

SIMULAZIONE 7-07-23

① $|A| = 5$

$|B| = 8$

 $\alpha = 30^\circ$ rispetto a Y $\alpha = 60^\circ$ rispetto a X

$A_x, B_x, A_y, B_y = ?$

$|C| = ?$ MODULO, DIREZIONE, VERSO

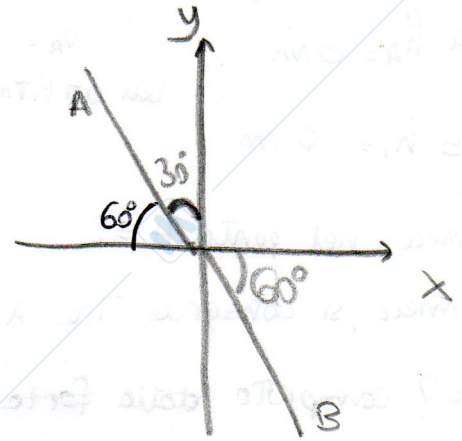
$C = A + B$

$A_x = |A| \cdot \cos 60^\circ = 2,5$

$A_y = |A| \cdot \sin 60^\circ = 4,3$

$B_x = |B| \cdot \cos 60^\circ = 4,0$

$B_y = |B| \cdot \sin 60^\circ = 6,9$



$$C = A + B = (A_x + B_x)\hat{i} + (A_y + B_y)\hat{j} = (2,5 + 4)\hat{i} + (4,3 + 6,9)\hat{j} =$$

$$6,5\hat{i} + 11,2\hat{j}$$

$$|C| = \sqrt{C_x^2 + C_y^2} = \sqrt{6,5^2 + 11,2^2} = \boxed{12,94}$$

② $[I] = [A] = \frac{[C]}{[s]}$

$[Q] = [C] = [A] \cdot [s]$

CULOMB

derivata

$$I = \frac{Q}{t}$$

$$\bullet 1 \text{ m}^3 = 10^3 \text{ dm}^3 = \boxed{10^3 \text{ L}}$$

$$1 \text{ L} = 1 \text{ dm}^3$$

$$\bullet T_1 - T_2 = 13 \text{ K} \quad \text{e una differenza, quindi costante}$$

$$\boxed{13^\circ \text{C}}$$

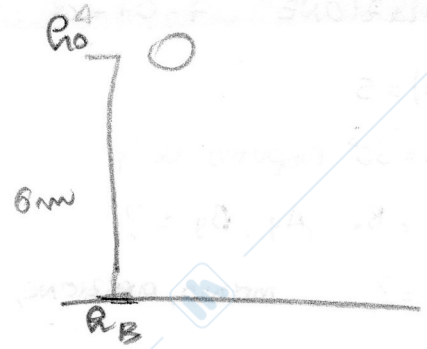
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3) $m = 10 \text{ kg}$

A $h_A = 6 \text{ m}$

B $h_B = 0 \text{ m}$

$v_A = 0 \text{ m/s}$
con attrito



E mecc nel punto A = ?

E mecc si conserva tra A e B ?

$l = ?$ compiuto dalla forza di attrito se raggiunge suolo con $v = 2,3 \text{ m/s}$

E mecc nel punto A

$E_{mecc} = E_{cin} + E_{pot} = K_A + U_A = 0 + mgh_A = 10 \text{ kg} \cdot 9,81 \cdot 6 = \boxed{588,6 \text{ J}}$

LA FORZA DI ATTRITO

E mecc non si conserva perché \vec{v} non è una forza conservativa

$L = \Delta K$ teorema dell'E cinetica

$L = -\Delta U$ teorema E potenziale (LATO FORZE CONSERVATIVE)

$E_{mecc i} = E_{mecc f}$
solo quando ci sono forze conservative

$\Delta K = -\Delta U \neq$

$L = \Delta K + \Delta U = (K_B - K_A) + (U_B - U_A) = \frac{1}{2} m v_B^2 - mgh_A = \frac{1}{2} \cdot 10 \text{ kg} \cdot 2,3 \text{ m/s}^2 -$

