

The mass of a metal cylinder varies jointly as its height and the square of the radius of its base. One cylinder has a mass of 120 g. Find the mass of a second cylinder made of the same metal, 3 times as high, and having one-half the base radius of the first.

Solution

$$\begin{aligned}m &= \rho V = \rho hS = \rho h\pi r^2 \gg \frac{m_2}{m_1} = \frac{h_2 r_2^2}{h_1 r_1^2} = 3 * \left(\frac{1}{2}\right)^2 = \frac{3}{4} \gg m_2 = \frac{3}{4} * 120 \text{ g} \\&= 90 \text{ g}\end{aligned}$$