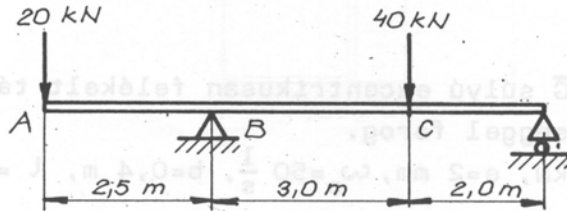


STATIKA

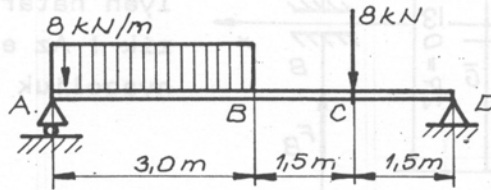
4.00 KÉTTÁMASZÚ TARTÓK IGÉNYBEVÉTELE

A feladatokban határozza meg a támaszerőket és az igénybevételi ábrákat !

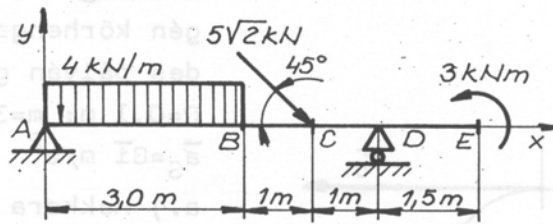
4.1.



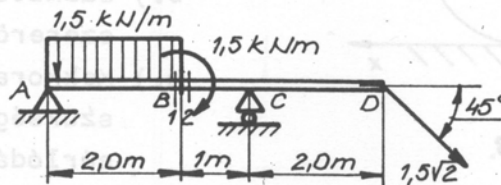
4.2.



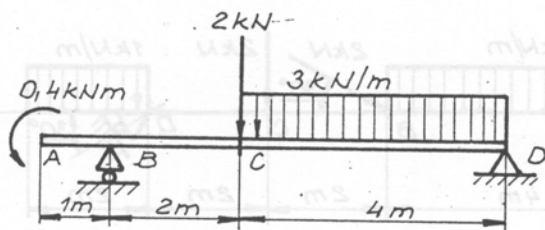
4.3.



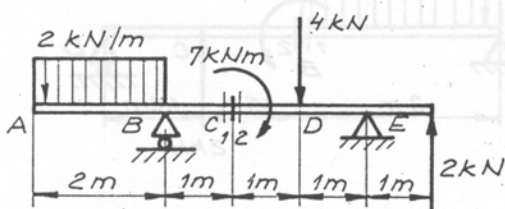
4.4.



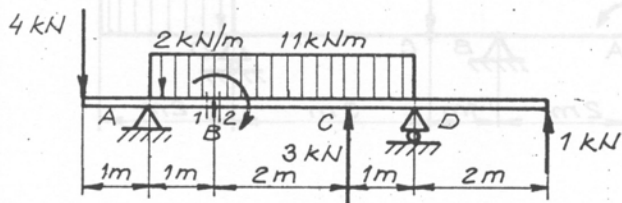
4.5.



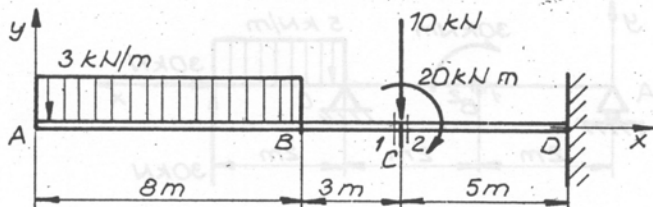
4.6.



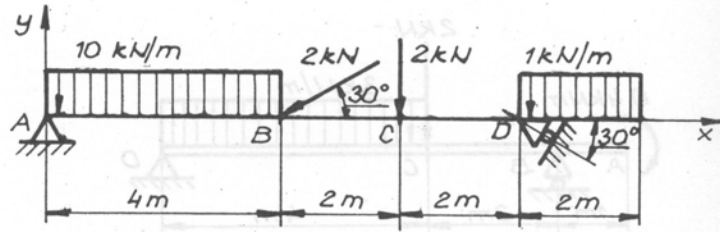
4.7.



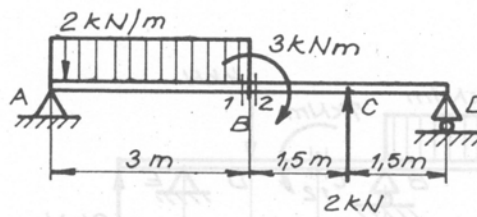
4.8.



