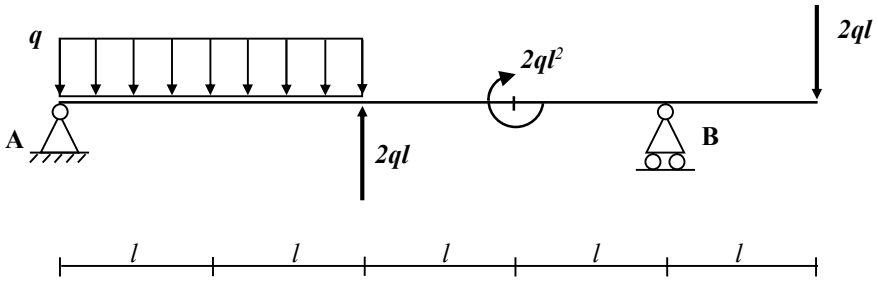
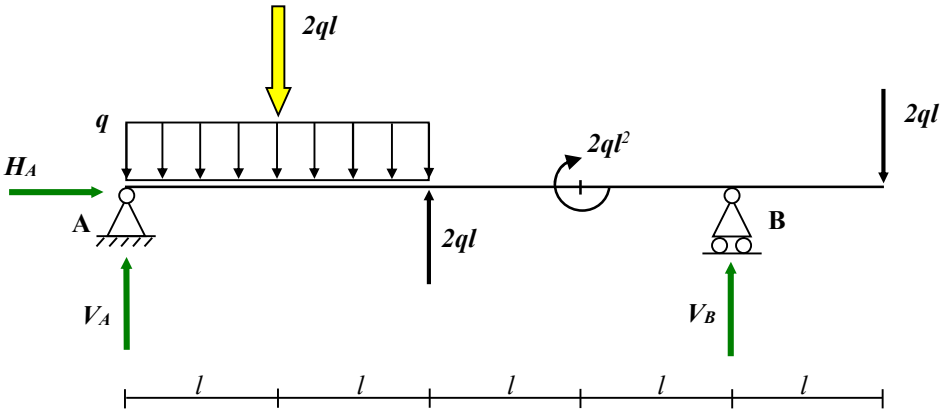
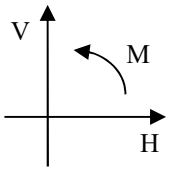
Determinare le reazioni vincolari e tracciare i diagrammi di sollecitazione



Calcolo delle reazioni vincolari :





Poiché la struttura è isostatica applicando le equazioni cardinali della statica si ha :

$$\begin{cases} \sum_H : \quad H_A = 0 \\ \sum_V : \quad V_A - 2ql + 2ql + V_B - 2ql = 0 \\ \sum_M (A): \quad -2ql^2 + 2ql \cdot 2l - 2ql^2 + V_B \cdot 4l - 2ql \cdot 5l = 0 \end{cases} \Rightarrow \begin{cases} \sum_H : \quad H_A = 0 \\ \sum_V : \quad V_A = -\frac{1}{2} ql \\ \sum_M (A): \quad V_B = \frac{5}{2} ql \end{cases}$$

