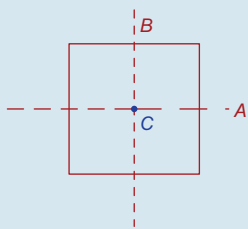
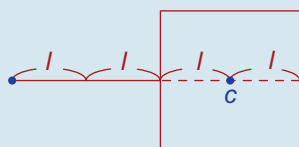


Q. 8. (a)



$$\begin{aligned} I_C &= I_A + I_B \\ &= \frac{1}{3}ml^2 + \frac{1}{3}ml^2 \\ &= \frac{2}{3}ml^2 \end{aligned}$$

(b) (ii)



**The rod:**

$$I_p = \frac{4}{3}ml^2$$

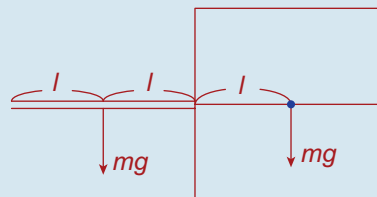
**The lamina:**

$$\begin{aligned} I_p &= I_c + md^2 \\ &= \frac{2}{3}ml^2 + m(3l)^2 \\ &= \frac{29}{3}ml^2 \end{aligned}$$

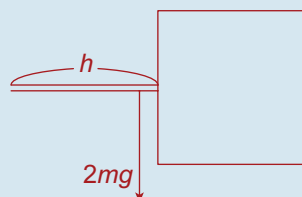
**The system:**

$$\begin{aligned} I_p &= \frac{4}{3}ml^2 + \frac{29}{3}ml^2 \\ &= 11ml^2 \end{aligned}$$

(ii) **Forces:**



**Resultant:**



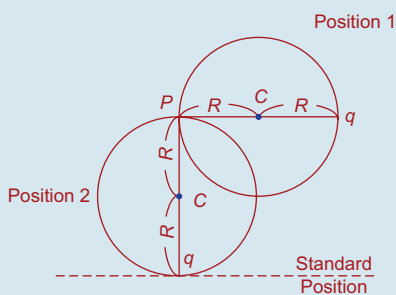
**Taking moments about p:**

$$\begin{aligned} mg(l) + mg(3l) &= 2mgh \\ \Rightarrow h &= 2l \end{aligned}$$

The mass of the system is  $2m$ .

$$\begin{aligned} T &= 2\pi\sqrt{\frac{I}{mgh}} \\ &= 2\pi\sqrt{\frac{11ml^2}{(2m)g(2l)}} \\ &= 2\pi\sqrt{\frac{11l}{4g}} \end{aligned}$$

Q. 9. (i)



**The disc:**

$$\begin{aligned} I_p &= I_c + md^2 \\ &= \frac{1}{2}mR^2 + mR^2 = \frac{3}{2}mR^2 \end{aligned}$$

**The point mass:**

$$I_p = (2m)(2R)^2 = 8mR^2$$

**The system:**

$$I_p = \frac{3}{2}mR^2 + 8mR^2 = \frac{19}{2}mR^2$$