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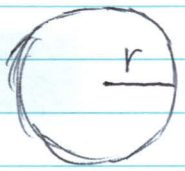
How does the area of a circle related to a Volume of sphere ?

The Area of a circle :

Area = $A = \pi r^2$

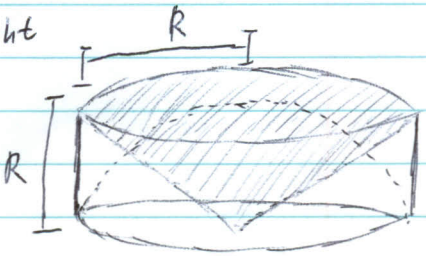


How does the area of a circle related to a Volume of sphere ?

Cylinder : First we have to know how to calculate of Volume of a cone and Cylinder.

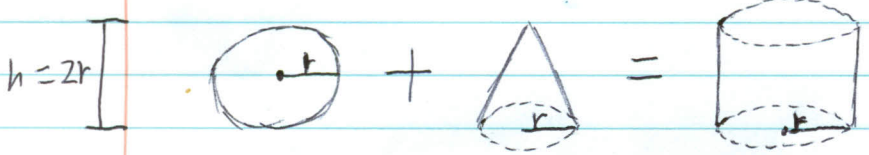
$(\pi r^2)(r)$ = (Area of base/circule) × height

Cone $(\frac{1}{3})$ (area of base) × height = $(\frac{1}{3})(\pi R^2)R$



(fig 1)

As the Archimedes principles states 「source: en.wikipedia.org/wiki/Archimedes」



So. Sphere's Volume + Cone's volume = cylinder's Volume.

「Since we only have the Volume formulas of the cone and cylinder, we can do some simple math to get the sphere's Volume.

Sphere's volume = Cylinder's Volume − Cone's Volume

$$\text{Sphere's volume} = \left(\left((\pi r^2)(r)\right) - \left(\left(\tfrac{1}{3}\right)(\pi r^2)r\right)\right) \times 2$$

we times 2, because we have to get 2 times of the hemisphere (fig 1)

$$= \left((\pi r^3) - (\tfrac{1}{3}\pi r^3)\right)2$$

$$= 2\left(\tfrac{3}{3}\pi r^3 - \tfrac{1}{3}\pi r^3\right)$$

$$= 2\left(\tfrac{2}{3}\pi r^3\right)$$

$$\text{Sphere's Volume} = \frac{4}{3}\pi r^3$$

As we can see, the area of a circle have a directly relationship to sphere's Volume. In order to prove the formula of sphere's volume by Archimedes Principle, we need the circle's area formula to fill in the Volume's formulas of cone and cylinder.」