

A horizontal circular platform of radius 0.5m and mass 0.45kg is free to rotate about its axis. Two massless spring toy-guns, each carrying a steel ball of mass 0.05kg are attached to the platform at a distance 0.25m from the centre on its either sides along its diameter (see figure). Each gun simultaneously fires the ball horizontally and perpendicular to the diameter in opposite directions. After leaving the platform, the balls have horizontal speed of 9ms^{-1} with respect to the ground. The rotational speed of the platform in rads^{-1} after the balls leave the platform is :



Solution

Using the principle of Angular momentum conservation,

$$L_1 = L_2$$

or

$$I_1 \omega_1 = (mvr)_2$$

or

$$\left(\frac{0.4 \times 0.5 \times 0.5}{2}\right) \omega_1 = 2 \times 0.05 \times 9 \times \frac{0.5}{2}$$

Thus $\omega_1 = 4$