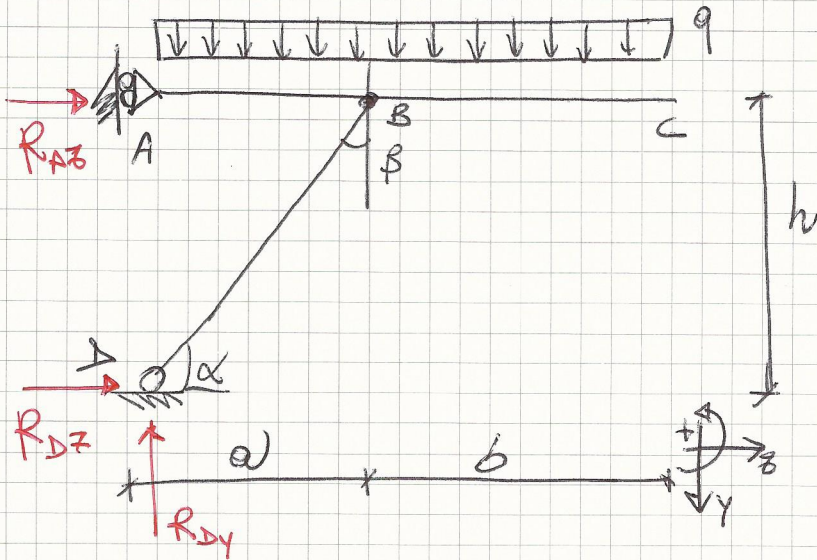


Exercício 1



$$q = 0,8 \text{ kN/m}$$

$$a = 1,2 \text{ m}$$

$$b = 1,8 \text{ m}$$

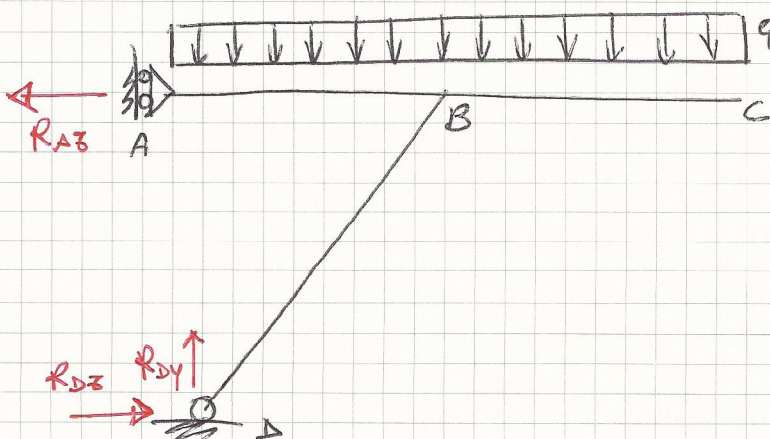
$$h = 1,5 \text{ m}$$

$$\beta = \arctg\left(\frac{a}{h}\right) = 0,6747 \text{ rad} = 38,66^\circ$$

$$\alpha = \arctg\left(\frac{h}{a}\right) = 0,8960 \text{ rad} = 51,34^\circ$$

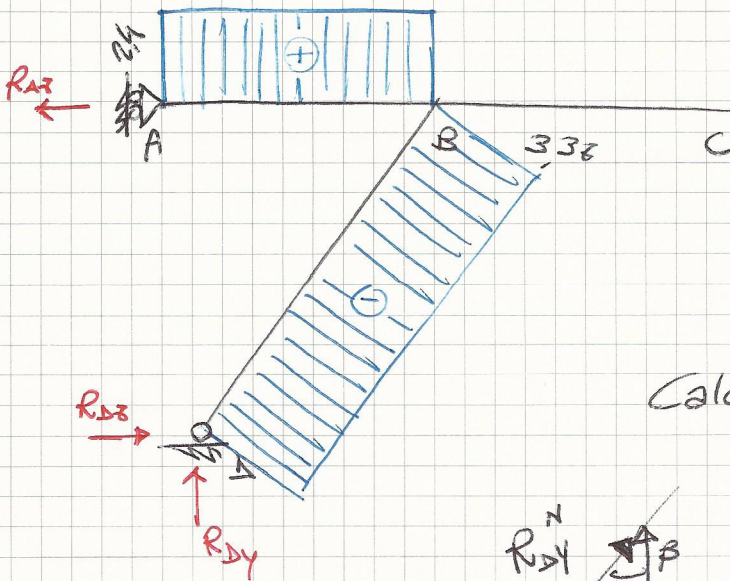
$$\begin{cases} \downarrow) -R_{Dy} + q(a+b) = 0 \\ \rightarrow) R_{Dz} + R_A = 0 \\ \curvearrowright) -R_A \cdot h - \frac{q(a+b)^2}{2} = 0 \end{cases}$$

$$\begin{cases} R_{Dy} = q(a+b) = 0,8(1,2+1,8) = 2,4 \text{ kN} \\ R_{Dz} = -R_A = 2,4 \text{ kN} \\ R_A = -\frac{q(a+b)^2}{2h} = -\frac{0,8(1,2+1,8)^2}{2 \cdot 1,5} = -2,4 \text{ kN} \end{cases}$$



