UCM : Centripetal Force calculations

① $T = \frac{\text{time}}{1 \text{ rev}}$ $\quad f = \frac{\#\text{ rev}}{1 s}$

$f = \frac{1}{T} = \frac{1}{1.82s} = 0.55 \text{ Hz}$

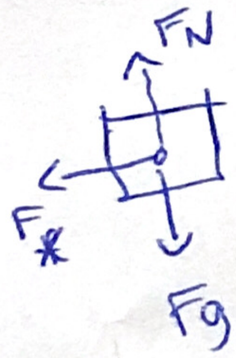
② $v = \frac{2\pi r}{T}$

$v = \frac{2\pi (50m)}{48s} = 6.54 m/s$

③ $a_c = \frac{v^2}{r}$

$a_c = \frac{(3.2 m/s)^2}{2.2 m} = 4.65 m/s^2$

④



$\Sigma F_x = F_f = F_c$

$= \mu F_N = \frac{mv^2}{r}$

$= \mu(m \cdot g) = \frac{mv^2}{r}$

$= \mu(g) = \frac{v^2}{r}$

$= \mu(9.8) = \frac{(3.2 m/s)^2}{2.2}$

$= \mu = .47$

$\Sigma F_y = F_N - F_g = 0$

$F_N = F_g$

$F_N = m \cdot g$

(5)

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scale = F_N

$\Sigma F_y = F_N + F_y = F_c$

$F_N = F_c - F_y$

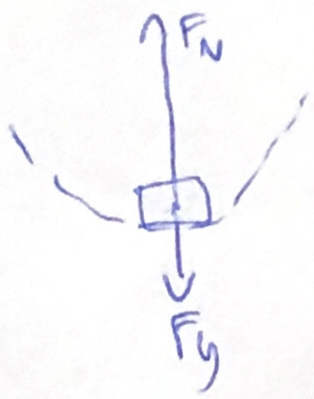
$F_N = \frac{mv^2}{r} - mg$

$F_N = \frac{(60kg)(21m/s)^2}{30.5} - (60kg)(9.8)$

$F_N = 867.5 - 588$

$F_N = 280N$

(6)



$\Sigma F_y = F_N - F_g = F_c$

$F_N = F_c + F_g$

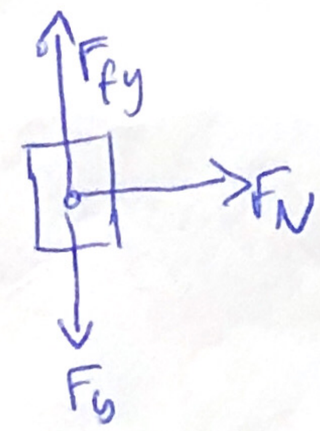
$F_N = \frac{mv^2}{r} + mg$

$F_N = \frac{(60)(15)^2}{30.5} + (60)(9.8)$

$F_N = 443 + 588$

$F_N = 1031$

(7)



$\Sigma F_x = F_N = F_c$

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

$= \frac{40(15^2)}{95}$

$F_N = 947$

$\Sigma F_y = F_{fs} - F_g = 0$

$F_{fs} = mg$

$\mu F_N = mg$

$\mu = \frac{mg}{F_N}$

$\mu = \frac{(40kg)(9.8)}{947}$

$\mu = 0.41$