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$$P = 3,4 \cdot 10^3 \text{ W} \quad \leadsto \quad P = \frac{W}{\Delta t}$$

$$\Delta t = 1 \text{ h}$$

$$m = 200 \text{ kg}$$

$$T_2 = 32^\circ\text{C}$$

$$T_1 = 20^\circ\text{C}$$

dell' $\text{H}_2\text{O}$

} in 1h la macchina termica permette questo cambiamento

Quanto vale  $\eta$ ?

$$\eta = 1 - \frac{|Q_1|}{Q_2}$$

$$W = Q_2 - |Q_1|$$

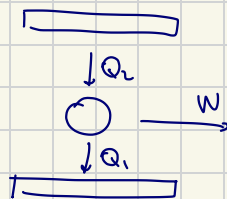
Posso calcolare il lavoro uso la potenza  $W = P \Delta t$

$Q_1$  è il calore che permette di far modificare lo stato dell' $\text{H}_2\text{O}$

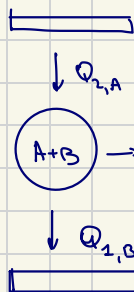
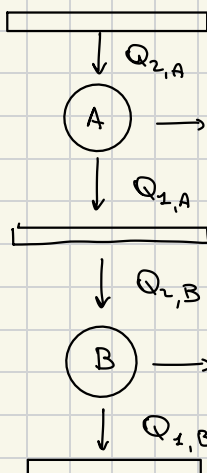
Per calcolare  $Q_1$  uso  $|Q_1| = c_{\text{H}_2\text{O}} m (T_2 - T_1)$  } occhio ai segni per conversioni entr. uscente  
 $Q_1 + Q_{\text{H}_2\text{O}} = 0$

$$Q_2 = W + |Q_1| \quad \text{ho tutto}$$

$$\eta = 1 - \frac{c_{\text{H}_2\text{O}} m (T_2 - T_1)}{P \Delta t + c_{\text{H}_2\text{O}} m (T_2 - T_1)} \approx 0,55$$



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$$Q_{1,A} + Q_{2,B} = 0$$

$$\eta_A = \frac{W_A}{Q_{2,A}}$$

$$\eta_B = \frac{W_B}{Q_{2,B}}$$

$$\eta_{A+B} = \text{rendimento totale} = \frac{W_A + W_B}{Q_{2,A}}$$

in funzione di  $\eta_A$  e  $\eta_B$

$$\begin{aligned} Q_{2,A} + Q_{1,A} &= W_A \\ -Q_{1,A} &= Q_{2,A} - W_A \end{aligned}$$

$$\eta_{A+B} = \frac{W_A + W_B}{Q_{2,A}} = \frac{\overset{\eta_A}{\boxed{W_A}}}{\boxed{Q_{2,A}}} + \frac{W_B}{Q_{2,A}} = \eta_A + \frac{W_B}{Q_{2,A}} \cdot \frac{Q_{2,B}}{Q_{2,B}}$$

$$= \eta_A + \eta_B \frac{Q_{2,B}}{Q_{2,A}} \quad \boxed{=} \quad \eta_A + \eta_B \left( -\frac{Q_{1,A}}{Q_{2,A}} \right) \quad \boxed{=}$$

$$= \eta_A + \eta_B \left( \frac{Q_{2,A} - W_A}{Q_{2,A}} \right) =$$

$$= \eta_A + \eta_B \left( \frac{Q_{2,A}}{Q_{2,A}} - \frac{W_A}{Q_{2,A}} \right) = \eta_A + \eta_B (1 - \eta_A)$$

$$\boxed{\eta_{A+B} = \eta_A + \eta_B (1 - \eta_A)}$$

o II punto  $\leadsto$  numeri.