

Warm up: Jared has a ball of chocolate wrapped with foil measuring a total of 8 cm^2 . Kate has a ball of chocolate that is twice the radius of Jared's. How much foil is needed to wrap Kate's chocolate ball?

↳ if r is multiplied by 2, Surface Area is multiplied by 2^2 ($A = 4\pi r^2$), $8 \times 2^2 = 32 \text{ cm}^2$ ∴ Kate needs foil to cover 32 cm^2 .

Volume of Spheres

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

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: $1 \text{ cm}^3 = 1 \text{ mL}$) $r = 11 \text{ cm}$



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

$$= 5575.27976... \text{ mL}$$

$$= 5.575 \text{ L}$$

$$= 5.575 \text{ kg}$$

$$\frac{\$0.79}{100\text{g}} \times 10$$

$$= \$7.90/\text{kg}$$

$$\text{Cost} = 5.575 \times 7.90 \times 1.13$$

$$\approx 49.77$$

∴ it will cost \$49.77 to fill the pinata.

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

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

↑ ×3

When r is tripled, Volume is $3^3 = 27$ times larger.

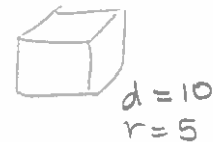
Example 3: A spherical gemstone just fits inside a plastic cube with edges 10 cm.

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

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

$$= 523.598...$$

$$\approx 524 \text{ cm}^3$$



b) How much empty space is there?

$$V_{\text{space}} = V_{\text{cube}} - V_{\text{sphere}}$$

$$= 10^3 - 524$$

$$\approx 476 \text{ cm}^3$$

Example 4: A snowball with volume 237 cm^3 has a mass of 28 g. What is the mass of a snowball with a radius 38 cm?

$$V = \frac{4\pi(38)^3}{3}$$

$$V = 229847.2961$$

$$V \approx 229847.2961$$

Use rates.

$$\frac{\text{grams}}{\text{cm}^3} \quad \frac{28}{237} \leftarrow \frac{x}{229847.2961}$$

$$x = \frac{28 \times 229847.2961}{237}$$

$$x = 27154.95 \text{ grams}$$

$$x \approx 27.2 \text{ kg.}$$