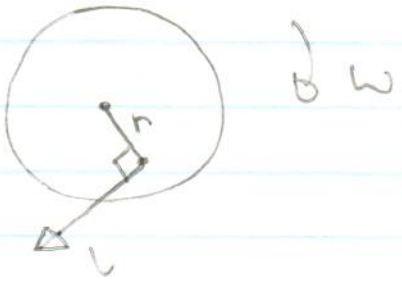
Exercise 6A

(10) $\omega = 15(2\pi) = 30\pi \text{ rad s}^{-1}$



$v = r\omega$

$\therefore 2 = r\ 30\pi$

$\therefore r = 0,0212 \text{ m}$

Exercise 6B

(1) $r = \frac{10}{100} = 0,10 \text{ m}$

(a) $\omega = 33 \text{ rpm} = \frac{33 \times 2\pi}{60} = 3,456 \text{ rad.s}^{-1}$

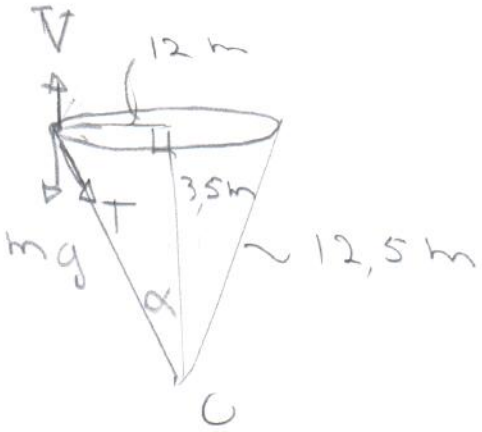
$\therefore \omega = 3,46 \text{ rad.s}^{-1}$

(b) $v = r\omega = 0,1(3,46) = 0,346 \text{ m s}^{-1}$

(c) $a_n = r\omega^2 = 0,1(3,46)^2 = 1,19 \text{ m s}^{-2}$

Towards the axis.

Exercise 6 C



(9) $m = 0,5\ kg$

$l = 12,5\ m$

$v = 24\ m\,s^{-1}$

$\rightarrow \Sigma F_n = ma_n$

$T\sin\alpha = 0,5 \cdot \frac{v^2}{r}$

$\therefore T\,\frac{12}{12,5} = 0,5\,\frac{24^2}{12}$

$\therefore T = 25\ N$

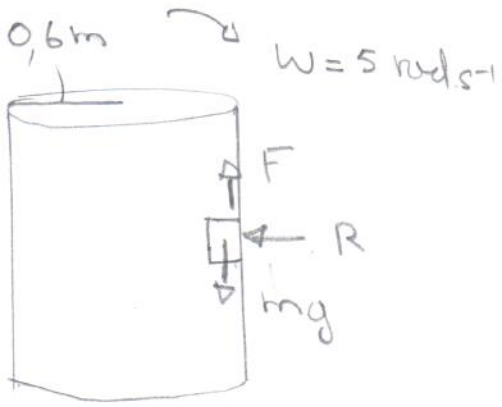
$\uparrow \Sigma F_y = 0$

$V - mg - T\cos\alpha = 0$

$\therefore V = 0,5(10) + 25\,\frac{3,5}{12,5}$

$\therefore V = 12\ N$

Miscellaneous Exercise 6



(7) $r = 0,6\,m$

$\omega = 5\ rad\ s^{-1}$

$m = 0,1\,kg$

↑) $\Sigma F_y = 0$

$F - 0,1(10) = 0$

$\therefore F = 1,0\ N$

→) $\Sigma F = m a_n$

$\therefore R = m\omega^2 r = 0,1\,(5)^2\,0,6$

$\therefore R = 1,5$

$F_{lim} = \mu R = 0,8(1,5) = 1,2\ N > F$

If about to slip $F = \mu R$

$\therefore 1,0 = 0,8R \Rightarrow R = 1,25\ N$

→) $\Sigma F_n = m a_n$

$R = m\omega^2 r$

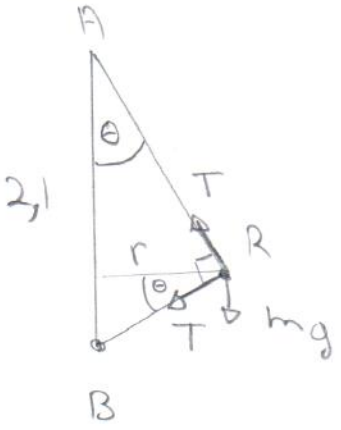
$\therefore 1,25 = 0,1\,\omega^2\,0,6$

$\therefore \omega = 4,56\ rad\ s^{-1}$

(13) $\sin\theta = \frac{3}{5}$

$\cos\theta = \frac{4}{5}$

$m = 0,3\,kg$



(a) $\overset{A}{+\uparrow}$ $\Sigma F_y = 0$

$T\cos\theta - T\sin\theta - mg = 0$

$\therefore T\left(\frac{4}{5} - \frac{3}{5}\right) = 0,3(10)$

$\therefore T = 15\,N$

(b) $\overset{+}{\Leftarrow}$ $\Sigma F_n = ma_n$

$T(\sin\theta + T\cos\theta) = m\frac{v^2}{r}$

$15\left(\frac{3}{5} + \frac{4}{5}\right) = 0,3\,\frac{v^2}{r}$ $\quad -①$

But $r = 2,1\cos\theta.\sin\theta = 2,1\,\frac{4}{5}\cdot\frac{3}{5} = 1,008\,m$

$\therefore$ From ①: $v = 8,4\,m.s^{-1}$