

$$T - 4g = 8b \quad \text{Equation 3}$$

$$T - 3g = 6a \quad \text{Equation 1}$$

$$\Rightarrow a = \frac{T - 3g}{6}$$

$$T - 4g = 8b \quad \text{Equation 3}$$

$$\Rightarrow b = \frac{T - 4g}{8}$$

$$6g - T = 3a + 3b \quad \text{Equation 2}$$

$$\Rightarrow 6g - T = 3\left(\frac{T - 3g}{6}\right) + 3\left(\frac{T - 4g}{8}\right)$$

$$\Rightarrow 6g - T = \left(\frac{T - 3g}{2}\right) + 3\left(\frac{T - 4g}{8}\right)$$

$$\Rightarrow 48g - 8T = 4T - 12g + 3T - 12g$$

$$\Rightarrow 15T = 72g$$

$$\Rightarrow T = \frac{24g}{5} \text{ N}$$

$$a = \frac{T - 3g}{6} = \frac{\frac{24g}{5} - 3g}{6}$$

$$= \frac{24g - 15g}{30}$$

$$= \frac{9g}{30}$$

$$= \frac{3g}{10} \text{ m/s}^2 \quad \dots \text{ acceleration of 6 kg mass}$$

$$b = \frac{T - 4g}{8}$$

$$= \frac{24g}{5} - \frac{4g}{8}$$

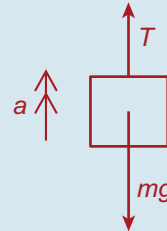
$$= \frac{24g - 20g}{40}$$

$$= \frac{4g}{40}$$

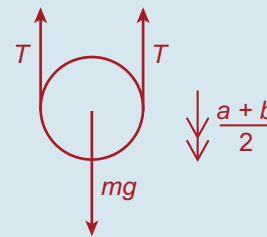
$$= \frac{g}{10} \text{ m/s}^2 \quad \dots \text{ acceleration of 8 kg mass}$$

$$\begin{aligned} \frac{a + b}{2} &= \frac{\frac{3g}{10} + \frac{g}{10}}{2} \\ &= \frac{3g + g}{20} = \frac{4g}{20} \\ &= \frac{g}{5} \text{ m/s}^2 \quad \dots \text{ acceleration of pulley} \end{aligned}$$

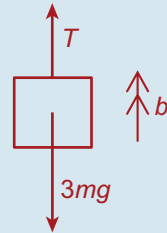
Q. 10. (i) Mass m



Pulley B



Mass $3m$



(ii) Mass m : $T - mg = ma$ Equation 1

Mass $3m$: $T - 3mg = 3mb$ Equation 2

Pulley B:

$$Mg - 2T = M\left(\frac{a + b}{2}\right) \quad \text{Equation 3}$$

$$a = \frac{T - mg}{m} \quad \text{from Equation 1}$$

$$b = \frac{T - 3mg}{3m} \quad \text{from Equation 2}$$

$$Mg - 2T = M\left(\frac{a + b}{2}\right) \quad \text{Equation 3}$$

$$\Rightarrow 2Mg - 4T = Ma + Mb$$

$$\Rightarrow 2Mg - 4T = M\left(\frac{T - mg}{m}\right) + M\left(\frac{T - 3mg}{3m}\right)$$

... multiply by $3m$