Teacher Demonstration - Volume of a Sphere

you tube link

$$h = 2r$$

$$\begin{aligned} V_{cylinder} &= \pi r^2 h \\ &= \pi r^2 (2r) \\ &= 2\pi r^3 \end{aligned}$$

Conclusion:

The Sphere fills 2/3 of the cylinder with the same diameter.

So, sphere is 2/3 of the volume of the cylinder.

$$V_{sphere} = \frac{2}{3} V_{cylinder}$$

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

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

Volume of a Sphere: $V = \frac{4\pi r^3}{3}$ or $V = \frac{4}{3}\pi r^3$

Example 1: A spherical piñata has a diameter of 22 cm. One litre of candy weighs one kilogram and candy costs $0.79/100 g, How much will it cost to fill the piñata - don't forget to include 13% taxes. (recall: 1 cm^3= 1 mL)

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

$V = \frac{4(3.14)(11^3)}{3}$

$V = \frac{(4)(3.14)(1331)}{3}$

$V = 5572.4\ cm^3$

$V = 5572.4\ mL$ $\quad 1L = 1000\ mL$

$V = 5.5724\ L$

$5.5724\ kg$ $\quad 1000\ g = 1\ kg$

$5572.4\ g$

$C = 55.724 \times .79$

$C = 44.02 \times 1.13$ (taxes

$C = \$49.74$

∴ it will cost you $49.74 to fill this piñata

Example 2: The radius of a sphere is tripled. How does this affect the volume of the sphere? Explain.

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

Since we are working with the exponent 3 it will actually change it by multiplying by 27

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

$$= \frac{4(3.14)(2^3)}{3}$$

$$= \frac{4(3.14)(8)}{3}$$

$$\frac{4\pi(3r)^3}{3}$$

$$4(3.14)(3(2))^3$$

$$4(3.14)(27(8))$$

Example 3: A spherical gemstone just fits inside a plastic cube with edges 10 cm.

a) Calculate the volume of the gemstone, to the nearest cubic centimetre.

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

$$V = \frac{4(3.14)(5^3)}{3}$$

$r = 5$

$$V = \frac{4(3.14)(125)}{3}$$

$$V = 523.3\ cm^3$$

b) How much empty space is in the cube when the gemstone is inside?

$$V = l \times w \times h$$

$$V = 10 \times 10 \times 10$$

$$V = 1000\ cm^3$$

Empty space $= 1000 - 523.3$

$$= 476.7\ cm^3$$