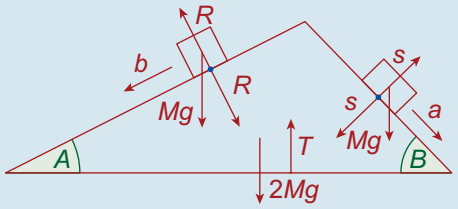
Q. 5.

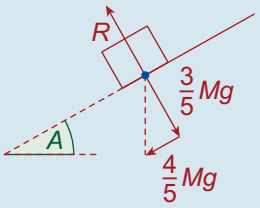


Since $\tan a = \frac{4}{3}$, $\sin A = \frac{4}{5}$, $\cos A = \frac{3}{5}$

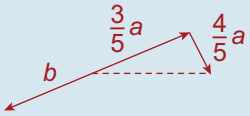
Since $\tan B = \frac{3}{4}$, $\sin B = \frac{3}{5}$, $\cos B = \frac{4}{5}$

First Particle:

Forces



Accelerations



Along plane:

$F = ma$

$\Rightarrow \frac{4}{5}Mg = M\left(b - \frac{3}{5}a\right)$

$\Rightarrow 4g = 5b - 3a$ … ①

Perpendicular to the plane:

$F = ma$

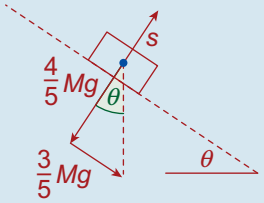
$\Rightarrow \frac{3}{5}Mg - R = M\left(\frac{4}{5}a\right)$

$\Rightarrow 3Mg - 5R = 4Ma$

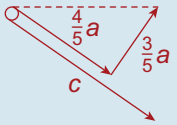
$\Rightarrow R = \frac{3Mg - 4Ma}{5}$ … ②

Other Particle:

Forces



Accelerations



Along the plane: $\frac{3}{5}Mg = M\left(\frac{4}{5}a + c\right)$

$\Rightarrow 3g = 4a + 5c$ ….. ③

Perpendicular to the plane:

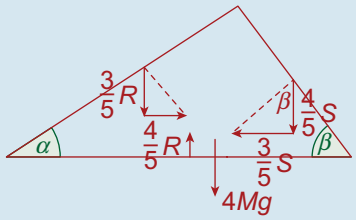
$S - \frac{4}{5}Mg = M\left(\frac{3}{5}a\right)$

$\Rightarrow 5S - 4Mg = 3Ma$

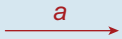
$\Rightarrow S = \frac{3Ma + 4Mg}{5}$ …. ④

The Wedge:

Forces



Acceleration



$\frac{4}{5}R - \frac{3}{5}S = 2Ma$

$\Rightarrow \frac{4}{5}\left(\frac{3Mg - 4Ma}{5}\right) - \frac{3}{5}\left(\frac{3Ma + 4Mg}{5}\right) = 2Ma$

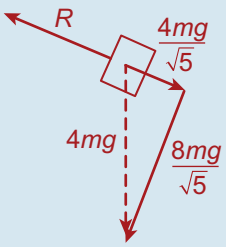
(from ② and ④)

$\Rightarrow \frac{1}{25}(12Mg - 16Ma - 9Ma - 12Mg) = 2Ma$

$\Rightarrow a = 0$

$\therefore$ it remains at rest. **QED**

Q. 6. (i) ***4m* mass**



Wedge