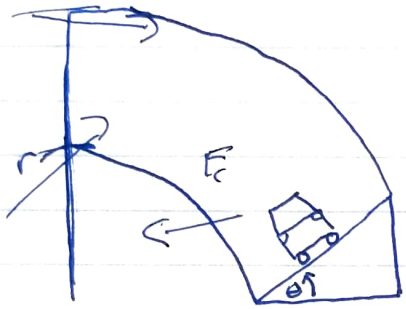
Demo Problems - banked turns, work & power, bungee jumping

① Banked turns




what should θ be to keep the car on the road? Assume no friction.

* circle so centripital force

$F_c = \frac{mv^2}{r}$

$F_c$ is MAGNITUDE

centripital force must point to center

draw free body


$F_c$ is the x component of the normal force

$F_g$ & $F_{1y}$ cancel as it is not rising or falling

$F_g = ma$
$= F_y$ (not falling or rising)

$F_c = \frac{mv^2}{r} = F_{1x}$ $\frac{F_c}{F_y} = \tan\theta$

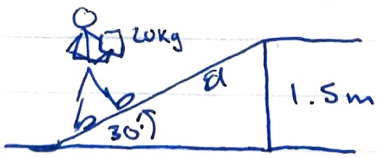
$\theta = \tan^{-1}\left(\frac{mv^2}{mg}\right) = \tan^{-1}\left(\frac{v^2}{rg}\right)$ ???

$\tan^{-1}\left(\frac{15^2}{100(9.8)}\right) \approx 12.931°$

V = 15 m/s

r = 100

② work to carry?




$W = Fd\cos\theta$ $M = .3$

$\sin 30 = \frac{1.5}{d}$

$d = \frac{1.5}{\sin 30} = 3\text{ m}$


work to carry:

$W = 196(3)\cos(30)$

$= 509.223\text{ J}$

work to carry:

$W = 196(1.5)\cos(1)$ * only use 1.5 & no angle bc in this case you are only pushing up

$= 294\text{ J}$