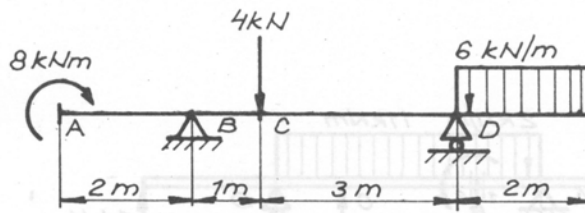
4.9.



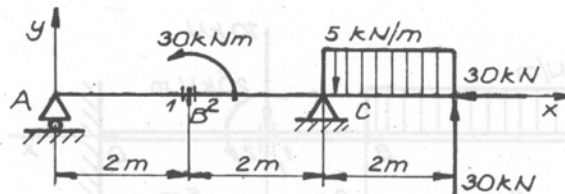
4.10.



4.11.



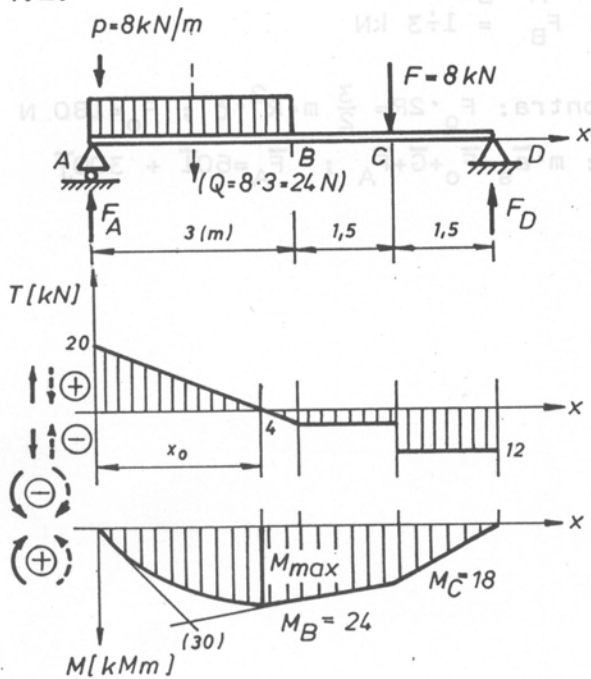
4.12.



4.1.

$$F_B = 46 \text{ kN}, \quad F_D = 14 \text{ kN}, \quad M_B = -50 \text{ kNm}, \quad M_C = 28 \text{ kNm}$$

4.2.



Reakcióerők:

$$M_A = 0$$

$$0 = -24 \cdot 1,5 - 8 \cdot 4,5 + F_D \cdot 6$$

$$F_D = 12 \text{ kN} \uparrow$$

$$F_{\text{össz}} = 0$$

$$F_A = 32 - 12 = 20 \text{ kN} \uparrow$$

Nyomatékok:

