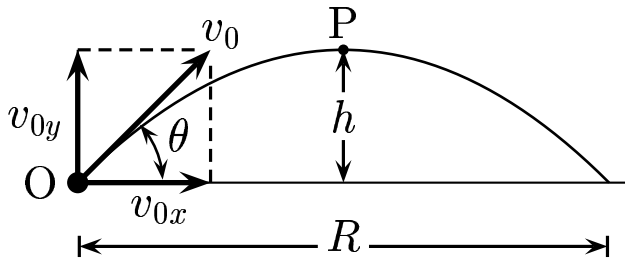
A projectile trajectory has a maximum height h, a range R. The mass is m and the initial speed v_0. The angle between the initial velocity vector and the horizontal direction is θ.



Determine the angular momentum ℓ at P with respect to O.

A) $\ell = \dfrac{R\,m\,v_{0x}}{2} = \dfrac{R\,m\,v_0\,\cos\theta}{2}$.

B) $\ell = R\,m\,v_{0y} = R\,m\,v_0\,\sin\theta$.

C) $\ell = h\,m\,v_{0x} = h\,m\,v_0\,\cos\theta$.

By inspection, at P the momentum vector is $m\,v_{0x}$.

It is along the horizontal direction.

The lever arm is the perpendicular distance from O to the momentum vector, which is h.

So the angular momentum is $\ell = h\,m\,v_{0x}$.

Answer **C**.