

## Task #81652

Archeologists have discovered the legendary Golden Igloo of the Pribiloff Islands, a structure consisting of half-spherical shell with an inner diameter of 1.25 m and an out diameter of 1.45 m. What is the value of this antiquity, given that gold currently sells for \$1,263/ounce and has a density of 19.3 g/cm<sup>3</sup>? (Note that 1 ounce = 31.1034768 g)

### Solution.

To find the price of this artifact, you first need to find the volume of the hemispherical shell.

$$V_f = (4/3 * \pi * r^3)/2$$

$$V_f = (V_{\text{big}} - V_s)/2$$

$$r_l = D_l/2$$

$$r_s = D_s/2$$

$$r_l = 0.725 \text{ m}$$

$$r_s = 0.625 \text{ m}$$

$$r_{\text{big}} = r_s + r_l$$

$$r_{\text{big}} = 0.725\text{m} + 0.625\text{m} = 1.35 \text{ m}$$

$$V_{\text{big}} = 4/3 * 3.14 * (1.35)^3 = 10.30077 \text{ m}^3$$

$$V_s = 4/3 * 3.14 * (0.625)^3 = 1.02214 \text{ m}^3$$

$$V_f = (10.30077 \text{ m}^3 - 1.02214 \text{ m}^3)/2 = 4.639315 \text{ m}^3 = 4639315 \text{ cm}^3$$

Knowing the volume and density, you can find a mass.

$$m = \rho * V$$

$$m = 19.3\text{g/cm}^3 * 4639315 \text{ cm}^3 = 89538779.5 \text{ g}$$

Then convert the mass from grams to ounces and multiply by the price of one gram of gold.

$$m = 89538779.5 \text{ g} / 31.1034768 \text{ g} = 2878738.61 \text{ ounce}$$

C – price

$$C = 2878738.61 \text{ ounce} * 1263\$ = 3635846861,61 \$$$

### Answer:

$$C = 2878738.61 \text{ ounce} * 1263\$ = 3635846861,61 \$$$

Answer provided by AssignmentExpert.com