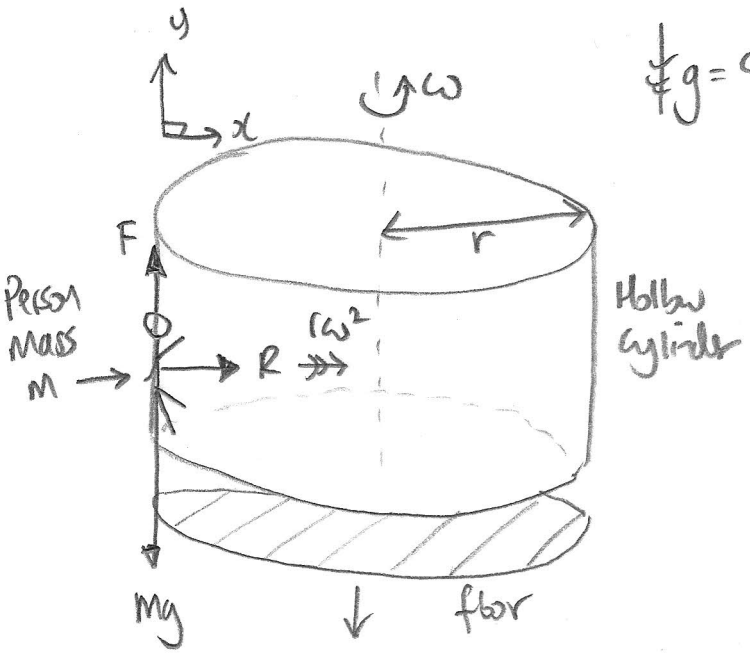
WALL OF DEATH

[$1\ rads^{-1} = \frac{1}{2\pi}\ rev/s$
$= \frac{60}{2\pi}\ RPM$]



$g = 9.81\ N/kg$

Person of mass m sticks to interior wall of rotating cylinder when $\omega >$ critical value.

Newton II:

// x (radially inwards)

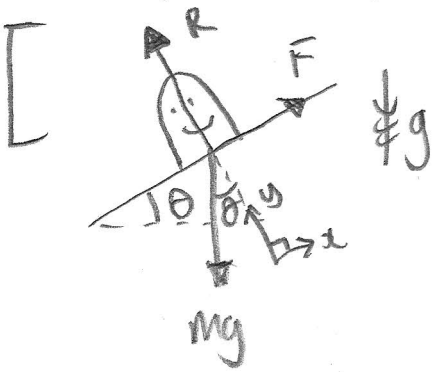
$$mr\omega^2 = R \quad (1)$$

mass × acceleration

// y $$0 = F - mg \quad (2)$$

And for no slip: $$F \leq \mu R \quad (3)$$

μ is coefficient of static friction.

[

g

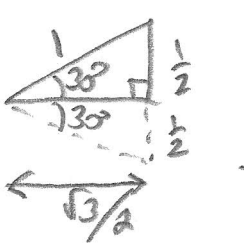
Newton II: // x : $0 = F - mg\sin\theta$
// y : $0 = R - mg\cos\theta$

No slip $F \leq \mu R$

$\therefore\ mg\sin\theta \leq \mu mg\cos\theta \ \therefore\ \tan\theta \leq \mu$

Assume no slip if in equilibrium

So let $\mu = \tan 30° = \frac{1}{\sqrt{3}}$



] Aside to set sensible μ

.... So for wall of death:

$$F \leq \mu R$$

$$\Rightarrow \quad mg \leq \mu mr\omega^2$$

$$\therefore \quad \sqrt{\frac{g}{\mu r}} \leq \omega$$

let $r = 6.0\ m$
$\mu = \frac{1}{\sqrt{3}}$
$g = 9.81\ N/kg$

$\Rightarrow \omega = 5.32\ rads^{-1}$
$= 50.8\ RPM$