



UNIVERSITÀ
DEGLI STUDI
DI TERAMO

Fisica

Medicina Veterinaria — Semestre
Aperto 2026

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Lezioni 50 e 51

Outline

Lezione 50

- Macchine Termiche e rendimento, Ciclo di Carnot
- Esercizi su cicli

Lezione 51

- Esercitazione riepilogo Termodinamica
- Esercizi di riepilogo in generale

Esercizi (Tommasi)

Esercizio # 1406

Carnot

$$\begin{cases} T_2 = 200\text{K} \\ T_1 = 400\text{K} \end{cases}$$

$$\begin{cases} T_2 = 600\text{K} \\ T_1 = 900\text{K} \end{cases}$$

η_1 vs η_2 ?

A) $\eta_1 > \eta_2$

D) No ~~x~~

B) $\eta_2 > \eta_1$

E) No ~~x~~

C) $\eta_1 = \eta_2$

$$\eta = \frac{W}{Q_{\text{ASS}}} = \frac{Q_{\text{ASS}} - Q_{\text{CED}}}{Q_{\text{ASS}}} = 1 - \frac{Q_{\text{CED}}}{Q_{\text{ASS}}}$$

SEMPRE $\rightarrow$

Per Carnot $\rightarrow \eta = 1 - \frac{T_2}{T_1}$ $\begin{matrix} T_1 \\ T_2 \end{matrix}$

$$\eta_1 = 1 - \frac{200}{400}$$

$$\eta_2 = 1 - \frac{600}{900}$$

$$\eta_1 = 0,5$$

$$\eta_2 = 0,35$$

$$\eta_1 > \eta_2$$

A) $\checkmark$

Esercizio # 1408

500 Kcal

$$L = 836 \text{ KJ}$$

$$Q_2 = Q_{\text{CED}} = ?$$

$$\eta = ?$$

- A) 300 Kcal ; 60%
B) " " 40% ✓
C) 300 J 60%

- D) 300 MJ 60
E) " KJ 40'

$$\text{Ciclo} \rightarrow \Delta E = Q - L \Rightarrow \boxed{Q = L}$$

$$L = Q_{\text{ASS}} - Q_{\text{CED}}$$

↑ ↓ ↑
? ?

$$Q_{\text{CED}} = Q_{\text{ASS}} - L$$

$$Q_{\text{ASS}} = 500 \text{ Kcal} = 500 \text{ K} \cdot 4,18 \text{ J} \\ \approx 2090 \text{ KJ}$$

$$Q_{\text{CED}} = 2090 - 836 \approx 1200 \text{ KJ}$$

$$Q_{\text{CED}} = 300 \text{ Kcal}$$

$$\eta = 1 - \frac{Q_{\text{CED}}}{Q_{\text{ASS}}} = \frac{L}{Q_{\text{ASS}}} = \frac{836}{2096} = \\ = 1 - \frac{1200}{2096} \approx 0,4$$

$$\eta \approx 40\%$$

B) ✓

Esercizio # 1413

$$T_1 = 324^\circ\text{C}$$

$$T_2 = 27^\circ\text{C}$$

$$Q_{\text{ASS}} = 50 \text{ KJ}$$

$$\angle = ?$$

A) 25 KJ

B) 50 "

C) 75 "

D) 5 "

E) 10 KJ

$$\angle = ?$$

$$\angle = Q_{\text{ASS}} - Q_{\text{UED}}$$

$$\eta_{\text{Carnot}} = \frac{\angle}{Q_{\text{ASS}}} = 1 - \frac{T_2}{T_1}$$

$$\angle = Q_{\text{ASS}} \left(1 - \frac{T_2}{T_1} \right)$$

$$T_1 = 324^\circ + 273,15 = 600,15 \text{ K}$$

$$T_2 = 27 + 273,15 = 300,15 \text{ K}$$

$$\angle \approx 50 \left(1 - \frac{300}{600} \right) = 25 \text{ KJ}$$

A) ✓

Carnot:

$$\frac{Q_1}{Q_2} = \frac{T_1}{T_2}$$

$$Q_2 = Q_1 \frac{T_2}{T_1}$$

$$\angle = Q_1 - Q_2 = Q_1 - Q_1 \left(\frac{T_2}{T_1} \right) = Q_1 \left(1 - \frac{T_2}{T_1} \right)$$

