Nocho Rivero

Tasca 2

a) $v_{max}$ sense peralt

$F_{centrípeta} = F_f \longrightarrow m\,a = \mu \cdot N \longrightarrow m\dfrac{v^2}{r} = \mu\, m\, g \longrightarrow$

$\longrightarrow v^2 = \dfrac{\mu\, m\, g\, r}{m} \longrightarrow v^2 = \mu\, g\, r \longrightarrow v = \sqrt{\mu\, g\, r} = \sqrt{0{,}75 \cdot 9{,}81 \cdot 50}$

$= \boxed{60{,}05 \ m/s = v_{max}}$

b) $v_{max}$ amb peralt

eix x $\longrightarrow$ $N \sin\alpha + F_f = F_{centrípeta} \longrightarrow N\sin\alpha + \mu N\cos\alpha = m\dfrac{v^2}{r}$ ①

eix y $\longrightarrow$ $N\cos\alpha - F_f - P = 0 \longrightarrow N\cos\alpha - \mu N\sin\alpha - mg = 0$ ②

① $v^2 = \dfrac{r(N\sin\alpha + \mu N\cos\alpha)}{m}$

② $N(\cos\alpha - \mu\sin\alpha) - mg = 0 \longrightarrow N = \dfrac{mg}{\cos\alpha - \mu\sin\alpha}$

① $v^2 = \dfrac{r\,N(\sin\alpha + \mu\cos\alpha)}{m} \longrightarrow v^2 = \dfrac{r\left(\dfrac{mg}{\cos\alpha - \mu\sin\alpha}\right)(\sin\alpha + \mu\cos\alpha)}{m}$

$\longrightarrow v^2 = \dfrac{r\,mg(\sin\alpha + \mu\cos\alpha)}{m(\cos\alpha - \mu\sin\alpha)} \longrightarrow v^2 = \dfrac{rg(\sin\alpha + \mu\cos\alpha)}{(\cos\alpha - \mu\sin\alpha)}$

$\longrightarrow v = \sqrt{\dfrac{rg(\sin\alpha + \mu\cos\alpha)}{(\cos\alpha - \mu\sin\alpha)}} = \sqrt{\dfrac{500 \cdot 9{,}81\,(\sin 15 + 0{,}75 \cdot \cos 15)}{\cos 15 - 0{,}75\,\sin 15}}$

$= \boxed{79{,}05 \ m/s = v_{max}}$