Derivation Of Volume Of A Sphere

Volume Of A Sphere

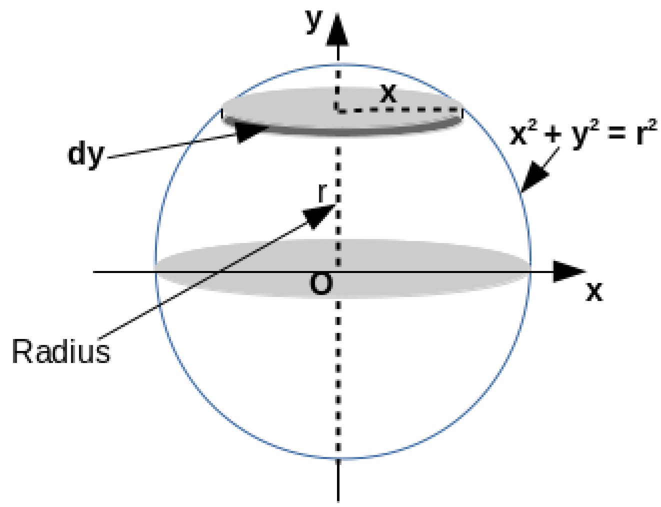

Figure 113.9

The sphere illustrated in figure 113.9 is generated by revolving the circle with center at the origin and radius r about the y axis.
Volume of sphere = $\mathbf{(4/3)\pi r^3}$

<u>Derivation Of Volume Of A Sphere</u>

Area of circular cross-section = $\boldsymbol{\pi x^2}$. Since radius of cross-section is x
Volume of cross-sectional area = $\boldsymbol{\pi(x^2)dy}$
Volume of sphere is twice volume of hemisphere

So, volume of sphere = $\mathbf{2\int_0^r \pi(x^2)\, dy}$-------------**(1)**

$$= 2\pi\int_0^r (r^2 - y^2)dy$$

$$= 2\pi(r^3 - r^3/3)$$

$$= 2\pi(3r^3 - r^3)/3$$

$$= (4/3)\pi r^3.$$

The string is $S_1P_1A_{14}$ - Empty Space – Containership - Volume