

A giant sphere of solid gold has a mass

$$M = (2.06 \pm 0.21) \times 10^7 \text{ kg}$$

What is the radius of this sphere?

Look up density of gold, and find

$$\rho = 19,300 \pm 200 \frac{\text{kg}}{\text{m}^3}$$

The connection between mass, radius and density is

$$M = \frac{4}{3} \pi R^3 \rho$$

Re-arranging,

$$R = \left(\frac{3M}{4\pi\rho} \right)^{1/3}$$

We can determine the radius of the sphere:

$$R = \left(\frac{3 \cdot 2.06 \times 10^7 \text{ kg}}{4\pi (19,300 \text{ kg/m}^3)} \right)^{1/3}$$
$$= 6.34 \text{ m}$$

But what is the uncertainty in radius, ΔR ?