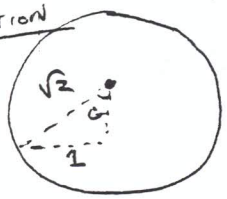
1984 (C.R Met) Hons

(2) Position



Trig ⇒ other side is 1 also.

FORCES

$\vec{R} = R\left(\frac{1}{\sqrt{2}}\right)\vec{i} + R\left(\frac{1}{\sqrt{2}}\right)\vec{j}$

$\vec{R} = \frac{R}{\sqrt{2}}\vec{i} + \frac{R}{\sqrt{2}}\vec{j}$

NII ⇒ ↕, that $\frac{R}{\sqrt{2}} - mg = 0 \Rightarrow R = \sqrt{2}mg$

NII (Radial) ⇒ $\frac{R}{\sqrt{2}} = m\omega^2 r$

$\Rightarrow mg = m\omega^2(1)$

$\Rightarrow \omega = \sqrt{g}$ Rad/sec.

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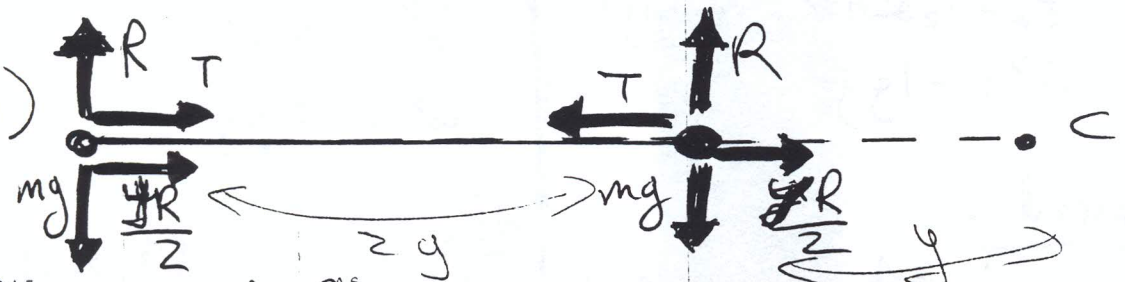
(2)



(i) Left particle:

NII ($\vec{j}$ dir^n) ⇒ $R = mg$.

NII ($\vec{i}$ dir^n) ⇒ $T + \frac{R}{2} = m\omega^2(2y)$

$\Rightarrow T + \frac{mg}{2} = 3m\omega^2 y$ ①

Right Particle:

NII ($\vec{j}$ dir^n)

$\frac{R}{2} - T = m\omega^2 y$

$\Rightarrow \frac{mg}{2} - T = m\omega^2 y$ ②

Add Eqn ① and ②:

$\Rightarrow \frac{mg}{2} + \frac{mg}{2} = 3m\omega^2 y + m\omega^2 y$

$\Rightarrow mg = 4m\omega^2 y$

$\Rightarrow \frac{g}{4} = \omega^2$

$\Rightarrow \omega = \frac{\sqrt{g}}{2}$ Rad/Sec.