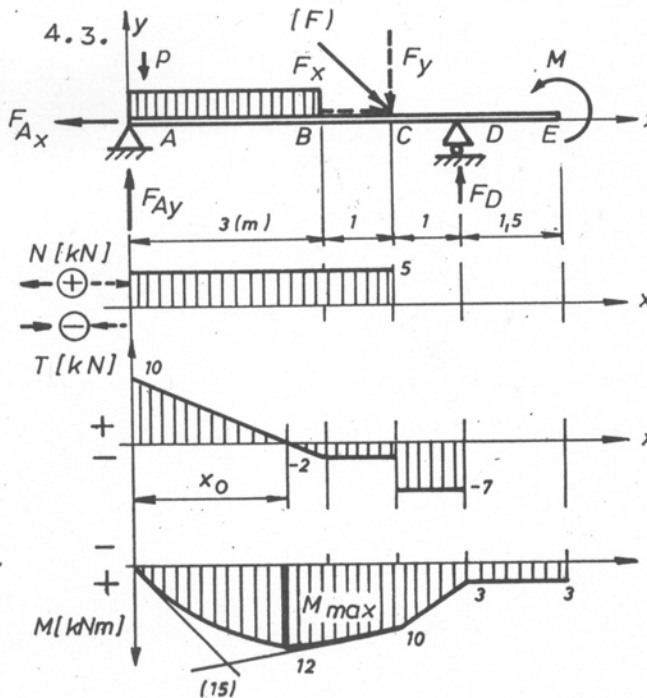
ahol $T=0$, ott $M=\text{maximum}$

$$F_A - p \cdot x_0 = 0$$

$$x_0 = 2,5 \text{ m}$$

$$M_{\text{max}} = F_A \cdot x_0 - p \cdot \frac{x_0^2}{2}$$

$$M_{\text{max}} = 25 \text{ kNm}$$



$$F_{Ax} = F_x = 5 \text{ kN} \leftarrow$$

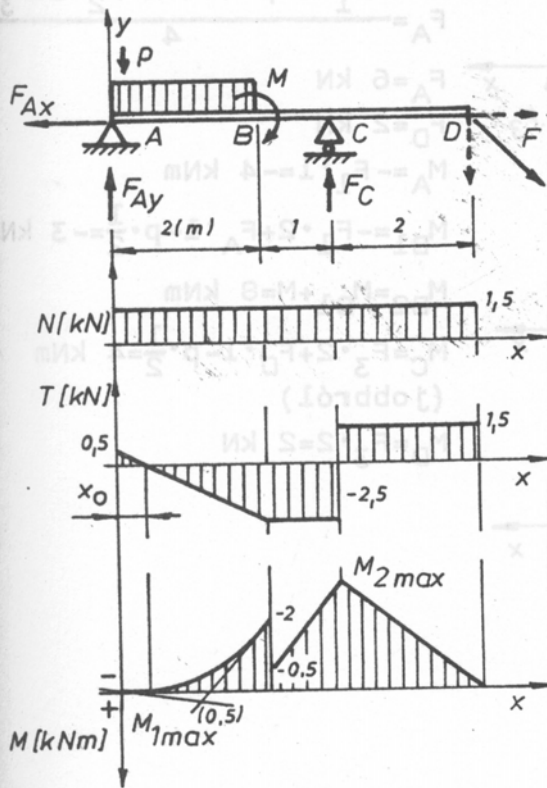
$$F_D = \frac{p \cdot 3 \cdot 1,5 + F_y \cdot 4 - M}{5}$$

$$F_D = 7 \text{ kN} \uparrow$$

$$F_{Ay} = 10 \text{ kN} \uparrow$$

$$x_0 = \frac{10}{4} = 2,5 \text{ m}$$

$$M_{\text{max}} = 12,5 \text{ kNm}$$



$$F_{Ax} = F_x = 1,5 \text{ kN} \leftarrow$$

$$M_C = 0$$

$$F_{Ay} = \frac{-p \cdot 2 \cdot 2 + 1,5 + F_y \cdot 2}{3}$$

$$F_{Ay} = 0,5 \text{ kN} \uparrow$$

$$F_C = 4 \text{ kN} \uparrow$$

$$x_0 = \frac{1}{3} \text{ m}$$

$$M_{1 \max} = 0,0825 \text{ kNm}$$

$$M_{2 \max} = -3 \text{ kNm}$$

($x=3(\text{m})$ -nél)

4.4.

5. $F_B = 5,4 \text{ kN}$, $F_D = 8,6 \text{ kN}$, $M_{\max} = 12,33 \text{ kNm}$

$M_A = -0,4 \text{ kNm}$, $M_B = -0,4 \text{ kNm}$, $M_C = 10,4 \text{ kNm}$

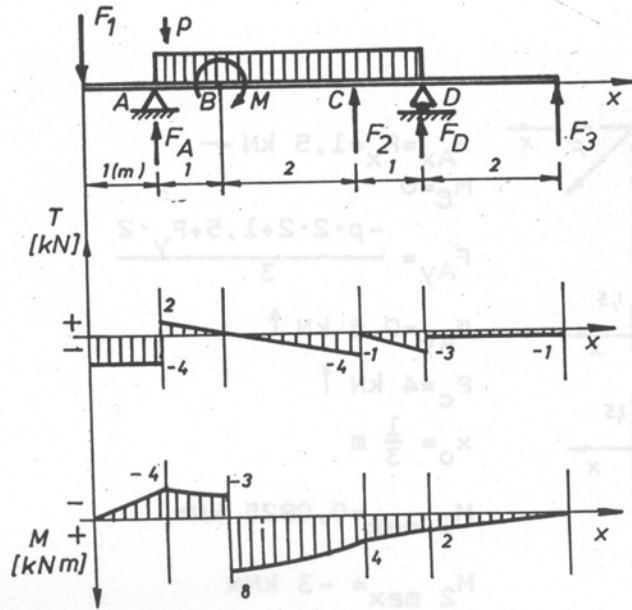
6.