Stessa
espressione
ottenuta prima!

$$\angle = 25 \text{ KJ}$$

Esercizio # 1449

$$\Delta S = ?$$

fusione 1kg ghiaccio 0°C

($c_f = 80 \text{ Kcal/kg}$; $1 \text{ Kcal} = 4186 \text{ J}$)

- A) 80 J/K D) 1227 J/K ✓
B) 293 " E) 4186 "
C) 800 " F) 4186 "

$$\Delta S = \frac{\Delta Q}{T} = \frac{m c_f}{T} = \frac{1 \cdot 80 \cdot 4186 \text{ J}}{(0 + 273,15)}$$

$$= \frac{320000}{273,15} \approx 1200 \text{ J/K}$$

D) ✓

Esercizio # 1438

ADIAB. ?

A)
B)

Esercizio # 829

5m $P = ?$

0,1 atm A)

0,5 atm B)

1 atm C)

2,5 atm D)

5 atm E)

$$P = \cancel{P_0} + \rho g h$$

$$= \rho g h$$

$$= \cancel{10^3} \cdot \cancel{10} \cdot 5$$

$$= 5 \cdot 10^4 \text{ Pa}$$

$$= \underline{5 \cdot 10^4} \text{ atm}$$

10^5
 $\approx 0,5 \text{ atm}$

B)

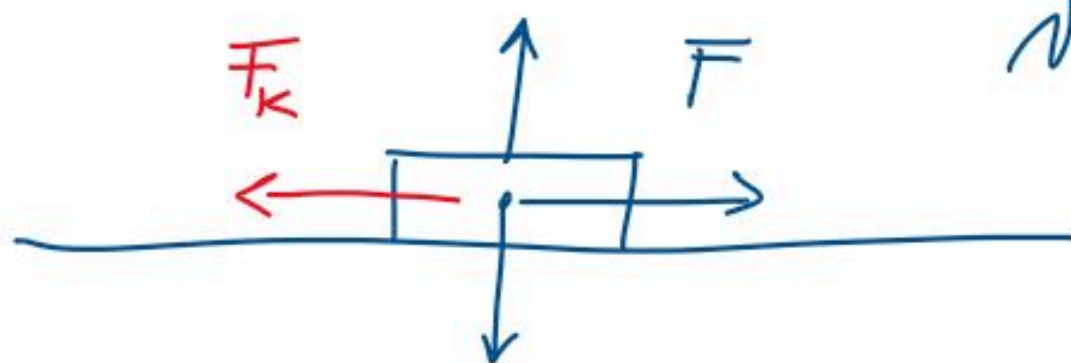
Esercizio # 527

$$m = 50 \text{ kg} \quad \vec{v} = \text{cost.}$$

$$|\vec{F}| = 300 \text{ N}$$

$$\mu_D = ?$$

- A) 0,47 D) 0,6 ←
B) 0,25 E) 0,33
C) 0,1



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

$$F_k = \mu_D N = \mu_D mg = F$$

$$\mu_D = \frac{F}{mg} = \frac{300}{50 \cdot 10} = \frac{300}{500}$$

$$\mu_D \approx 0,6$$

⇒

Esercizio #875

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

$$F_p' = 10 \text{ N}$$

$$V = ?$$

A) $0,158 \text{ dm}^3$

B) $1,58 \text{ m}^3$

C) $1,58 \text{ cm}^3$

D) 1580 m^3

E) $1580 \text{ cm}^3 \leftarrow$