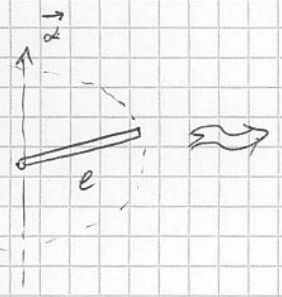
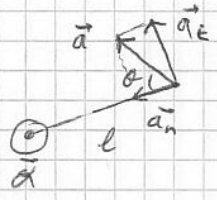
14.27.





$\theta = 60°$

$a = 15 \frac{m}{s^2}$

$\omega = 2 \frac{rad}{s}$

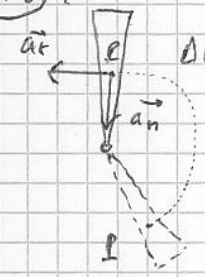
a). $a_n = \omega^2 \ell = 4\ell$ $\qquad \tan\theta = \frac{a_t}{a_n} = \frac{\ell\alpha}{4\ell} = \frac{\alpha}{4} = \sqrt{3} \Rightarrow \alpha = 4\sqrt{3}$

$a_t = \ell\alpha$

$a = 15 = \sqrt{16\ell^2 + 16 \cdot 3\,\ell^2} = \sqrt{64\ell^2} = 8\ell \Rightarrow \ell = \frac{15}{8} \approx 1{,}88\,m$

b). $\omega_f = \alpha \Delta t + \omega_i = 4\sqrt{3} \cdot 1 + 2 \approx 8{,}9 \frac{rad}{s}$

14.28.



$\begin{cases} \alpha = \text{constante} \\ \omega = \alpha \Delta t \\ a_t = r\alpha \\ a_n = \omega^2 r = \alpha^2 \Delta t^2 r \end{cases}$

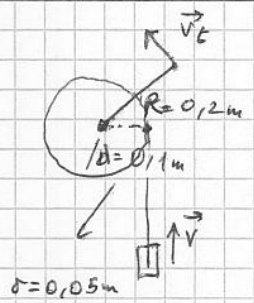
• Quand a-t-on $r\alpha = \alpha^2 \Delta t^2 r$?

$r\alpha = \alpha^2 \Delta t^2 r$

$1 = \alpha \Delta t^2$

$\Rightarrow \Delta t = \sqrt{\frac{1}{\alpha}}$

14.31.



$v_t = 1{,}2 \frac{m}{s} = \omega R$

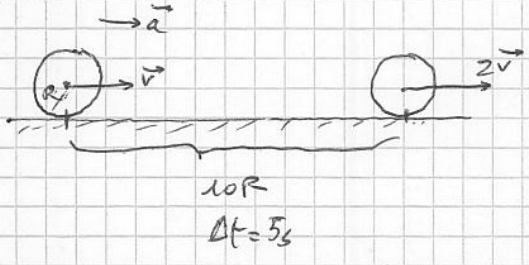
• la manivelle est solidaire du tambour. Ils ont la même vitesse angulaire.

• $\omega = \frac{v_t}{R} = \frac{1{,}2}{0{,}2} = 6 \frac{rad}{s}$

$\Rightarrow v_{sem}$ = vitesse tangentielle d'un point de la circonférence du tambour

$v_{sem} = \omega \cdot r = 0{,}3 \frac{m}{s}$

14.33.



• $a = \frac{v_f - v_i}{\Delta t} = \frac{v}{5}$ (1)

• $10R = \frac{1}{2} a \Delta t^2 + v \Delta t = \frac{1}{2} \frac{v}{5} 25 + v \cdot 5$

$10R = 2{,}5v + 5v = 7{,}5v$ (2)

• Condition de roulement sans glissement : $a = \alpha R \Rightarrow \alpha = \frac{a}{R}$ (3)

$v = \omega R$

(1) dans (3) : $\alpha = \frac{v}{5R} \overset{\text{avec (2)}}{=} \frac{v}{\left(\frac{7{,}5v}{2}\right)} = \frac{2v}{7{,}5v} = \frac{2}{7{,}5} \approx 0{,}27 \frac{rad}{s}$