08/11/20

Troisième : Fin du TD : mécanique.

Travail à faire pour le 15/11/20 :

Energie : grandeur physique qui quantifie la capacité d'un corps à modifier son environnement.

* Energie électrique ↔ conversion d'énergie.
* Energie cinétique ↔
* Energie potentielle de pesanteur.
* Energie thermique = chaleur.
* Energie nucléaire
* Energie mécanique = $E_c + E_{pp}$.

} formes d'énergie.

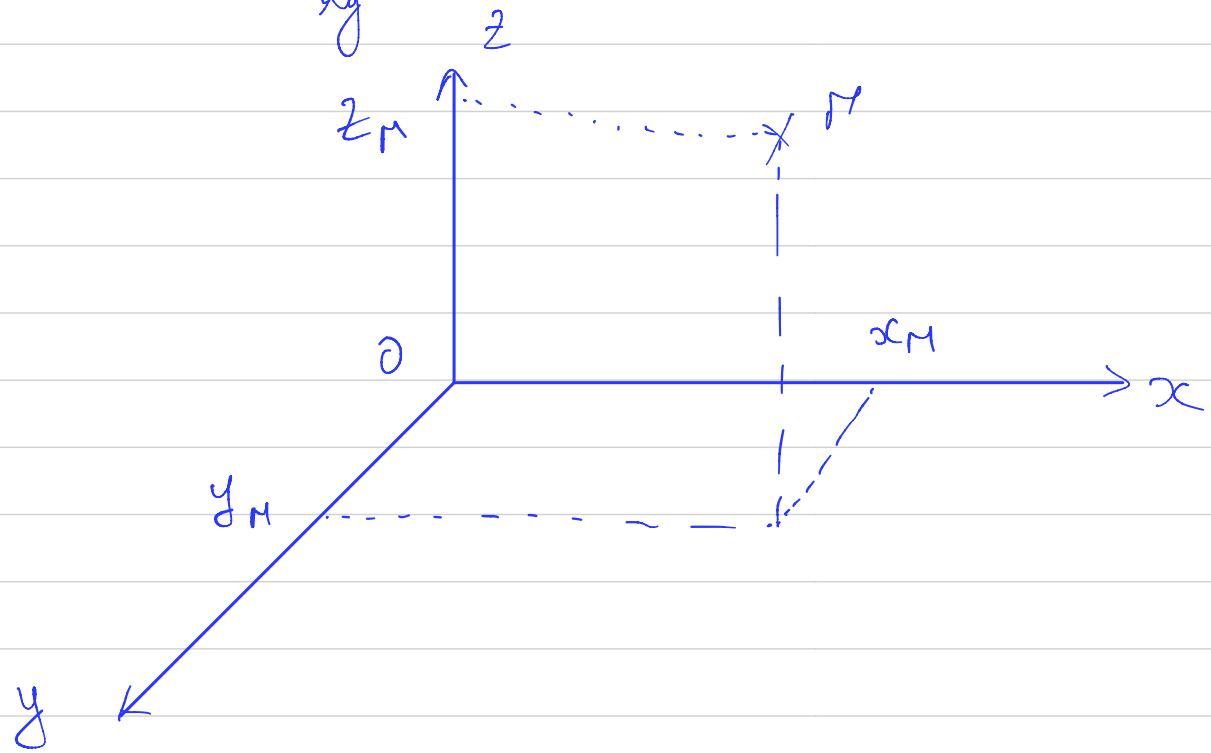
Transfert d'énergie.

$$E_c = \frac{1}{2} m v^2$$

J ; kg ; m/s.