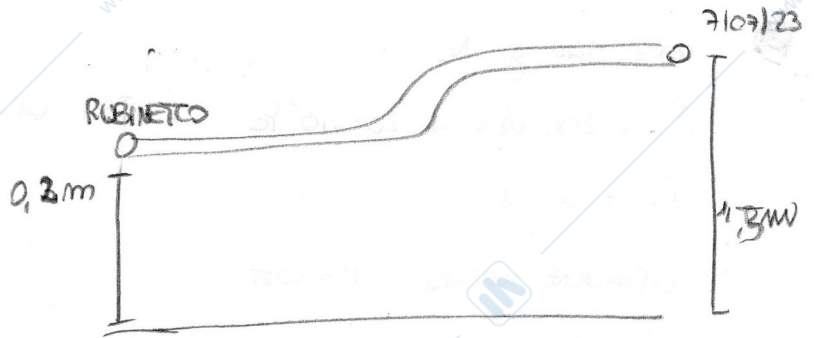
$10 \text{ kg} \cdot 9,81 \cdot 6 \text{ m} =$

$\boxed{-577 \text{ J}}$

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OTTENSO

4) $d = 3 \text{ cm}$

$h_1 = 0,2 \text{ m}$	$h_2 = 1,5 \text{ m}$
$P_1 = 2 \text{ atm}$ H ₂ O	$P_2 = ?$ H ₂ O
$v_1 = 3 \text{ m/s}$ H ₂ O	$v_2 = ?$ H ₂ O



- v_{H_2O} se ϕ diminuisce del 50%.
- Massima distanza orizzontale raggiunta dall'H₂O se $\phi \downarrow$ del 50% e il tubo

EP CONTINUITA' $A_1 \cdot v_1 = A_2 \cdot v_2$

$$v_2 = \frac{A_1}{A_2} \cdot v_1 = \boxed{3 \text{ m/s}}$$

se ϕ non cambia, anche v_2 non cambia

EP BERNOULLI

$$P_1 + \frac{1}{2} \rho v_1^2 + \rho g h_1 = P_2 + \frac{1}{2} \rho v_2^2 + \rho g h_2$$

$$2 \text{ atm} + \frac{1}{2} \rho (3 \text{ m/s})^2 + 9,81 \rho \cdot 0,2 \text{ m} = P_2 + \frac{1}{2} \rho (3 \text{ m/s})^2 + 9,81 \rho \cdot 1,2 \text{ m} =$$

$$P_1 + \frac{1}{2} \rho (v_1^2 - v_2^2) + \rho g h_1 - \rho g h_2 = P_2$$

$$202650 \text{ Pa} + \frac{1}{2} (9-9) + \rho g (h_1 - h_2) =$$

$$202650 \text{ Pa} + 1000 \text{ m}^3 \cdot 9,81 \frac{\text{m}}{\text{s}^2} (0,2 - 1,5) \text{ m} = 189897 \text{ Pa}$$

$$\Rightarrow \boxed{1,87 \text{ atm}}$$

v_{H_2O} con ϕ del 50%.

$$A_1 v_1 = A_2 v_2$$

$$v_2 = \frac{A_1 \cdot v_1}{\frac{1}{2} A_1} = 2 \cdot v_1 = 2 \cdot 3 \text{ m/s} = \boxed{6 \text{ m/s}}$$

se ϕ dimezza, la velocità raddoppia.

Moto H₂O: parabolico // Al suolo

$$\begin{cases} x = v_2 t \\ y = h_2 + v_{y0} t - \frac{1}{2} g t^2 \end{cases}$$

$$\rightarrow t = \sqrt{\frac{h_2}{\frac{1}{2} g}} = \sqrt{\frac{1,5 \text{ m}}{\frac{1}{2} \cdot 9,81}} = 0,55 \text{ s}$$

$$x = 6 \text{ m/s} \cdot 0,55 \text{ s} = \boxed{3,31 \text{ m}}$$

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ASTORICO

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$$m = 140 \text{ g N}_2$$

$$P_i = 200 \text{ kPa} \rightarrow 200 \cdot 10^3 \text{ Pa}$$

$$T_i = 300 \text{ K}$$

ESPANSIONE ISOBARA $P = \text{cost}$

$$|L| = 10 \text{ kJ} \rightarrow 10000 \text{ J}$$

$$V_i \text{ gas} = ?$$

$$V_f \text{ gas} = ?$$

$$T_f \text{ gas} = ?$$

$$L = ?$$

in una Trasf. isocora $P_f = 2P_i$

$$V = \text{cost.}$$

$$101325 \text{ Pa} : 1 \text{ atm} = 200 \cdot 10^3 : x$$

$$PV = nRT$$

$$n = \frac{m}{M} = \frac{140 \text{ g}}{28 \text{ g/mol}} = 5 \text{ mol}$$

$$V_i = \frac{nRT}{P_i} = \frac{5 \text{ mol} \cdot 8,31 \cdot 300 \text{ K}}{200 \cdot 10^3 \text{ Pa}} = \boxed{6,239 \cdot 10^{-2} \text{ m}^3}$$