1

Diagramma N



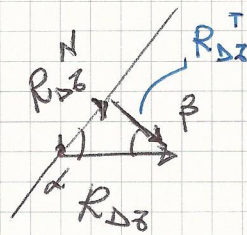
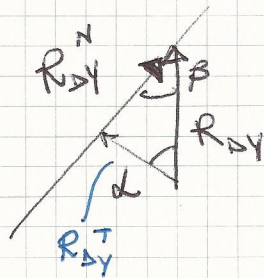
← [+ sul cavo]

$$N_A^\Delta = +R_{Ay} = 2,4 \text{ kN}$$

$$N_C = 0$$

$$N_B^\Delta = 0 \text{ (guardando il tratto BC)}$$

Calcolo N_Δ



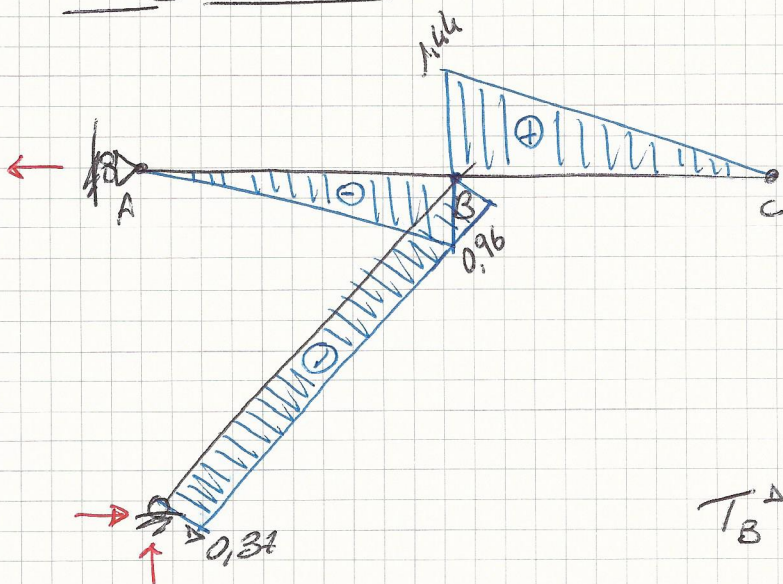
↑ sul cavo

$$N_\Delta = -R_{By}^N - R_{Bx}^N = -R_{By} \cdot \cos \beta - R_{Bx} \cdot \sin \beta =$$

$$= -2,4 \cdot \cos 38,66 - 2,4 \cdot \sin 38,66 =$$

$$= -3,37 \text{ kN}$$

Diagramma T



$$T_A = 0$$

$$T_C = 0$$

$$T_B^S = -q \cdot \ell = -0,96 \text{ kN}$$

$$q \cdot \ell \downarrow \ominus$$

$$T_B^\Delta = +q \cdot b = 1,44 \text{ (guardando il tratto BC)}$$

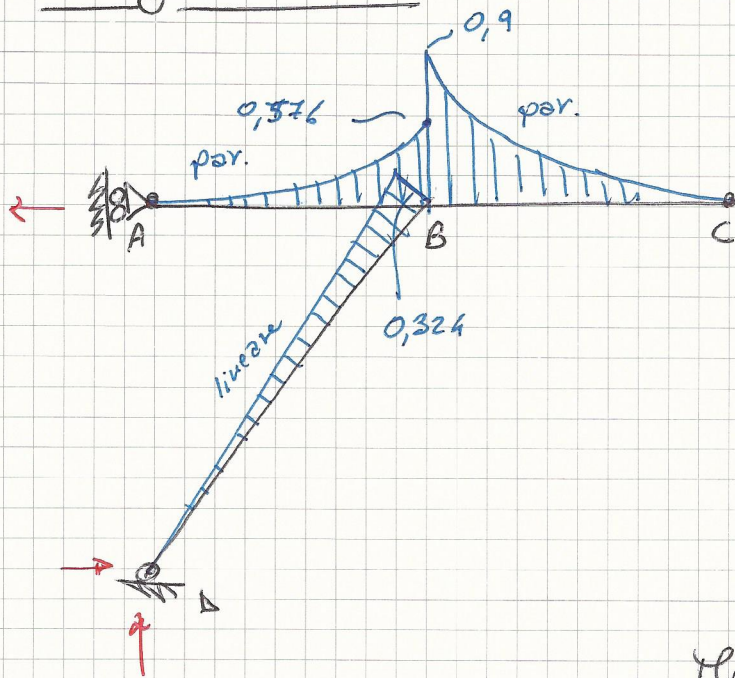
$$\downarrow \oplus$$

$$T_\Delta \text{ (guardare i triangoli già studiati per } N_\Delta) = R_{By}^T - R_{Bx}^T =$$

$$= R_{By} \cdot \sin \beta - R_{Bx} \cdot \cos \beta = -0,37 \text{ kN}$$

(3)