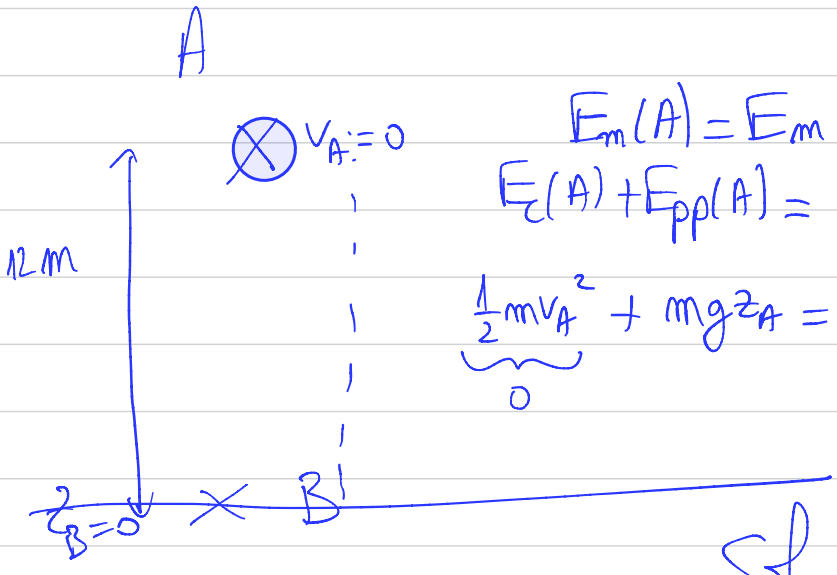
$$E_{pp} = m g z$$

kg ; N/kg ; m.



$$E_m = E_c + E_{pp}.$$

$$\boxed{E_m = \text{cste}.}$$



$$E_m(A) = E_m(B)$$

$$E_c(A) + E_{pp}(A) = E_c(B) + E_{pp}(B)$$

$$\underbrace{\frac{1}{2}mv_A^2}_{0} + mgz_A = \frac{1}{2}mv_B^2 + \underbrace{mgz_B}_{=0}.$$

Sol.

$$mgz_A = \frac{1}{2}mv_B^2$$

$$\frac{1}{2}v_B^2 = gz_A.$$

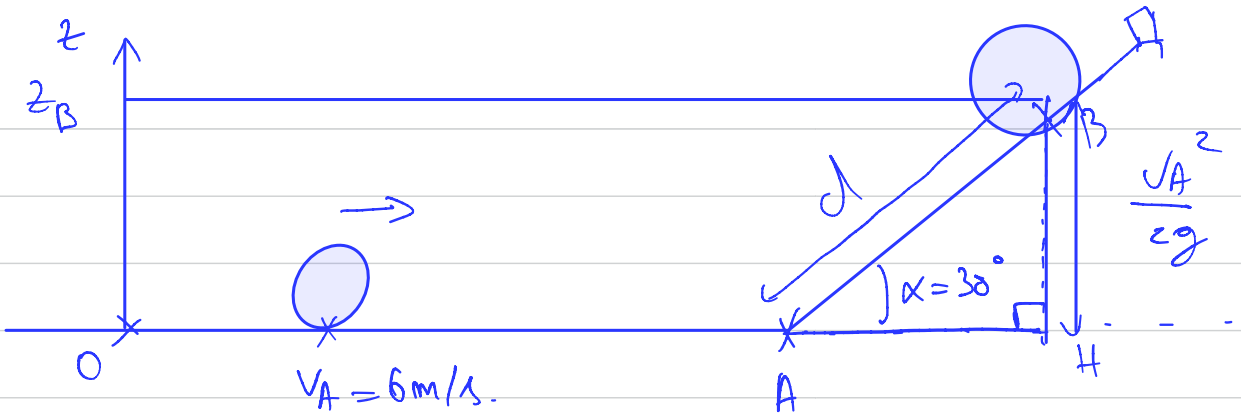
$$v_B^2 = 2gz_A$$

$$\boxed{v_B = \sqrt{2gz_A}}$$

$$v_B = \sqrt{2 \times 9{,}81 \times 12}$$

$$v_B = 15{,}34 \text{ m/s}.$$

$$v_B = 55{,}2 \text{ km/h}.$$



$$E_m(A) = E_m(B).$$

$$E_c(A) + E_{pp}(A) = E_c(B) + E_{pp}(B).$$

$$\frac{1}{2} \times m \times V_A^2 + \underbrace{mg \times z_A}_{=0 \text{ car } z_A = 0} = \underbrace{\frac{1}{2} m \times V_B^2}_{=0 \text{ car } V_B = 0} + mg z_B.$$

$$\frac{1}{2} m V_A^2 = mg z_B.$$

$$g z_B = \frac{V_A^2}{2}$$

$$z_B = \frac{V_A^2}{2g}$$

Le triangle ABH est rectangle en H. Donc on a :