$F_B = 5 \text{ kN}$, $F_E = 1 \text{ kN}$

$M_B = -4 \text{ kNm}$, $M_{C1} = -3 \text{ kNm}$, $M_{C2} = 4 \text{ kNm}$,

$M_D = 5 \text{ kNm}$, $M_E = 2 \text{ kNm}$

4.7.



$$M_D = 0 - b61$$

$$F_A = \frac{+F_1 \cdot 5 + p \cdot 4 \cdot 2 - M - F_2 \cdot 1 + F_3 \cdot 2}{4}$$

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

$$F_D = 2 \text{ kN}$$

$$M_A = -F_1 \cdot 1 = -4 \text{ kNm}$$

$$M_{B1} = -F_1 \cdot 2 + F_A \cdot 1 - p \cdot \frac{1}{2} = -3 \text{ kNm}$$

$$M_{B2} = M_{B1} + M = 8 \text{ kNm}$$

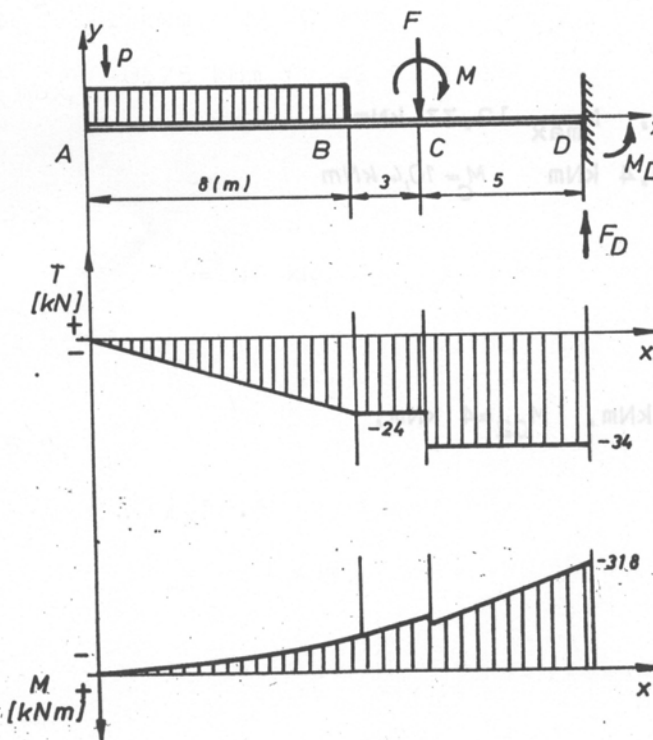
$$M_C = F_3 \cdot 2 + F_D \cdot 1 - p \cdot \frac{1}{2} = 4 \text{ kNm}$$

(jobbról)

$$M_D = F_3 \cdot 2 = 2 \text{ kNm}$$

4.7.

4.8.



