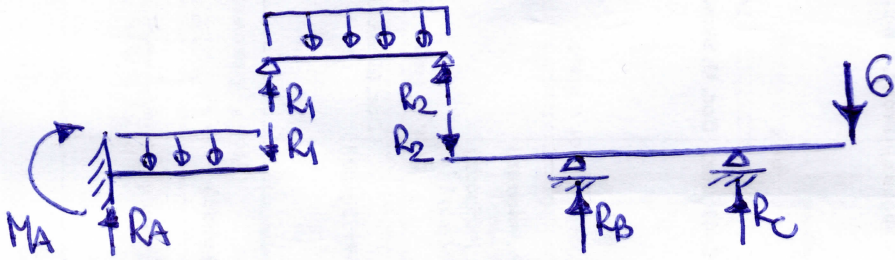
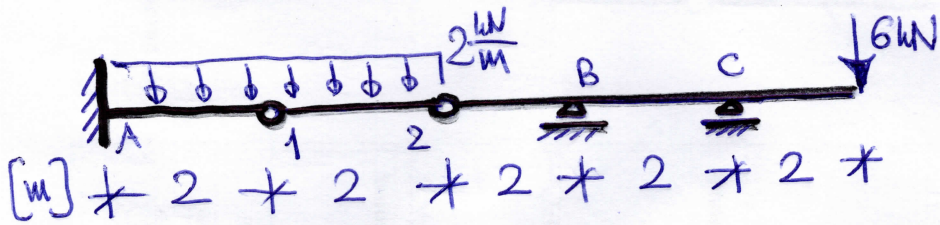


MECHANIKA OGÓLNA



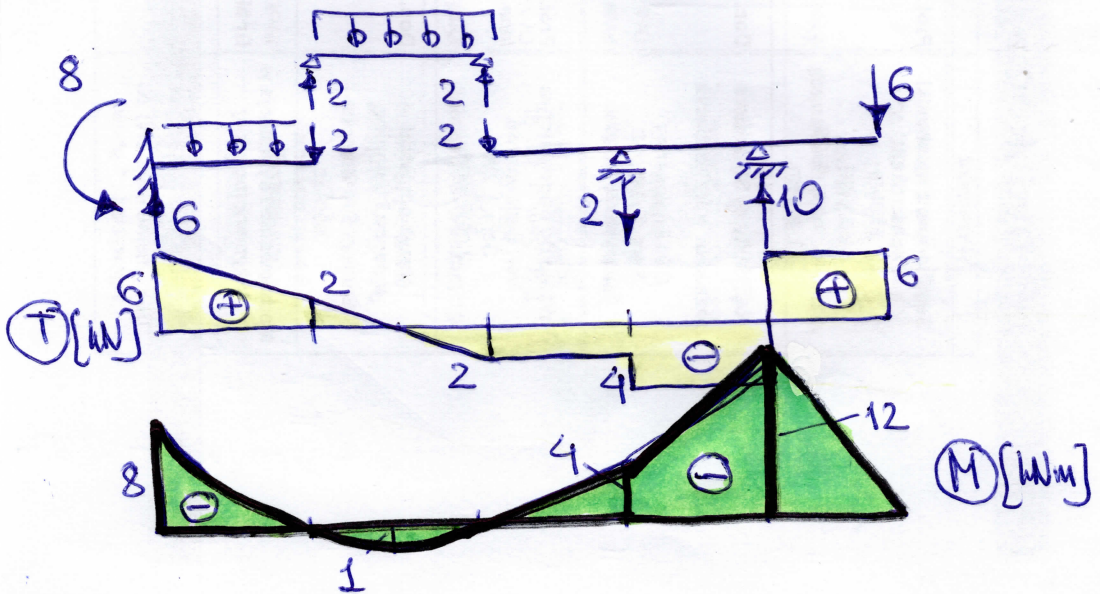
reakcje podporowe: 1-2 $R_1 = R_2 = 2 \text{ kN}$

