

Chapt 5

5.10 $a_c = 6.25 * 10^3 a_g$

$$a_c = \frac{v^2}{r} \rightarrow v = \sqrt{a_c r} \quad \& \quad v = 2\pi R \omega$$

$$2\pi r \omega = \sqrt{a_c r} \rightarrow \omega = \frac{\sqrt{a_c r}}{2\pi r} = \frac{1}{2\pi} \sqrt{\frac{a_c}{r}}$$

$$\omega = \sqrt{\frac{6.25 * 10^4}{5 * 10^{-2}}} \frac{1}{2\pi} = \underline{\underline{178 \frac{\text{rad}}{\text{s}}}}$$

5.15 $ma = 180 \frac{\text{N}}{g}$

$v = 28 \text{ m/s}$ $m = 0.75 \text{ kg}$

R? $180 = m \frac{v^2}{R}$

$$R = \frac{mv^2}{180} = \frac{(0.75)(28)^2}{180} = \underline{\underline{3.3 \text{ m}}}$$

5.38 $mg - N = \frac{mv^2}{R}$

$N \leq 3mg$

$v = 230 \text{ m/s}$

$$mg - 3mg = \frac{mv^2}{R} \rightarrow -2mg = \frac{mv^2}{R} \rightarrow R \geq \frac{v^2}{2g}$$

$$R \geq \frac{(230)^2}{2(9.8)} \rightarrow \underline{\underline{R \geq 2.7 \text{ km}}}$$

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5.58 $R = 3.3\text{m}$ $v = 10.0\text{m/s}$ $m = 55\text{kg}$ ~~$\mu = 0.32$~~

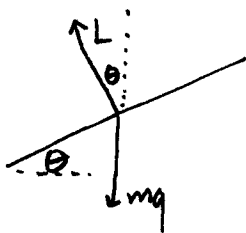
a.) The wall exerts a force on the person that keeps him from travelling off in a straight line.

b.) $F = m \frac{v^2}{R} = \frac{55(10)^2}{3.3} = \underline{1666\text{N}}$

c.) $f = mg \rightarrow \mu N = mg$ $N = 1666\text{N}$

$\mu(1666) = 55(9.8) \rightarrow \mu = \frac{1666}{55} \frac{55(9.8)}{1666} \Rightarrow \underline{\mu = 0.32}$

5.24



a.) $L \cos \theta = mg \rightarrow L = \frac{mg}{\cos \theta}$

$L \sin \theta = \frac{mv^2}{r} \rightarrow mg \frac{\sin \theta}{\cos \theta} = \frac{mv^2}{r}$

$\tan \theta = \frac{v^2}{gr}$

b.) $v = 195\text{m/s}$ $r = 8250\text{m}$

$\theta = \tan^{-1} \frac{195^2}{9.8(8250)} \quad \underline{\theta = 25.2^\circ}$