A hoop of radius r and mass m rotating with an angular velocity ω_0 is placed on a rough horizontal surface. The initial velocity of the centre of the hoop is zero. What will be the velocity if the centre of the loop when it ceases to slip ?

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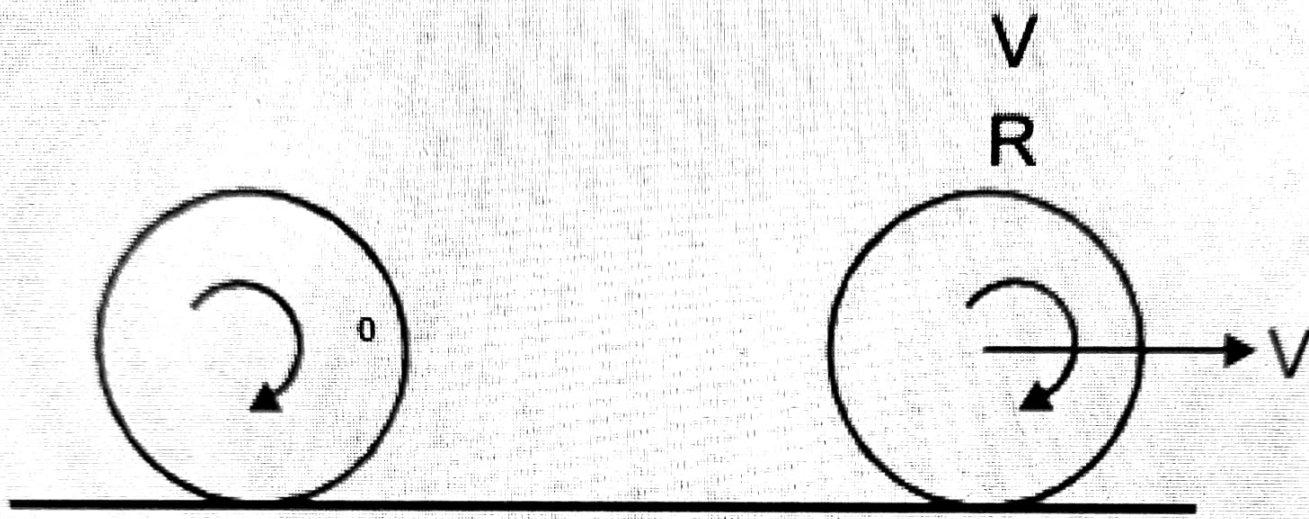
(A) $\frac{r\omega_0}{3}$ (B) $\frac{r\omega_0}{2}$ (C) $r\omega_0$ (D) $\frac{r\omega_0}{4}$

Sol.



$$mr^2\omega_0 = mvr + mr^2 \times \frac{v_0}{r}$$

$$\Rightarrow v = \frac{\omega_0 r}{2}$$

Ans (3)