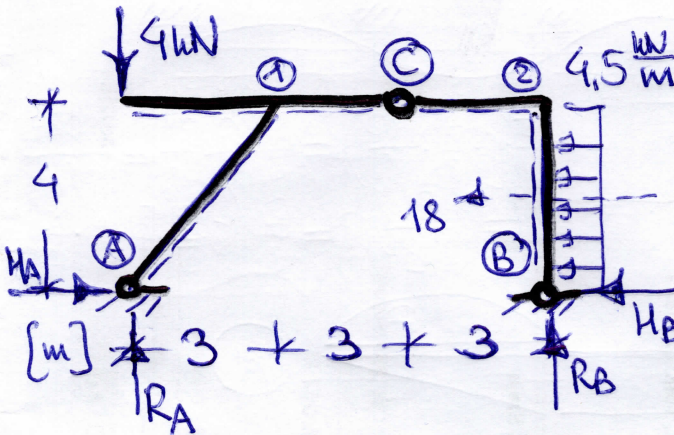
A-1 $\sum P_y = R_A - 2 \cdot 2 - R_1 = 0 \Rightarrow R_A = 6 \text{ kN}$

$\sum M_A = M_A + 2 \cdot 2 \cdot 1 + 2R_1 = 0 \Rightarrow M_A = -8 \text{ kNm}$

2-B-C $\sum M_B = 2R_C + 2R_2 - 6 \cdot 4 = 0 \Rightarrow R_C = 10 \text{ kN}$

$\sum M_C = 4R_2 - 6 \cdot 2 - 2R_B = 0 \Rightarrow R_B = -2 \text{ kN}$





$$\Sigma M_A = 18 \cdot 2 + 9R_B = 0$$

$$R_B = -4 \text{ kN}$$

$$\Sigma M_B = 18 \cdot 2 + 4 \cdot 9 - 9R_A = 0$$

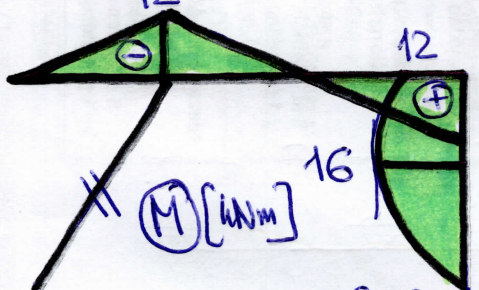
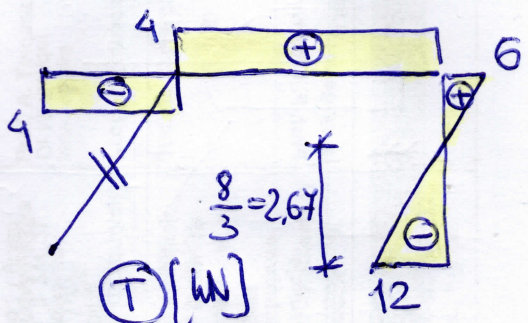
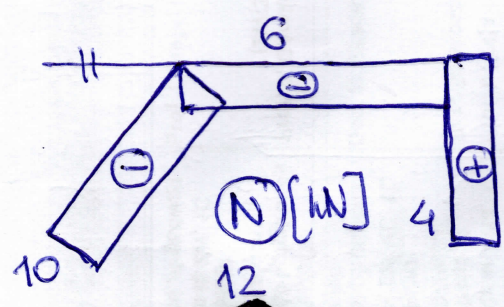
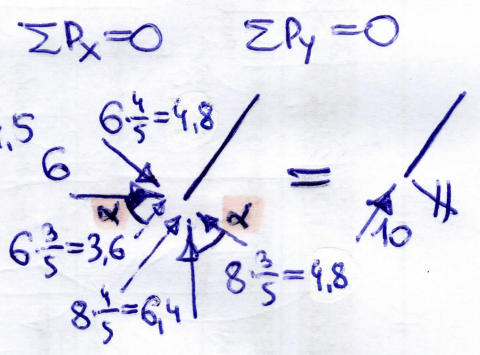
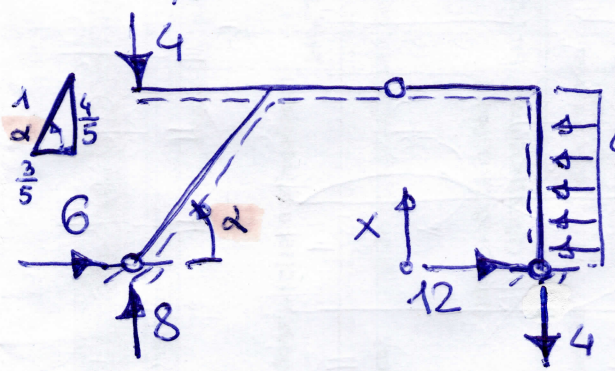
$$R_A = 8 \text{ kN}$$

