chapter 3

Q3

$\theta = \pi$ $\quad r = 45\ cm$

$t = 0.2\ se$ $\quad F = ?!$

$m = 2\ kg$

Sol:

$$\omega = \frac{\theta}{t} = \frac{\pi}{0.2}\ \frac{rad}{se}$$

$$a = r\alpha$$

$$= r\omega^2 = 45 \times 10^{-2} \left(\frac{\pi}{0.2}\right)^2$$

$$= 11.1\ m/s^2$$

$$a_c = \frac{v^2}{r}$$

$$= \frac{(\omega r)^2}{r}$$

$$a_c = \omega^2 r$$

$$F = ma$$

$$= 2 \times 11.1$$

$$F \approx 220\ N$$

Q4

m = 3800 kg

v = 65 km/h

r = 80 m

(a) $\vec{F}$ = ? the road exerts on the car

(b) $\vec{F}$ = ? if v = 100 km/h

Solution

(a)

$$65 \frac{km}{h} = 18.05 \, m/s$$

$$\vec{F} = m a_c$$

$$= m \frac{v^2}{r}$$

$$= 3800 \times \frac{(18.05)^2}{80}$$

$$\vec{F} = 15.5 \times 10^3 \, N$$

(b)

$$\frac{100}{3.6} \frac{km}{h} = 27.8 \frac{m}{s}$$

$$\vec{F} = 3800 \times \frac{(27.8)^2}{80}$$

$$\vec{F} = 37 \times 10^3 \, N$$

Chap 25

1

$v = 180 \text{ km/h} =$

$\omega = ?!$ if a single lap of the track is 2.4 km

when $\rightarrow \theta = 2\pi \rightarrow x = 2.4 \text{ km}$

$x = r\theta$

$\therefore r = \frac{x}{\theta} = \frac{2.4}{2\pi} = \boxed{\frac{1.2}{\pi} = r}$ ✓

now

$\omega = \frac{v}{r}$

$= 180 \left(\frac{km}{h}\right) / \left(\frac{1.2}{\pi}\right) \frac{Km}{Pi}$

$= 150 \frac{Pi}{h}$ radians per hour

$\omega = 150 \frac{Pi}{h} \times \frac{1\ h}{3600 s} = \frac{1}{24}$ rad. sec^{-1}

Q 3.6

If $m = 2500\ kg$ ulas one $F_c = ?$

$$F = m a_c$$

$$= m \frac{v^2}{r} = \frac{m (\omega r)^2}{r}$$

$$= m \omega^2 r$$

$$= 2500 \left(\frac{1}{24}\right)^2 * \left(\frac{1.2}{\pi}\right)$$

$$= 16.5 * 10^3\ N$$

Chapter 1:

1. $V_i = 0$ "accelerated uniformly"
... it reaches the 5m

28

r = 8 m

one revolution every 7 s = T

(a) $\omega = ?$

$$\omega = \frac{2\pi}{T} = \frac{2\pi}{7} = 0.9 \text{ rad/s}$$

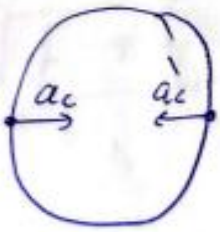
(b) speed = ?

$$v = r\omega = 8 \times 0.9 = 7.2 \text{ m/s}$$

(c) $a_c = ?$

$$a_c = \frac{v^2}{r} = \frac{(7.2)^2}{8} = 6.4 \text{ m/s}^2$$

(d) $\vec{a}_c = 0$ since it's vector value.



$\vec{a}_c = -\vec{a}_c$ and each point on the circle has an opposite one infront.