SIMULAZIONE 16/07/21

1) • $\varepsilon_0 = \dfrac{[A]^2[s]^4}{[kg][m]^3}$ • $B = \dfrac{[kg]}{[s^2][A]}$

2) $m = 1{,}3$ kg

$(0,0)$

$F_1\ (-5,3)$ N

$F_2\ (5,5)$ N

• $F_{TOT} = F_1 + F_2 = ?$ • $F_{TOT} = \begin{pmatrix}-5\\3\end{pmatrix} + \begin{pmatrix}5\\5\end{pmatrix} = \boxed{\begin{pmatrix}0\\8\end{pmatrix}}$ N

• $a_x = ?$ • $a_y = ?$ • $F = ma$ $\quad a_x = \dfrac{0}{1{,}3} = \boxed{0\ m/s^2}$

$a_y = \dfrac{8}{1{,}3} = \boxed{6{,}2\ m/s^2}$

3) $m = 8$ kg NO ATTRITO

$v_A = 5$ m/s

$h_A = 15$ m

$h_B = -10$ m

$h_C = 10$ m

• E_{MECC} IN $A,B,C = ?$

• E_{CIN} IN $A,B,C = ?$

• E_{POT} IN $A,B,C = ?$

$E_{MECC} = E_{CIN} + E_{POT} = \frac{1}{2}mv^2 + mgh$

• $E_{MECC} = \frac{1}{2}mv_A^2 + mgh_A = \frac{1}{2}\cdot 8\cdot(5)^2 + 8\cdot 9{,}81\cdot 15 = \boxed{1276{,}2\ J}$

$E_{MECC\ A} = E_{MECC\ B} = E_{MECC\ C}$

• $E_{POT\ A} = mgh = 8\cdot 9{,}81\cdot 15 = \boxed{1177{,}2\ J}$

• $E_{POT\ B} = mgh = 8\cdot 9{,}81\cdot -10 = \boxed{-784{,}8\ J}$

• $E_{POT\ C} = mgh = 8\cdot 9{,}81\cdot 10 = \boxed{784{,}8\ J}$

• $E_{CIN\ A} = \frac{1}{2}mv^2 = \boxed{100\ J}$

• $E_{CIN\ B} = E_{MECC} - E_{POT_B} = \boxed{2061\ J}$

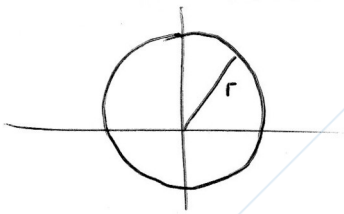
• $E_{CIN\ C} = E_{MECC} - E_{POT\ C} = \boxed{491{,}4\ J}$

4) $m = 20$ kg

MOTO CIRC UNIF.

$v_A = 1{,}25$ m/s

$r = 1{,}1$ m



• $\omega_A = ?$ $\quad \omega_B = \omega_A$ • $a_A = ?$

• $v_B = ?$ $\quad r_B = 2{,}3$ m $\quad 2\pi r : v = 2\pi : \omega$

• $\omega_A = \dfrac{2\pi \cdot v_A}{2\pi r} = \dfrac{1{,}25\ m/s}{1{,}1\ m} = \boxed{1{,}136\ rad/s}$

• $v_B = \dfrac{2\pi r_B \cdot \omega}{2\pi} = 2{,}3\ m \cdot 1{,}136\ rad/s = \boxed{2{,}61\ m/s}$

• $a_A = \dfrac{v_A^2}{\ldots} = \dfrac{1{,}25^2}{1{,}1} = \boxed{1{,}42\ m/s^2}$

5) $\varnothing_1 = 2\,cm \rightarrow 0{,}02\,m$

$v_1 = 9{,}9\ m/s \qquad h_1 = 0\ m$

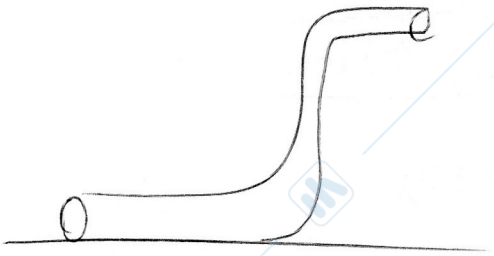
$P_1 = 210\ kPa + 210000\ Pa$

$\varnothing_2 = 1{,}2\,cm \rightarrow 0{,}012\ m$

$h_2 = 7{,}6\ m$

$\rho = 1000\ kg/m^3$

- $v_2 = ?$
- $P_2 = ?$



- EQ CONTINUITÀ $\quad v_1 A_1 = v_2 A_2 \rightarrow v_2 = \dfrac{v_1 A_1}{A_2} = \dfrac{0{,}9 \cdot 3{,}14 \cdot 10^{-4}}{1{,}13 \cdot 10^{-4}} = \boxed{2{,}5\ m/s}$

$A_1 = r^2\pi = \left(\dfrac{0{,}02}{2}\right)^2 \cdot \pi = 3{,}14 \cdot 10^{-4}\ m$

$A_2 = r^2\pi = \left(\dfrac{0{,}012}{2}\right)^2 \cdot \pi = 1{,}13 \cdot 10^{-4}\ m$

- EQ BERNOULLI

$$P_1 + \frac{1}{2}\rho v_1^2 + \rho g \cancel{h_1}^{0} = P_2 + \frac{1}{2}\rho v_2^2 + \rho g h_2$$

$$P_1 = P_2 + \frac{1}{2}\rho(v_1^2 - v_2^2) - \rho g h_2 = 210000\ Pa + \frac{1}{2}\cdot 1000 \cdot (0{,}9^2 - 2{,}5^2)$$

$$- 1000 \cdot 9{,}81 \cdot 7{,}6 = \boxed{132726\ Pa}$$

6) N_2 GAS BIATOMICO $\qquad C_p = \frac{7}{2}R = 29{,}085$

$C_v = \frac{5}{2}R = 20{,}775$

$P_1 = 1\ atm$

$T_1^\circ = 0^\circ C \qquad V_1 = 1\,L$

- $\Delta T = ?$
- $Q = ?$ SCAMBIATO

$P_2 = 1\ atm$

$V_2 = 2V_1$

TRASF ISOBARA

$$n_{mol} = \frac{L}{V_{mol}} = \frac{1\,L}{22{,}414\ \frac{mol}{L}} = 0{,}0446\ mol$$

- $PV = nRT_1$

$$T_1 = \frac{PV}{Rn} = \frac{1\ atm \cdot 1\,L}{0{,}0821 \cdot 0{,}0446} = \boxed{273{,}1\ K}$$

$$T_2 = \frac{PV}{Rn} = \frac{1\ atm \cdot 2\,L}{0{,}0821 \cdot 0{,}0446} = \boxed{546{,}2\ K}$$

- $Q = n\,c_p\,\Delta T =$

$0{,}0446 \cdot 29{,}085 \cdot (546{,}2 - 273{,}1)K = \boxed{354{,}26\ J}$