$$\Sigma M_C^L = 6R_A - 4H_A - 4 \cdot 6 = 0$$

$$H_A = 0 \text{ kN}$$

$$\Sigma M_C^P = 3R_B - 4H_B - 18 \cdot 2 = 0$$

$$H_B = -12 \text{ kN}$$



B-2 wprost na x

$$T(x) = -12 + \frac{9}{2}x$$

$$T(0) = -12 \text{ kN}$$

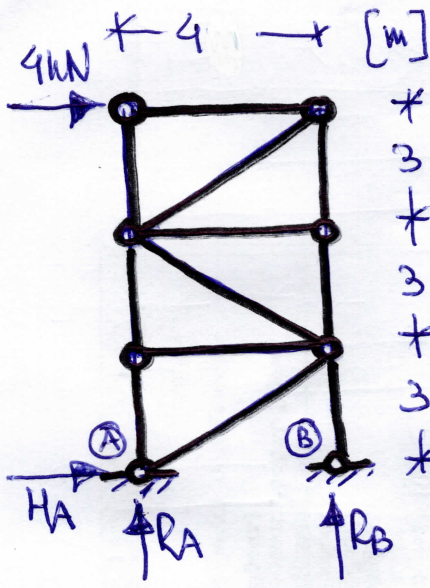
$$T(4) = 6 \text{ kN}$$

$$T(x) = 0 \Rightarrow x = \frac{8}{3} = 2,667 \text{ m}$$

$$M_{\max} = M\left(\frac{8}{3}\right) = 16 \text{ kNm}$$

$$M(x) = 12x - \frac{9}{4}x^2$$

$$M(0) = 0 \quad M(4) = 12 \text{ kNm}$$

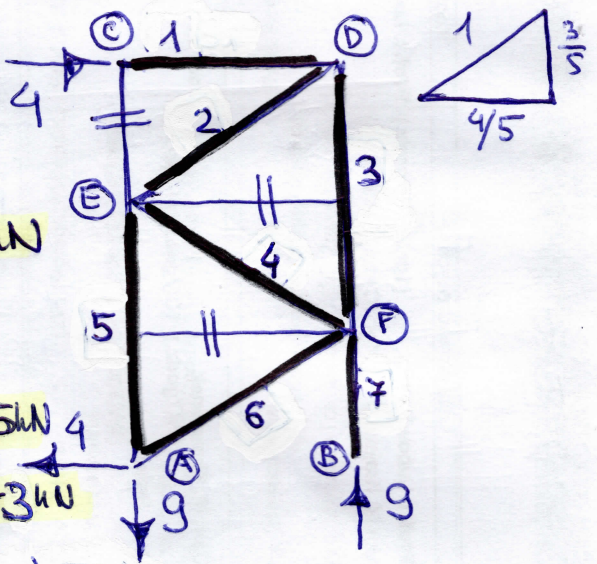


$$\sum M_A = 4 \cdot 9 - 4 R_B = 0 \Rightarrow R_B = 9 \text{ kN}$$

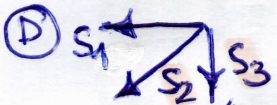
$$\sum M_B = 4 \cdot 9 + 4 R_A = 0 \Rightarrow R_A = -9 \text{ kN}$$

$$\sum P_x = 4 + H_A = 0 \Rightarrow H_A = -4 \text{ kN}$$

Wskazanie prętów zerowych
i zgrupowanie prętów
o wspólnych siłach:

