

Banked Curves

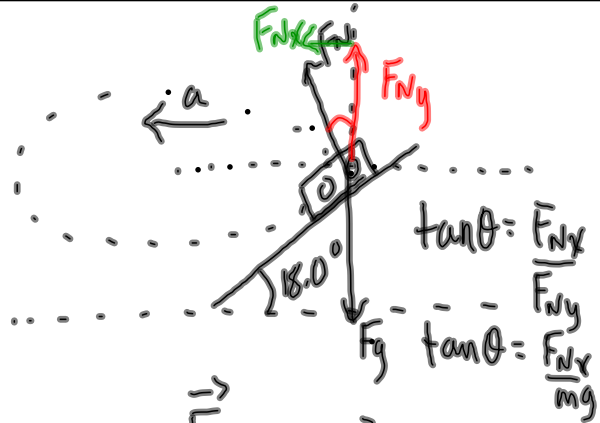
MP/565

$r = 382\text{m}$

$\theta = 18.0^\circ$

a) $v = ?$, (no friction)

b) does friction have a role in the record of 378.11 km/h



$\vec{F}_{net} = m\vec{a}$

$F_{Nx} = ma$

$mg \tan \theta = \frac{mv^2}{r}$

$g \tan \theta = \frac{v^2}{r}$

$v^2 = gr \tan \theta$

$v^2 = (9.81 \text{ m/s}^2)(382 \text{ m}) \tan 18.0^\circ$

$v = 34.9 \text{ m/s}$

If the car exceeds this speed, it will not be able to maintain the curved path

b) friction must play a role in cars reaching speeds of 378.11 km/h

$\frac{34.9 \text{ m}}{\text{s}} \cdot \left(\frac{1 \text{ km}}{1000 \text{ m}}\right) \left(\frac{3600 \text{ s}}{1 \text{ h}}\right)$

126 km/h

To DO

① PP/559

② PP/556

} draw FBDs!

$\vec{F}_{net} = m\vec{a}$
 (don't draw F_c in your FBD)
 centripetal acc.