EJERCICIO F2BE3211:

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$d_{JÚPITER} = ?$; $G = 6{,}67 \cdot 10^{-11}\ N \cdot m^2/kg^2$

$R_J = 6{,}99 \cdot 10^4\ Km = 6{,}99 \cdot 10^7\ m$

$R_{ÓRBITA\ DEL\ SATELITE\ (CALISTO)} = 1{,}88 \cdot 10^6\ Km = 1{,}88 \cdot 10^9\ m$

$T_{CALIXTO} = 16{,}9\ días = 16{,}9 \cdot 24 \cdot 60 \cdot 60 = 1460160\ s$

PROCEDIMIENTO:

$d = \frac{M_J}{V_J}$ → con la 3ª Ley de Kepler y Calisto

V_J → sabiendo $V_{esfera} = \frac{4}{3}\pi R^3$

3ª Ley de Kepler:

$F_g = m \cdot a_N$ (sobre calixto)

$$G\frac{M_J \cancel{m_S}}{R_{orS}^2} = \cancel{m_S} \cdot a_N$$

$$G\frac{M_J}{R_{orS}^2} = \frac{v^2}{R_{orS}} \Rightarrow \boxed{v^2 = G\frac{M_J}{R_{orS}}} \qquad v = \frac{s}{t} = \frac{2\pi R}{T}$$

$$\left(\frac{2\pi R_{orS}}{T}\right)^2 = G\frac{M_J}{R_{orS}} \Rightarrow \frac{4\pi^2 R_{orS}^2}{T^2} = G\frac{M_J}{R_{orS}}$$

$$\boxed{R_{orS}^3 = G\frac{M_J}{4\pi^2} \cdot T^2} \Rightarrow M_J = \frac{R_{orS}^3 \cdot 4\pi^2}{G \cdot T^2}$$

$$M_J = \frac{(1{,}88 \cdot 10^9)^3 \cdot 4\pi^2}{6{,}67 \cdot 10^{-11} \cdot (1460160)^2} = \boxed{1{,}84 \cdot 10^{27}\ kg}$$

$$d_J = \frac{M_J}{V_J} = \frac{1{,}84 \cdot 10^{27}}{\frac{4}{3}\pi \cdot R_J^3} = \frac{1{,}84 \cdot 10^{27}}{\frac{4}{3}\pi \cdot (6{,}99 \cdot 10^7)^3}$$

$$\boxed{d_J = 1286{,}17\ kg/m^3}$$