Answer on Question #48820 – Math – Geometry

if the radius of sphere is increased by 50% then the ratio of percentage increase in volume to the percentage increase in surface area

Solution:

Let the initial radius of the sphere $R_1 = R$ and final radius $R_2 = 1.5\ R$

Then, initial volume of the sphere: $V_1 = \frac{4}{3}\pi {R_1}^3 = \frac{4}{3}\pi R^3$

Final volume of the sphere: $V_2 = \frac{4}{3}\pi R_2^3 = \frac{4}{3}\pi(1.5R)^3 = 1.5^3 \cdot \frac{4}{3}\pi R^3$

Initial surface area of the sphere:

$$S_1 = 4\pi R_1^2 = 4\pi R^2$$

Final surface area of the sphere:

$$S_2 = 4\pi R_2^2 = 4\pi(1.5R)^2 = 1.5^2 \cdot 4\pi R^2$$

Ratio of percentage increase in volume to the percentage increase in surface area

$$\frac{increase\ in\ volume}{increase\ in\ surface} = \frac{\frac{V_2}{V_1} - 1}{\frac{S_2}{S_1} - 1} = \frac{\frac{1.5^3 \cdot \frac{4}{3}\pi R^3}{\frac{4}{3}\pi R^3} - 1}{\frac{1.5^2 \cdot 4\pi R^2}{4\pi R^2} - 1} = \frac{1.5^3 - 1}{1.5^2 - 1} = 1.9$$

Answer: 1.9