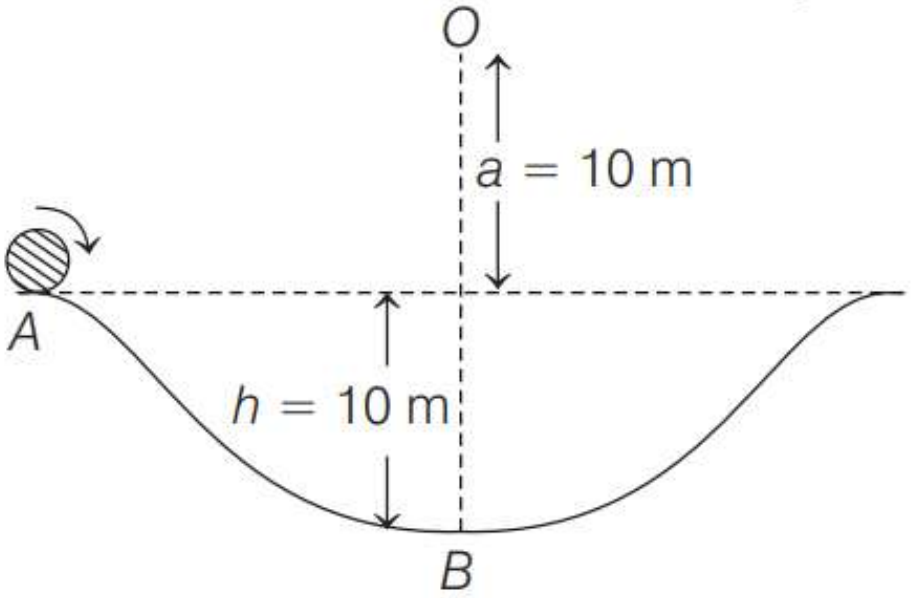
A particle of mass 20 g is released with an initial velocity 5 m/s along the curve from the point A, as shown in the figure. The point A is at height h from point B. The particle slides along the frictionless surface. When the particle reaches point B, its angular momentum about O will be (Take, $g = 10\ \text{m/s}^2$)

(2019 Main, 12 Jan II)



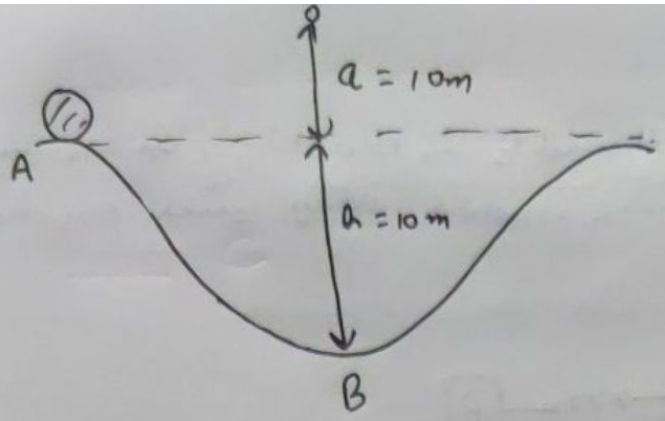
(a) $8\ \text{kg-m}^2/\text{s}$

(b) $3\ \text{kg-m}^2/\text{s}$

(c) $2\ \text{kg-m}^2/\text{s}$

(d) $6\ \text{kg-m}^2/\text{s}$

Sol 2



Since path is frictionless, energy conservation can be applied, But only should be apply it.

Momentum of ball around point O = $m V(a+h)$

m & (a+h) are known, so for calculating V energy conservation is applied

$$\frac{1}{2} m V_A^2 = \frac{1}{2} m V_B^2 - mgh$$

$$V_A^2 + 2gh = V_B^2$$

$$25 + 200 = V_B^2$$

$$V_B = 15 \text{ m/s}$$

$$\text{Momentum} = (20 \times 10^{-3})(15)(20)$$

$$= 6 \text{ Kg-m}^2/\text{s}$$

Note: No angular velocity will be gained by ball because of frictionless surface.