$$|L| = P \cdot \Delta V = P \cdot (V_i - V_f) = 200000 \cdot (6,239 \cdot 10^{-2} - V_f)$$

$$V_f = \frac{|L|}{P} + V_i = \frac{10000 \text{ J}}{200000 \text{ Pa}} + 6,239 \cdot 10^{-2} \text{ m}^3 = \boxed{11,23 \cdot 10^{-2} \text{ m}^3}$$

$$PV = nRT$$

$$T_f = \frac{PV}{nR} = \frac{200000 \text{ Pa} \cdot 11,23 \cdot 10^{-2} \text{ m}^3}{5 \text{ mol} \cdot 8,31} = \boxed{540,6 \text{ K}}$$

TRASF. ISOCORA $\rightarrow V = \text{cost} \rightarrow$ no variazione di volume

$$L = P \cdot \Delta V$$

$$L = 200000 \cdot (0) = \boxed{0 \text{ J}}$$

AUNA LUCA
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6

$$q_1 = +0,7 \mu\text{C} \rightarrow 7 \cdot 10^{-7} \text{C}$$

$$q_2 = -0,3 \mu\text{C} \rightarrow 3 \cdot 10^{-7} \text{C}$$

$$d = 80 \text{ cm} \rightarrow 0,8 \text{ m}$$

• $F_{12} = ?$ modulo, direz, verso

• $E_{TOT} = ?$ modulo, direz, verso

• $V = ?$

• $a = ?$ di un protone in M

$$q_p = 1,6 \cdot 10^{-19} \text{C} \quad m_p = 1,67 \cdot 10^{-27} \text{kg}$$

$$F_{12} = 9 \cdot 10^9 \cdot \frac{7 \cdot 10^{-7} \cdot 3 \cdot 10^{-7}}{(0,8)^2} = 2,95 \cdot 10^{-3} \text{N}$$

$$F_{1M} = 9 \cdot 10^9 \cdot \frac{7 \cdot 10^{-7} \cdot 1 \cdot 10^{-6}}{(0,4)^2} = 0,039 \text{N}$$

$$F_{M2} = 9 \cdot 10^9 \cdot \frac{3 \cdot 10^{-7} \cdot 1 \cdot 10^{-6}}{(0,4)^2} = 0,0168 \text{N}$$

verso E segue verso F

$$\rightarrow E = \frac{F}{q_M} = 39000 \frac{\text{N}}{\text{C}}$$

$$\rightarrow E = \frac{F}{q_M} = 16800 \frac{\text{N}}{\text{C}}$$

$$E_{TOT} = E_1 + E_2 = 5,6 \cdot 10^4 \frac{\text{N}}{\text{C}}$$

• con protone p:

$$F_{1M} = 9 \cdot 10^9 \cdot \frac{7 \cdot 10^{-7} \cdot 1,6 \cdot 10^{-19}}{(0,4)^2} = 6,3 \cdot 10^{-15} \text{N}$$

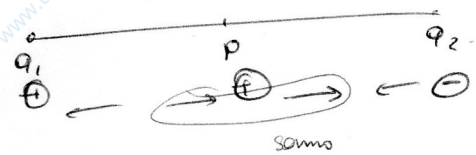
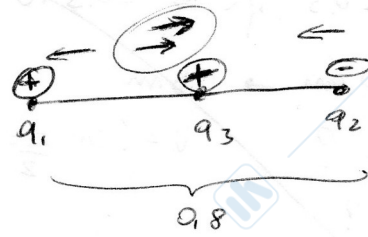
$$F_{2M} = 9 \cdot 10^9 \cdot \frac{3 \cdot 10^{-7} \cdot 1,6 \cdot 10^{-19}}{(0,4)^2} = 2,7 \cdot 10^{-15} \text{N}$$

$$F_{TOT} = F_{1M} + F_{2M} = 9 \cdot 10^{-15} \text{N}$$

$$F = ma \rightarrow a = \frac{F_{TOT}}{m} = \frac{9 \cdot 10^{-15} \text{N}}{1,67 \cdot 10^{-27} \text{kg}} = 5,38 \cdot 10^{12} \text{ms}^{-2}$$

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7/07/23



$$V_{1M} = 9 \cdot 10^9 \cdot \frac{7 \cdot 10^{-7}}{0,4} = 15750 \text{ volt}$$

$$V = k \cdot \frac{q_2}{d} = 9 \cdot 10^9 \cdot \frac{-3 \cdot 10^{-7}}{0,4} = -6750$$

$$V_{TOT} = V_1 + V_2 = 9000 \text{ volt}$$