Esercizio 1

$P = \frac{P_1V_1+P_2V_2}{(V_1+V_2)}$ $T = \frac{T_1T_2(P_1V_1+P_2V_2)}{(P_1V_1T_2+P_2V_2T_1)}$

Esercizio 2

$\gamma = 31/21$

Esercizio 3

$L_1 = 10$ cm $Q \approx 2993$ J

Esercizio 4

$P_{REF} \approx 215$ W

Esercizio 5

$W = 5/2\ P_1V\ (1 - \left(\frac{P_0}{P_1}\right)^{\frac{\gamma-1}{\gamma}})$

Esercizio 6

$v = \sqrt{\frac{2nRT_i}{m(\gamma-1)}\left(1-\left(\frac{V_i}{V_f}\right)^{\gamma-1}\right)} \approx 94{,}7$ m/s

Esercizio 7

$c = \frac{6NkT_0}{T^2}\left(1+e^{\frac{T}{T_0}}\left(\frac{T}{T_0}-1\right)\right)$

Esercizio 8

a) $W = \frac{1}{2}\ \alpha\ V_0^2\ (\eta^2-1)$
b) $\Delta U = \alpha\ V_0^2\ (\eta^2-1) / (\gamma-1)$
c) $c = \frac{1}{2}\ R\ (\gamma+1) / (\gamma-1)$

Esercizio 9

$c = \frac{R(x-\gamma)}{(x-1)(\gamma-1)}$

x=0 => isobara, x=1 => isoterma, x=γ => adiabatica, x=∞ => isocora

Esercizio 10

$$PV^n = \text{costante}, \text{ dove } n = 1 + \frac{R}{kc_V}$$

Esercizio 11

$$I_V = \frac{\rho_G \pi R^2 V\left(L_f - c_G T_G\right)}{\rho_A c_A T_A}$$

Esercizio 12

$$C = nR\left(\frac{5}{2} + \frac{1}{BV}\right)$$

Esercizio 13

$$h_1 = h_0 \frac{(P_A S + mg)}{[P_A S + (M+m)g]}$$

Esercizio 14

$$T = \frac{\pi r^2 L}{s(\gamma+2)}\sqrt{\frac{2\rho}{P_0}}\left(2^{\frac{\gamma}{2}+1} - 1\right)$$

Esercizio 15

$$\gamma = \frac{Q + nRT_0\left(k - 1 - ln(k)\right)}{Q - nRT_0 ln(k)}$$

biatomico

Esercizio 16

$$v = \sqrt{\frac{2(m+M)}{m^2} P_A V_0 \left(\frac{5}{2}\left(\left(\frac{V_0}{V_1}\right)^{\frac{2}{5}} - 1\right) - \left(1 - \frac{V_1}{V_0}\right)\right)}$$

Esercizio 17

$a)\ v_F = \sqrt{\frac{2}{m}\frac{P_0 S L_0}{(\gamma-1)}\left(1-\left(\frac{1}{2}\right)^{\gamma-1}\right)}$

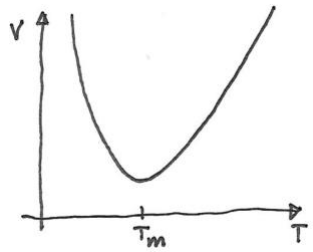
$b)$ se l'urto è anelastico il pistone si ferma, altrimenti rimbalza

$c)\ espansione\ {\sim}libera, m < \frac{2P_0 S L_0}{v_s^2(\gamma-1)}\left(1-\left(\frac{1}{2}\right)^{\gamma-1}\right) \approx 1g \quad v_S = \ vel.suono$

Esercizio 18

$T_F=T_0$

Esercizio 19



$T_m = 2T_0$

$W = \frac{15}{8}RT_0$

Esercizio 20

$V < \frac{\gamma\alpha}{\beta(\gamma+1)}\ endotermica, \qquad V > \frac{\gamma\alpha}{\beta(\gamma+1)}\ esotermica$

Esercizio 21

$Q = \frac{AH}{4}(7P_0 - 2\rho g H)$

Esercizio 22

a) P=kV, con k costante positiva qualsiasi

b) c=3R