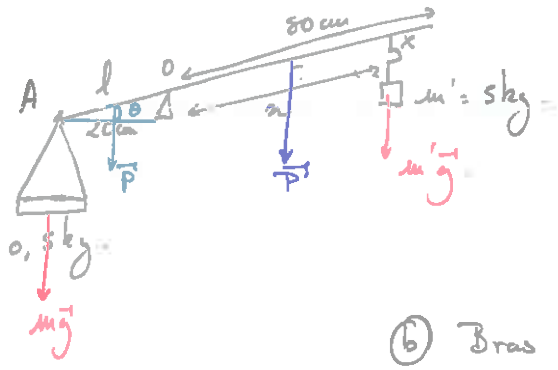
Exercice 6 : Balance.



1) ⓐ $mgl = m'gx_0 \Rightarrow x_0 = \frac{m}{m'} l = 2\,cm$

ⓑ $(m+\eta)gl = m'gx \Rightarrow x = \frac{m+\eta}{m'} l = 42\,cm$.

2) ⓐ $\mu = 5kg.m^{-1} = 0{,}05\,kg.cm^{-1} = \rho \times S$

$\Rightarrow S = 6{,}35\,cm^2$

ⓑ Bras droit : 1kg.
Bras gauche : 4kg.

$mgl + g\frac{l}{2} = 4g \times 0{,}4 + m'gx_0$

$x_0 = \frac{(m+1/2)l - 4\times 0{,}4}{m'}$ = -28 cm vers A.

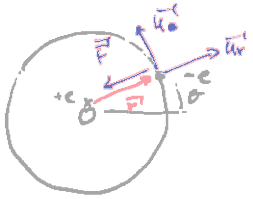
ⓒ $(m+\eta)gl + g\frac{l}{2} = 4g \times 0{,}4 + m'gx$

$x = \frac{(m+\eta+1/2)l - 1.6}{m'} = 12\,cm = x$

ⓓ $\eta = \frac{4\times 0.4 + m'x - l/2}{l} - m = 17.5\,kg = \eta$

$\Rightarrow$ c'est dommageable.

Exercice 8 : Atome de Bohr.



1) Classique : masse ponctuelle.

2) $\vec{F} = \frac{-e^2}{4\pi\varepsilon_0}\frac{\vec{r}}{r^3}$

3) $\vec{\Gamma}_{F,O} = \vec{r} \wedge \vec{F} = \vec{0}$ $\Rightarrow$ rien ne fait tourner l'e- de la cible plan.

4) $E_p = -\frac{k}{r}$

5) $\vec{L} = m\,r\,\vec{u_r} \wedge r\omega\,\vec{u_\theta} = mr^2\omega\,\vec{k} = \vec{L}$

6) $\vec{OH} = r\vec{u_r}$.
$\vec{v} = r\dot{\theta}\,\vec{u_\theta}$
$\vec{a} = r\ddot{\theta}\,\vec{u_\theta} + r\dot{\theta}\frac{d\vec{u_\theta}}{dt} = r\ddot{\theta}\,\vec{u_\theta} - r\dot{\theta}^2\vec{u_r}$.

$\vec{u_\theta} = -\sin\theta\,\vec{u_x} + \cos\theta\,\vec{u_y}$.
$\frac{d\vec{u_\theta}}{dt} = \dot{\theta}(-\vec{u_r})$.

ⓐ $m\left(r\ddot{\theta}\,\vec{u_\theta} - r\dot{\theta}^2\vec{u_r}\right) = -\frac{k}{r^2}\vec{u_r}$. $\Rightarrow \ddot{\theta} = 0 \Rightarrow \dot{\theta} = cste \Rightarrow$ mvt

ⓑ $\|\vec{v}\| = \sqrt{\frac{+k}{mr}}$

ⓒ $E_m = \frac{1}{2}\frac{mk}{mr} - \frac{k}{r} = -\frac{k}{2r} = E_p$