$$\sin(\alpha) = \frac{BH}{AB}$$

$$\sin(\alpha) = \frac{z_B}{d}.$$

$$d = \frac{z_B}{\sin(\alpha)}$$

$$d = \frac{\frac{V_A^2}{2g}}{\sin(\alpha)} \qquad V_A^2 = d \times 2g \times \sin(\alpha)$$

$$d = \frac{V_A^2}{2g} \times \frac{1}{\sin(\alpha)}$$

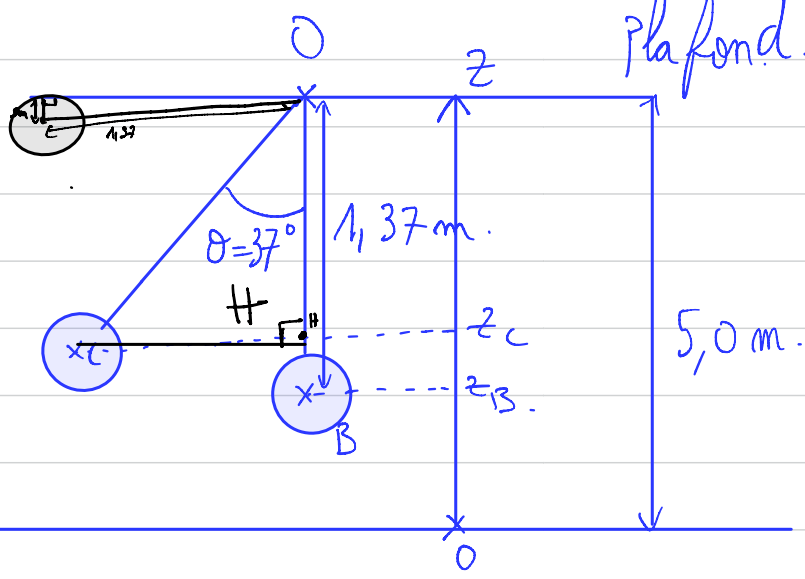
$$\boxed{d = \frac{V_A^2}{2g\sin(\alpha)}}$$

Expression littérale.

A.N : $d = \frac{6,0^2}{2 \times 9,81 \times \sin(30)} = 3,7 \text{ m}.$

Exercice bilan :

On néglige les frottements.



1) Quelle est l'altitude du point C

2) À Quelle vitesse le pendule passe par B.

1) Le triangle HCO est rectangle en H donc.

$$\cos(\theta) = \frac{OH}{OC}$$

$$OH = OC \times \cos(\theta).$$

$$OH = 1{,}37 \times \cos(37).$$

$$OH = 1{,}09 \text{ m}.$$

$$z_C = 5 - 1{,}09 = 3{,}9 \text{ m}.$$

2) $E_m(C) = E_m(B)$

$$E_c(C) + E_{pp}(C) = E_c(B) + E_{pp}(B)$$

$$\frac{1}{2} m v_C^2 + m g z_C = \frac{1}{2} m v_B^2 + m g z_B.$$

$= 0$ car $v_C = 0$

$$m g z_C = \frac{1}{2} m v_B^2 + m g z_B.$$

$$g z_C = \frac{1}{2} v_B^2 + g z_B.$$

$$g z_C - g z_B = \frac{1}{2} v_B^2.$$

$$2(g z_C - g z_B) = v_B^2.$$

$$2g(z_C - z_B) = v_B^2$$

$$v_B = \sqrt{2g(z_C - z_B)}.$$

$$V_B = \sqrt{2 \times 9{,}81 \times (3{,}9 - 3{,}63)}$$

$V_B = 2{,}3$ m/s.
$V_B = 8{,}29$ km/h.) $\times 3{,}6$

$0{,}9999\ldots = 1$

$3 \times \frac{1}{3} = 0{,}333333333\ldots \times 3$

$1 = 0{,}9999\ldots$

$\boxed{x = 0{,}9999\ldots}$ $+ \begin{matrix} 9 \\ 0{,}9\ldots \end{matrix}$

$10x = 9{,}9999\ldots$

$9 + x = 9{,}999\ldots$

$10x = 9 + x$. $99{,}999\ldots$

$10x - x = 9$. $99 + 0{,}999\ldots$

$99 + 1 = 100$.

$$g_{\alpha} = g.$$

$$\boxed{\alpha = 1.}$$