Diagramma M



$$M_A = 0$$

$$M_C = 0$$

$$M_D = 0$$

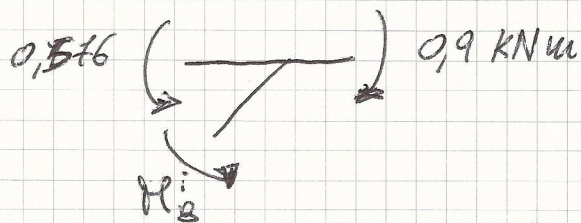
$$M_B^S = -\frac{q \cdot l^2}{2} = 0,576 \text{ kNm}$$

[-

$$M_B^\Delta = -\frac{q \cdot b^2}{2} = -0,9 \text{ kNm}$$

↓
guardando il tratto BC

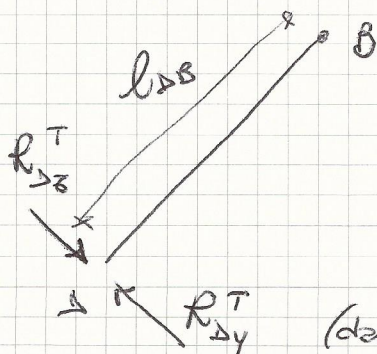
M_B^{int} → equilibrio di nodo



$$M_B^i + 0,576 - 0,9 = 0 \Rightarrow M_B^i = 0,324 \text{ kNm}$$

fibre tese ✓

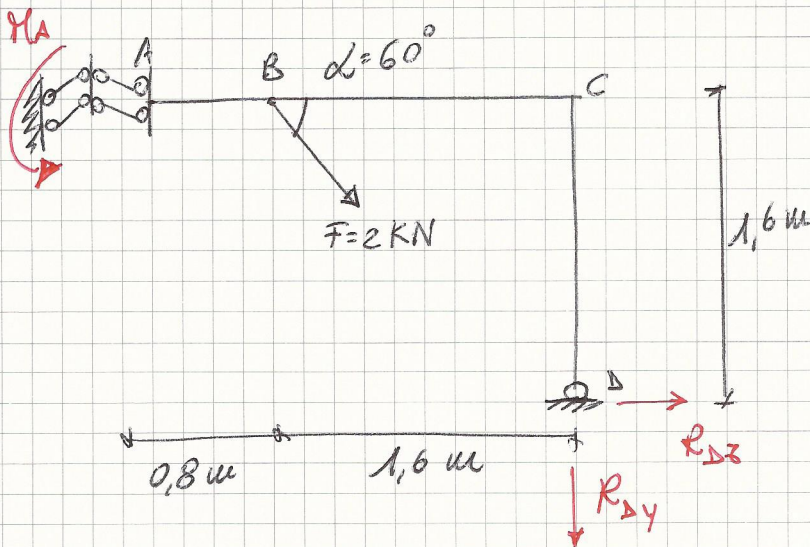
Se guardiamo l'asta DB



$$M_B^i = -R_{DB}^T \cdot l_{DB} + R_{DY}^T \cdot l_{DB}$$

(dai triangoli visti in diagramma N)

Esercizio 2



$$\left\{ \begin{array}{l} \downarrow) R_{Dy} + F \cdot \sin 60^\circ = 0 \\ \rightarrow) R_{Dz} + F \cos 60^\circ = 0 \\ \curvearrowright) M_A + F \sin 60^\circ \cdot 1,6 \text{ m} - F \cdot \cos 60^\circ \cdot 1,6 \text{ m} = 0 \end{array} \right.$$

$$\left\{ \begin{array}{l} R_{Dy} = -F \sin 60^\circ = -1,74 \text{ kN} \\ R_{Dz} = -F \cos 60^\circ = -1,00 \text{ kN} \\ M_A = F \cos 60^\circ \cdot 1,6 - F \sin 60^\circ \cdot 1,6 = -1,17 \text{ kNm} \end{array} \right.$$

