i.e. the point D is equidistant from any two points on the section which therefore is a circle whose Centre D is the foot of the perpendicular from the Centre of the sphere to the plane and whose radius is given by

$AD = \sqrt{(OA^2 - OD^2)}$

2. Great circle and small circle:-

If the plane cutting the sphere passes through centre of the sphere, then the corresponding section is called a great circle.

Any other plane which does not pass through the centre of the will cut the sphere in a circle which is called a small circle.



3. The Axis and Pole:-

The axis of any circle, great or small, is that diameter of the sphere which is perpendicular to its plane i.e. PQ is the axis in the adjoining figure. The extremities of this diameter are called the poles of the circles.