

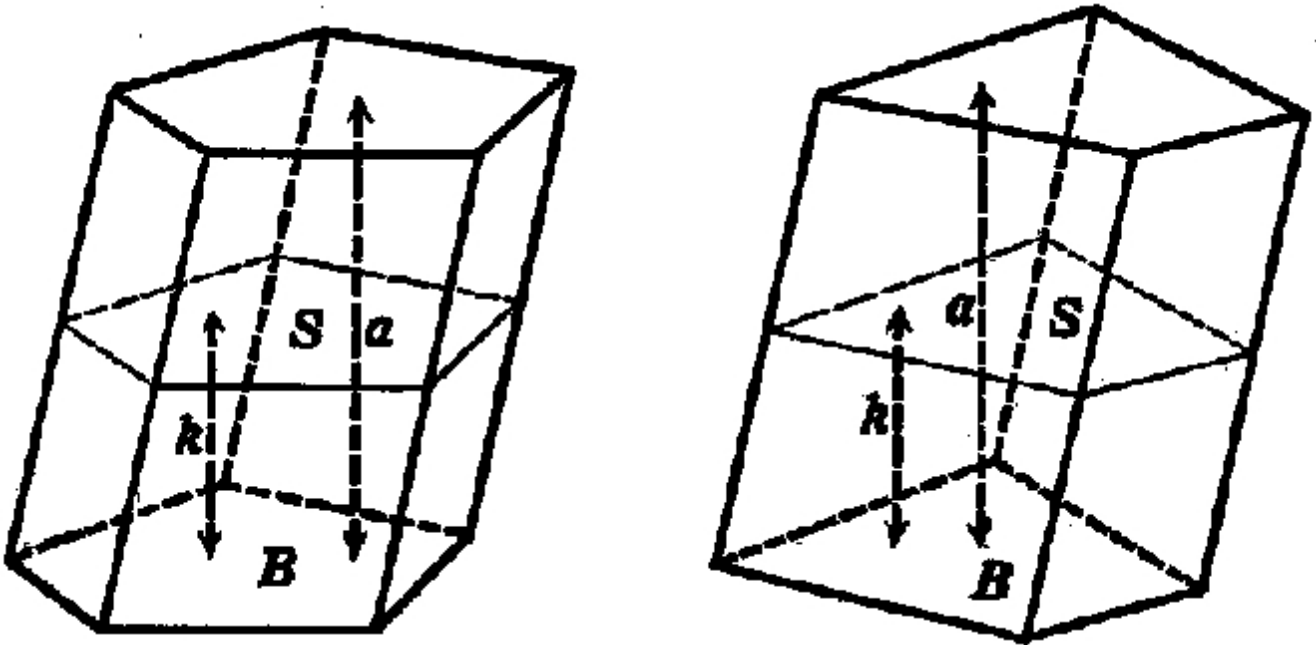


**Bonaventura Francesco Cavalieri**  
**1598-1647**

Cavalieri's Principle

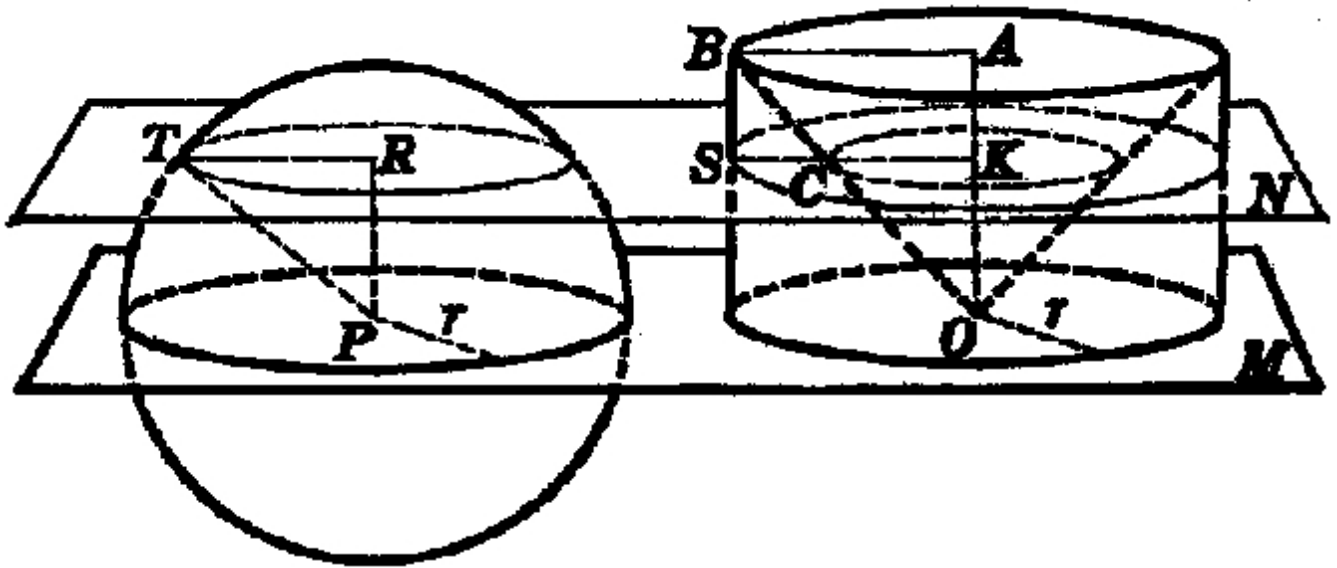
Plane and solid figures are equal in content when sections drawn at the same height from the base produce equal lines or areas.

## Cavalieri's Theorem



If in two solids of equal altitude the sections made by planes parallel to and at the same distance from their respective bases are always equal in area, the solids have the same volume.

## Volume of a Sphere



Since sections cut by plane  $N$  are equal in area then by Cavalieri's theorem the volume of a hemisphere of radius  $r$  is equal to the difference in volumes between a cylinder and a cone each with radius  $r$  and height  $r$ . It follows that the volume of a sphere is

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