Question 22284

If bowl floats in fluid (and we neglect its mass), the buoyant force is compensated by the gravitational force, which acts on the frog. The following equation expresses the latter thought:

$$m_f \cdot g = V_{bowl} \cdot \rho \cdot g \quad ,$$

where m_f is the mass of the frog, V_{bowl} is the volume of the hemispherical bowl, $\rho = 1.29 \cdot 10^3 \, kg/m^3$ is the density of the fluid.

Knowing that the volume of the hemisphere is $V_{bowl} = \frac{1}{2} V_{sphere} = \frac{2}{3} \pi r^3$, and plugging this expression into first equation, obtain: $m_f = V_{bowl} \rho = \frac{2}{3} \pi r^3 \rho = 0.42 \, kg$.