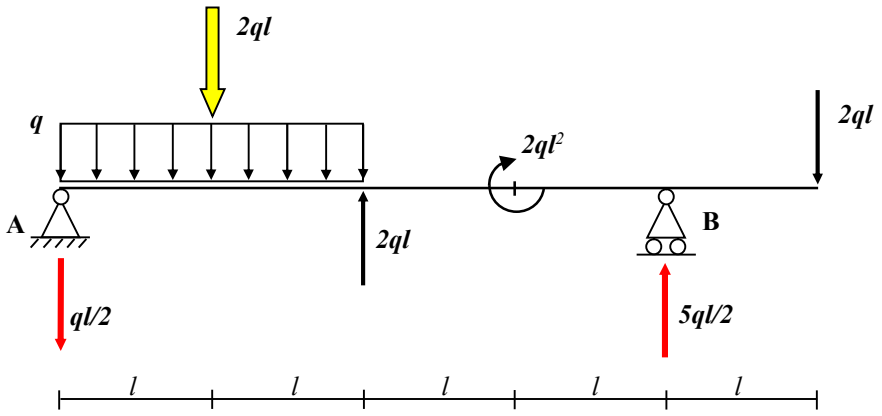
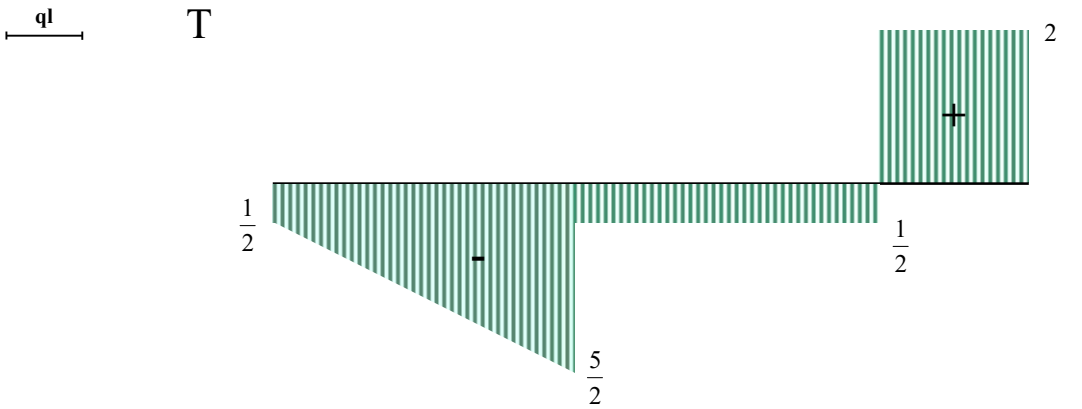
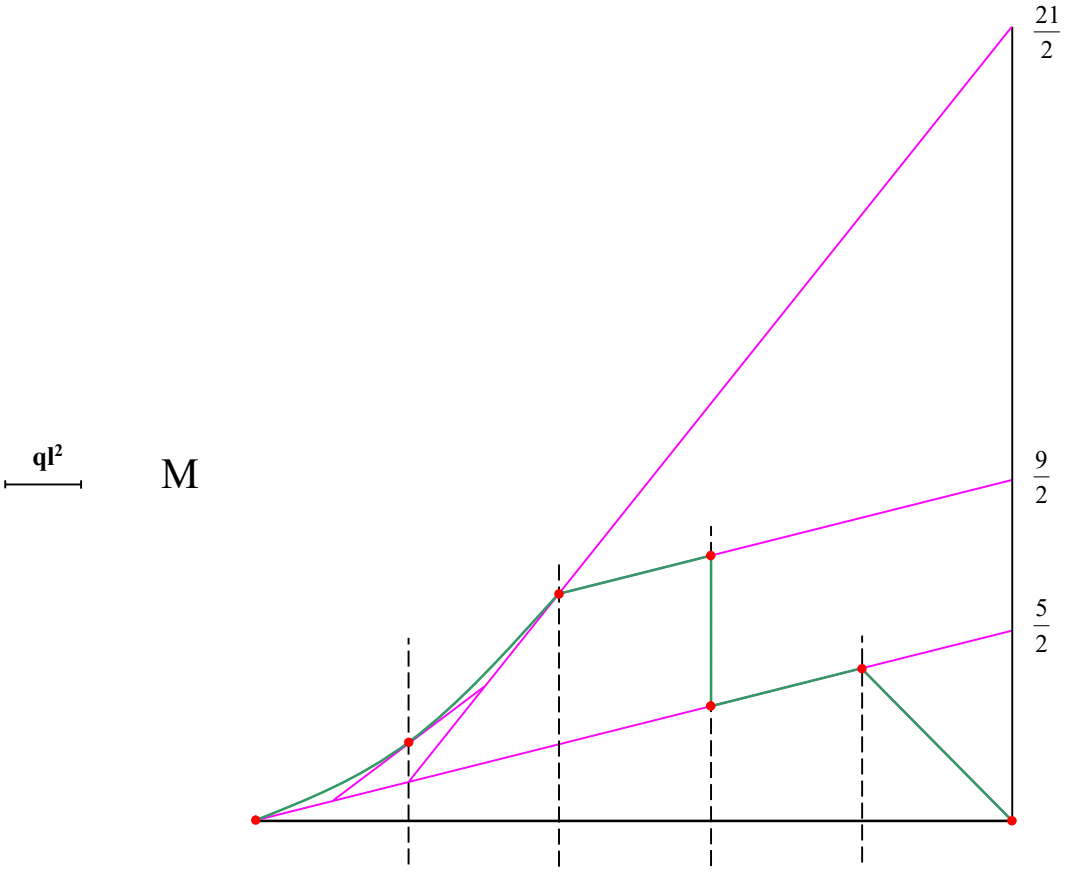
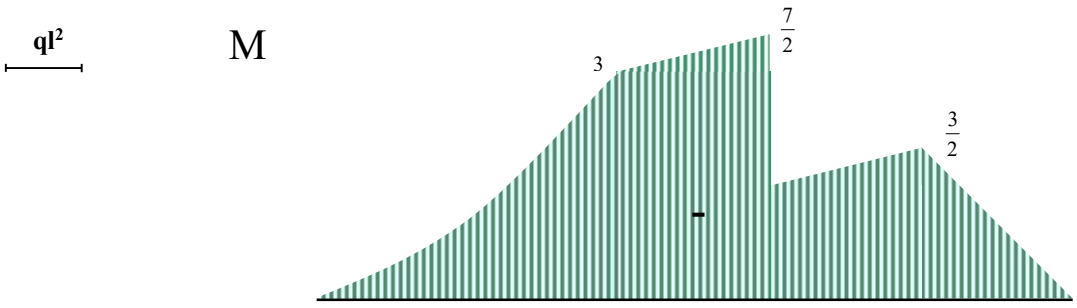
Allo stesso se il sistema viene espresso in forma matriciale : $AX = B$