$$F_D = p \cdot 8 + F$$

$$F_D = 34 \text{ kN}$$

$$M_D = -p \cdot 8 \cdot 12 - F \cdot 5 + M$$

$$M_D = -318 \text{ kNm}$$

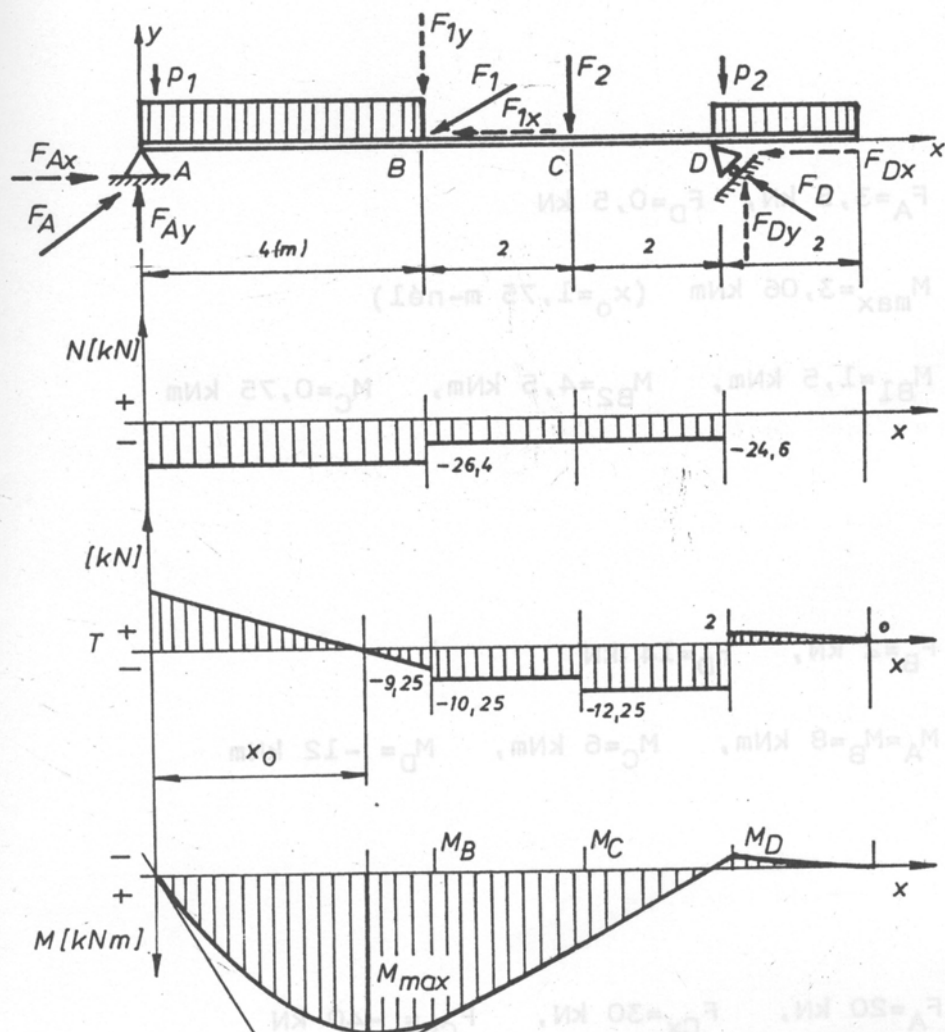
$$M_B = -96 \text{ kNm}$$

$$M_{C1} = -168 \text{ kNm}$$

$$M_{C2} = -148 \text{ kNm}$$

4.8.

4.9.



$$M_A = 0$$

$$0 = -p_1 \cdot 4 \cdot 2 - F_{1y} \cdot 4 - F_2 \cdot 6 + F_{Dy} \cdot 8 - p_2 \cdot 2 \cdot 9$$

$$F_{Dy} = 14,25 \text{ kN}$$

$$F_D = 28,5 \text{ kN} \leftarrow$$

$$F_{Dx} = 3 \cdot F_{Dy} = 24,68 \text{ kN}$$

$$F_{Ax} = F_{1x} + F_{Dx} = 26,41 \text{ kN}$$

$$F_{Ay} = p_1 \cdot 4 + F_{1y} + F_2 + p_2 \cdot 2 - F_{Dy} \quad F_A = 40,53 \text{ N} \rightarrow$$

$$F_{Ay} = 30,75 \text{ kN}$$

$$x_0 = 3,075 \text{ m}$$

$$M_{max} = 47,28 \text{ kNm}$$

$$M_B = 44 \text{ kNm}, \quad M_C = 22 \text{ kNm}, \quad M_D = -2 \text{ kNm}$$

4.10.

$$F_A = 3,5 \text{ kN}, \quad F_D = 0,5 \text{ kN}$$

$$M_{\max} = 3,06 \text{ kNm} \quad (x_0 = 1,75 \text{ m-nél})$$

$$M_{B1} = 1,5 \text{ kNm}, \quad M_{B2} = 4,5 \text{ kNm}, \quad M_C = 0,75 \text{ kNm}$$

4.11.

$$F_B = 2 \text{ kN}, \quad F_D = 14 \text{ kN}$$

$$M_A = M_B = 8 \text{ kNm}, \quad M_C = 6 \text{ kNm}, \quad M_D = -12 \text{ kNm}$$

4.12.

$$F_A = 20 \text{ kN}, \quad F_{Cx} = 30 \text{ kN}, \quad F_{Cy} = -40 \text{ kN}$$

$$M_{B1} = 40 \text{ kNm}, \quad M_{B2} = 10 \text{ kNm}, \quad M_C = 50 \text{ kNm}$$