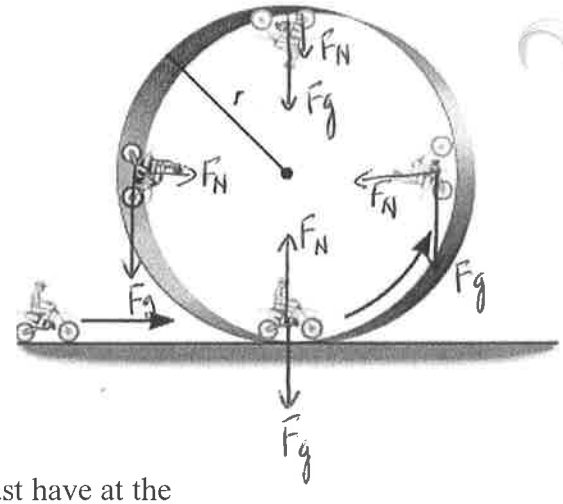
8. a) Compare the force exerted by the track on the cyclist at the top and the bottom.



Bottom: $F_{N\ max}$

Top: $F_{N\ min}$

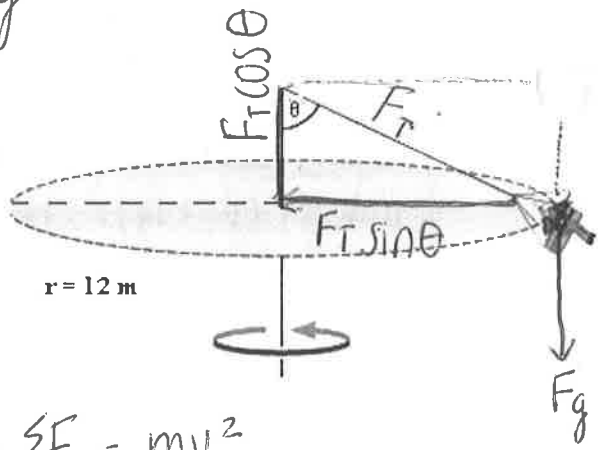
$$\Sigma F_{in} = \frac{mv^2}{r}$$

b) Derive an expression for the minimum speed the cyclist must have at the top to successfully make it around the track without falling.

$v_{min} = \sqrt{rg}$ see problem #7b

$\Sigma F_{in} = \frac{mv^2}{r} = mg$ $\quad v^2 = gr \quad v = \sqrt{rg}$

9. A student decides to go on the chair swing ride at an amusement park. Together the student and the chair have a combined mass of 80. kilograms and the chain makes an angle of 25° with the vertical as shown. Determine the tension in the chain and the speed of rotation of the ride.



$m = 80.\,kg \quad \theta = 25°$

F_{T_y}

$F_T\cos\theta = F_g$

$F_T\cos\theta = mg$

$F_T = \frac{mg}{\cos\theta}$

$F_T = 865N \rightarrow 870N$

1) What is the tension?

F_{T_x}

$F_T\sin\theta = \Sigma F_{in} = \frac{mv^2}{r}$

$v = \sqrt{\frac{F_T\sin\theta\, r}{m}}$

$v = 7.4\frac{m}{s}$

2) What is speed?