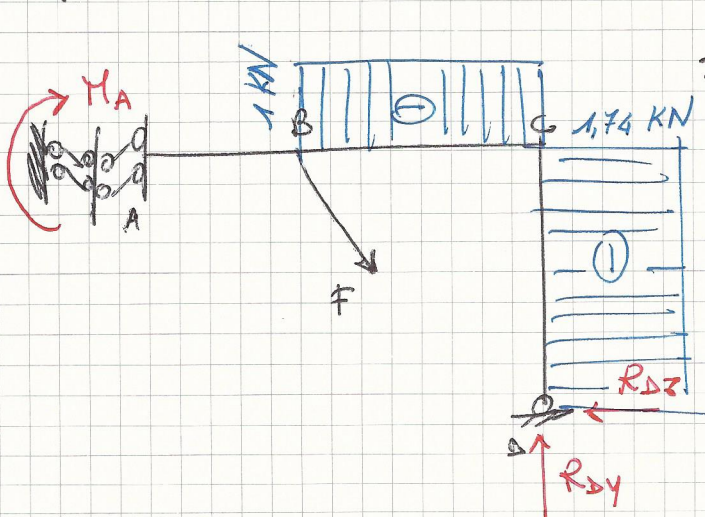
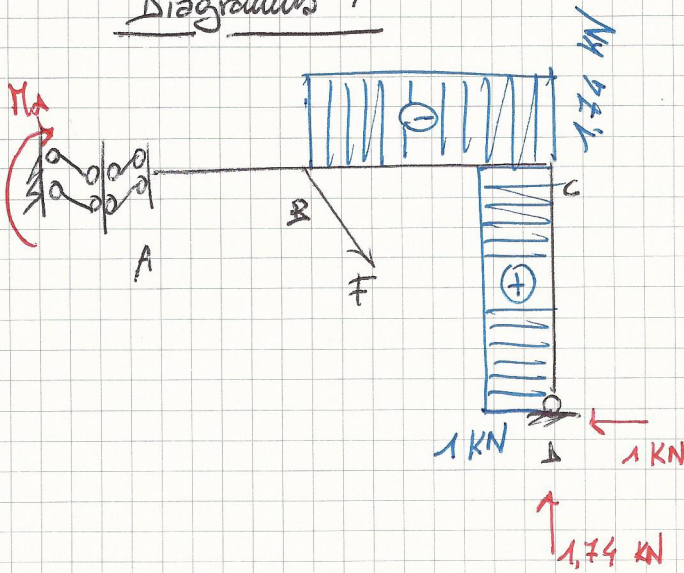


Diagramma N

$$\begin{aligned} N_A &= 0 \\ N_B^s &= 0 \\ N_B^\Delta &= -F \cos 60^\circ = -1 \text{ kN} \\ N_C^s &= -1 \text{ kN} \\ N_\Delta &= -R_{Dy} = -1,74 \text{ kN} \\ &\text{costante su CA} \end{aligned}$$

Diagramma T



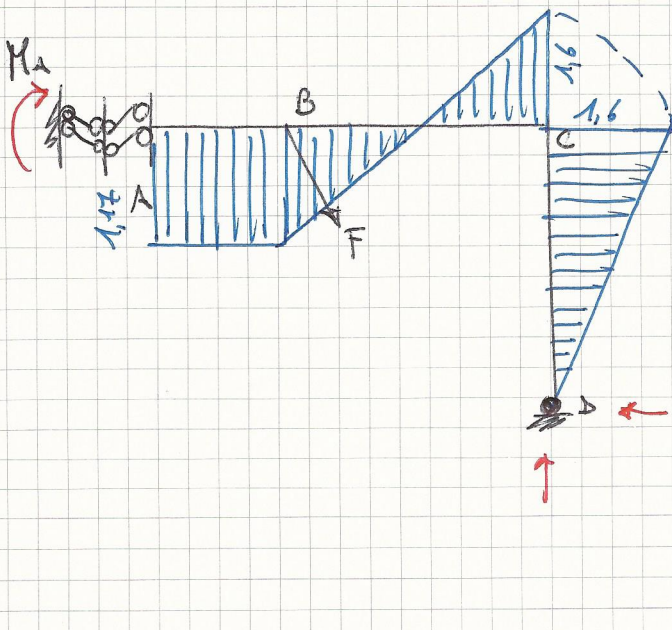
$$T_A = T_B^s = 0$$

$$T_B^A = -F \sin 60^\circ = -1,74 \text{ kN}$$

$$T_C^s = -1,74 \text{ kN}$$

$$T_A = 1 \text{ kN (costante)}$$

Diagramma M



$$M_A = 1,17 \text{ kNm}$$

$$M_C = 0$$

$$M_C^i \text{ (guardando tratto } \Delta C)$$

$$= R_{\Delta 3} \cdot 1,6 = 1,6 \text{ kNm}$$

$$M_C^s \text{ (guardando tratto } ABC) = M_A - F \sin 60^\circ \cdot 1,6 =$$

$$= 1,17 - 1,74 \cdot 1,6 = -1,61 \text{ kNm} \approx 1,6 \text{ kNm}$$

OK
equilibrio nodo
verificato