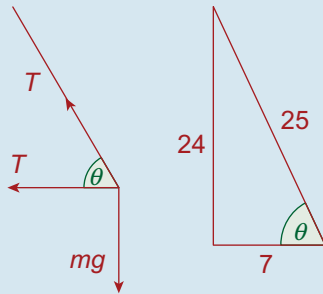


(ii) Forces



$$\uparrow = \downarrow$$

$$T \sin \theta = mg$$

$$\Rightarrow T = \frac{25mg}{24} \dots \textcircled{1}$$

$$\text{NZL: } \sum F = ma$$

$$\leftarrow T + T \cos \theta = m\omega^2 r$$

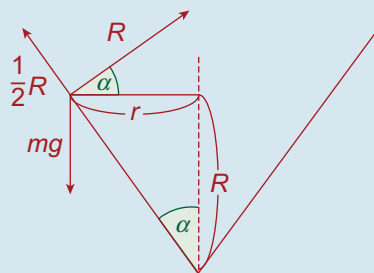
$$\Rightarrow \frac{25mg}{24} \left[1 + \frac{7}{25} \right] = m\omega^2 (0.7)$$

$$\Rightarrow \omega^2 = \frac{25g}{(0.7)(24)} \left[\frac{32}{25} \right]$$

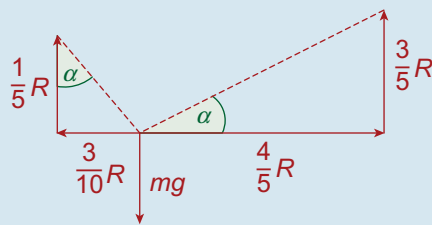
$$\Rightarrow \omega = \sqrt{\frac{40g}{21}}$$

Q. 10. (i) Since $\tan R = \frac{3}{4}$, $\sin = \frac{3}{5}$, $\cos = \frac{4}{5}$

Forces



Resolved



$$1: \frac{3}{5}R + \frac{2}{5}R = mg$$

$$\Rightarrow R = mg$$

$$2: F_c = m\omega^2 r$$

$$\Rightarrow \left(\frac{4}{5}R - \frac{3}{10}R \right) = m(7)^2 r$$

$$\Rightarrow \frac{1}{2}R = 49mr$$

$$\text{But } R = mg$$

$$\Rightarrow \frac{1}{2}mg = 49mr$$

$$\Rightarrow r = \frac{g}{98}$$

$$= \frac{1}{10}$$

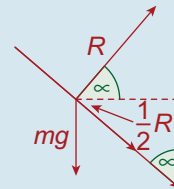
$$\text{But } \tan \alpha = \frac{3}{4} = \frac{r}{h}$$

$$\Rightarrow h = \frac{4}{3}r$$

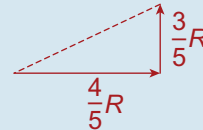
$$= \frac{4}{3} \left(\frac{1}{10} \right)$$

$$= \frac{2}{15} \text{ m}$$

(ii) Forces



Resolved



$$1: \frac{3}{5}R = \frac{2}{5}R + mg$$

$$\Rightarrow R = 5mg$$

$$2: F_c = m\omega^2 r$$

$$\Rightarrow \left(\frac{4}{5}R + \frac{3}{10}R \right) = m(49)(r)$$

$$\Rightarrow \frac{11}{10}R = 49mr$$

$$\text{But } r = 5mg$$

$$\therefore \frac{11}{10}(5mg) = 49mr$$

$$\Rightarrow r = \frac{11g}{98}$$

$$= \frac{11}{10}$$

$$\therefore h = \frac{4}{3}r$$

$$= \frac{4}{3} \left(\frac{11}{10} \right)$$

$$= \frac{22}{15} \text{ m}$$