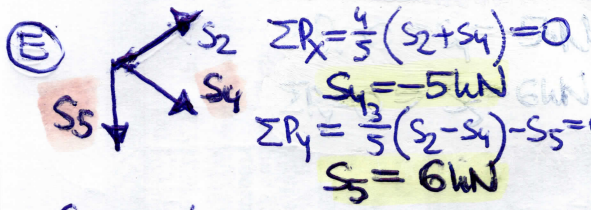


$$\textcircled{C} \sum P_x = 0 \Rightarrow S_1 = -4 \text{ kN}$$



$$\sum P_x = S_1 + \frac{4}{5} S_2 = 0 \Rightarrow S_2 = 5 \text{ kN}$$

$$\sum P_y = S_3 + \frac{3}{5} S_2 = 0 \Rightarrow S_3 = -3 \text{ kN}$$

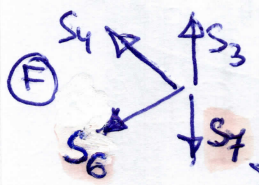


$$\sum P_x = \frac{4}{5} (S_2 + S_4) = 0$$

$$S_4 = -5 \text{ kN}$$

$$\sum P_y = \frac{3}{5} (S_2 - S_4) - S_5 = 0$$

$$S_5 = 6 \text{ kN}$$



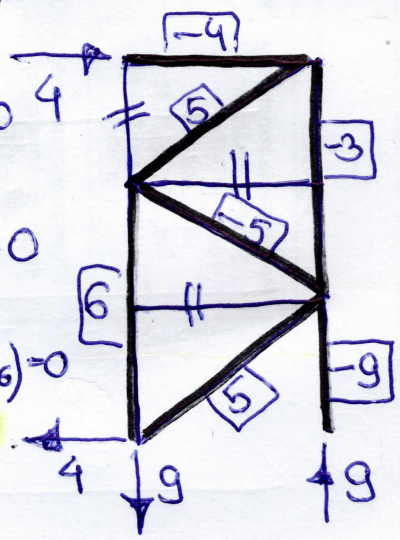
$$\sum P_x = \frac{4}{5} (S_4 + S_6) = 0$$

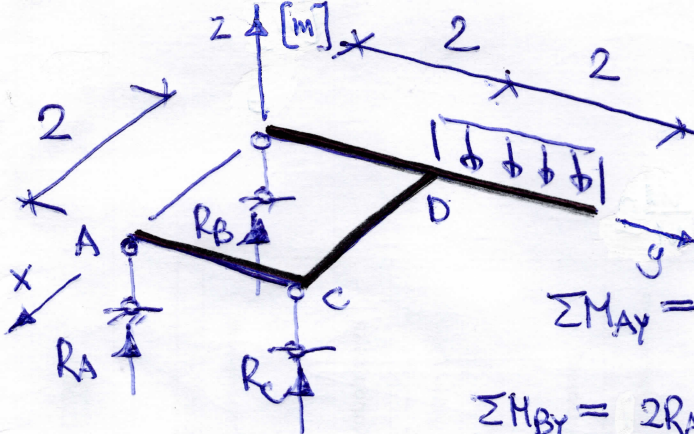
$$S_6 = 5 \text{ kN}$$

$$\sum P_y = S_3 - S_7 + \frac{3}{5} (S_4 - S_6) = 0$$

$$S_7 = -3 + \frac{3}{5} (-10) = -9 \text{ kN}$$

Wszyst (A) - sprężenie





$$\Sigma M_{Ax} = 0 \Rightarrow$$

$$2R_C - 2 \cdot 2 \cdot 3 = 0 \Rightarrow$$

$$R_C = 6 \text{ kN}$$

$$\Sigma M_{Ay} = 2R_B - 2 \cdot 2 \cdot 2 = 0 \Rightarrow$$

$$R_B = 4 \text{ kN}$$

$$\Sigma M_{By} = 2R_A + 2R_C = 0 \Rightarrow R_A = -6 \text{ kN}$$

$$\text{spr. } \Sigma F_z = R_A + R_B + R_C - 4 = 0$$