$$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 1 \\ 0 & 0 & 4l \end{pmatrix} \cdot \begin{pmatrix} H_A \\ V_A \\ V_B \end{pmatrix} = \begin{pmatrix} 0 \\ 2ql \\ 10ql^2 \end{pmatrix}$$

Applicando Cramer :

$$H_A = \frac{\begin{vmatrix} 0 & 0 & 0 \\ 2ql & 1 & 1 \\ 10ql^2 & 0 & 4l \end{vmatrix}}{\begin{vmatrix} 1 & 0 & 0 \\ 0 & 1 & 1 \\ 0 & 0 & 4l \end{vmatrix}} = 0 \quad , \quad V_A = \frac{\begin{vmatrix} 1 & 0 & 0 \\ 0 & 2ql & 1 \\ 0 & 10ql^2 & 4l \end{vmatrix}}{\begin{vmatrix} 1 & 0 & 0 \\ 0 & 1 & 1 \\ 0 & 0 & 4l \end{vmatrix}} = -\frac{1}{2}ql \quad , \quad V_B = \frac{\begin{vmatrix} 1 & 0 & 0 \\ 0 & 1 & 2ql \\ 0 & 0 & 10ql^2 \end{vmatrix}}{\begin{vmatrix} 1 & 0 & 0 \\ 0 & 1 & 1 \\ 0 & 0 & 4l \end{vmatrix}} = +\frac{5}{2}ql$$

Si ha quindi per il sistema equilibrato :



Diagrammi delle caratteristiche di sollecitazione . Applicando il metodo grafico :