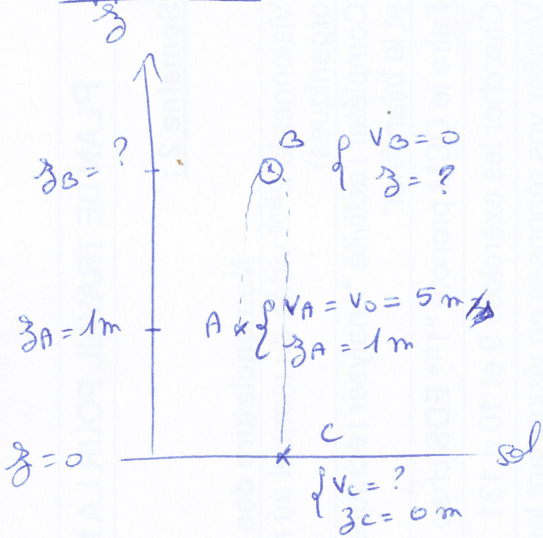
# Application




{Balle}

Bilan des forces

$\vec{P}$ uniquement!

(pas de fft!)

$$E_{m_A} = E_{m_B} = E_{m_C}$$

$$E_{c_A} + E_{pp_A} = E_{c_B} + E_{pp_B}$$

$$\frac{1}{2} m v_A^2 + m g z_A = \frac{1}{2} m v_B^2 + m g z_B$$

$$\cancel{m}\left(\frac{1}{2} v_A^2 + g z_A\right) = \cancel{m}\left(\frac{1}{2} \underbrace{v_B^2}_{=0} + g z_B\right)$$

$$z_B = \frac{v_A^2}{2g} + z_A = \frac{5^2}{2 \times 9{,}8} + 1 = 2{,}28\, m$$

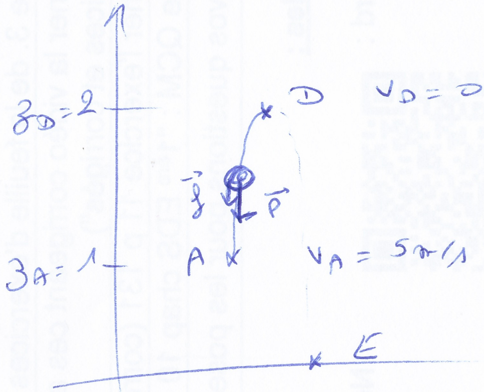
vrai quel que soit m à condition qu'il n'y ait pas de frottements!

$$\frac{1}{2} \cancel{m} v_A^2 + \cancel{m} g z_A = \frac{1}{2} \cancel{m} v_C^2 + m g \underbrace{z_C}_{=0}$$

$$v_C^2 = v_A^2 + 2 g z_A \iff v_C = \sqrt{v_A^2 + 2 g z_A}$$

$$v_C = \sqrt{5^2 + 2 \times 9{,}8 \times 1} = 6{,}68\, m/s$$

En réalité $z_{max} = 2\,m \Rightarrow$ il y a $\vec{f}$




$$\Delta E_m = W_{AD}(\vec{f})$$

$$E_{m_D} - E_{m_A} = -f \times AD$$

$$\underbrace{E_{c_D}}_{=0} + E_{pp_D} - E_{c_A} - E_{pp_A} = -f \times AD$$

$$mg(z_D - z_A) - \frac{1}{2} m v_A^2 = -f \times AD$$

$$-f = \frac{mg(z_D - z_A)}{AD} - \frac{m v_A^2}{2 \times AD}$$

$$f = \frac{m v_A^2}{2 \times AD} - \frac{mg(z_D - z_A)}{AD}$$

$$= \frac{30 \times 10^{-3} \times 5^2}{2 \times 1} - \frac{30 \times 10^{-3} \times 9{,}8 \times 1}{1}$$

$$= 0{,}081\ N \qquad (Rq\ P = 2{,}94\ N)$$

$$\Delta E_m = W_{DE}(\vec{f})$$

$$E_{c_E} + \underbrace{E_{pp_E}}_{=0} - \underbrace{E_{c_D}}_{=0} - E_{pp_D} = -f \times DE$$

$$\frac{1}{2} m v_E^2 - m g z_D = -f \times DE \Leftrightarrow v_E^2 = \frac{(-f \times DE + m g z_D) \times 2}{m}$$

$$\boxed{v_E = 5{,}3\ m/s}$$