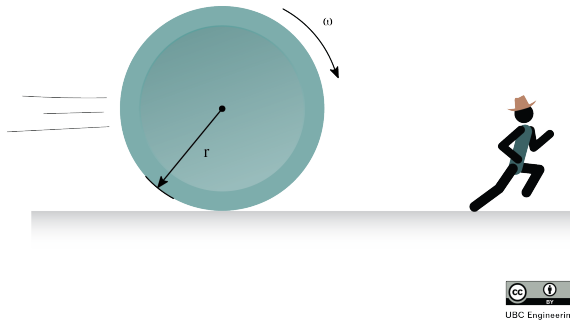# 22-R-IM-TW-31

An archaeologist is running away from a 4000 kg spherical boulder. If the boulder rolls with an angular speed of $\omega = 4$ rad/s without slipping and has a radius of $r = 1.5$ m, what is the linear and angular momentum of the boulder?

Solution:

$$I_G = \frac{2}{5}mr^2 = \frac{2}{5}(4000)(1.5)^2 = 3600 \ [\text{kg} \cdot \text{m}^2]$$

$$H_G = I_G\omega = (3600)(4) = 14400 \ [\text{kg} \cdot \text{rad/s}]$$

$$v = \omega r = (4)(1.5) = 6 \ [\text{m/s}]$$

$$L = mv = (4000)(6) = 24000 \ [\text{kg} \cdot \text{m/s}]$$