

$$\Rightarrow 6Mmg - 12mT = 3MT - 3Mmg + MT - 3Mmg$$

$$\Rightarrow 12Mmg = 12mT + 4MT \dots \text{divide by 4}$$

$$\Rightarrow 3Mmg = 3mT + MT$$

$$\Rightarrow 3Mmg = T(3m + M)$$

$$\Rightarrow g = T \left(\frac{3m + M}{3Mm} \right)$$

$$\Rightarrow g = T \left(\frac{1}{M} + \frac{1}{3m} \right) \dots \text{as required}$$

(iii) Let $M = 3m$

$$\Rightarrow g = T \left(\frac{1}{3m} + \frac{1}{3m} \right)$$

$$\Rightarrow g = T \left(\frac{2}{3m} \right)$$

$$\Rightarrow T = \frac{3mg}{2}$$

$$a = \frac{T - mg}{m}$$

$$= \frac{\frac{3mg}{2} - mg}{m}$$

$$= \frac{3mg - 2mg}{2m}$$

$$= \frac{mg}{2m}$$

$$= \frac{g}{2} \text{ m/s}^2 \dots m \text{ mass will move.}$$

$$b = \frac{T - 3mg}{3m}$$

$$= \frac{\frac{3mg}{2} - 3mg}{3m}$$

$$= \frac{3mg - 6mg}{6m}$$

$$= \frac{-3mg}{6m}$$

$$= -\frac{g}{2} \text{ m/s}^2 \dots 3m \text{ mass will move.}$$

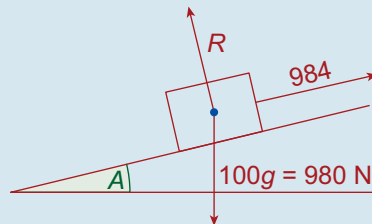
$$\frac{a + b}{2} = \frac{\frac{g}{2} - \frac{g}{2}}{2}$$

$$= 0 \text{ m/s}^2 \dots \text{pulley B will not move.}$$

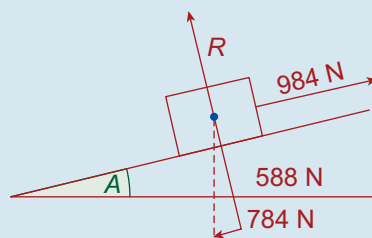
Exercise 5E

Q. 1. (a) $\tan A = \frac{4}{3} \Rightarrow \sin A = \frac{4}{5}, \cos A = \frac{3}{5}$

Forces



Resolved

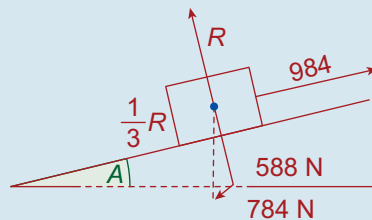


$$F = ma$$

$$\Rightarrow (984 - 784) = 100a$$

$$\Rightarrow a = 2 \text{ m/s}^2$$

(b) **Forces (Resolved)**



$$R = 588 \Rightarrow \text{Friction} = \frac{1}{3}R = 196 \text{ N}$$

$$F = ma$$

$$\Rightarrow (984 - 784 - 196) = 100a$$

$$\Rightarrow a = 0.04 \text{ m/s}^2$$

Q. 2. **3 kg**

Forces

