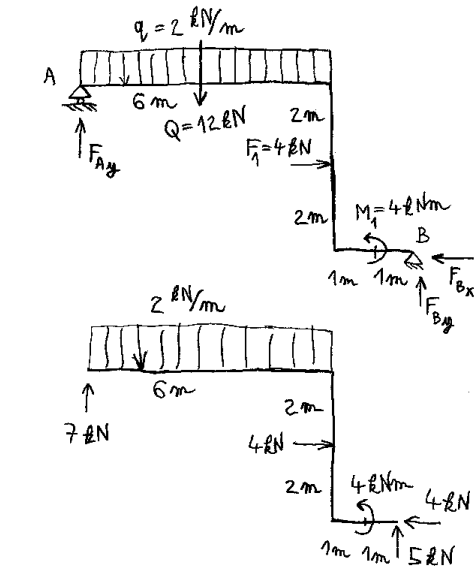


1. példa:

Számítsuk ki a reakcióerőket és rajzoljuk meg az igénybevételi ábrákat!



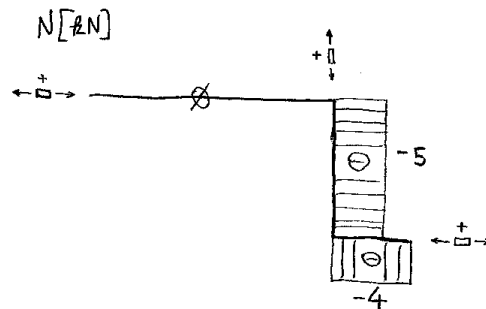
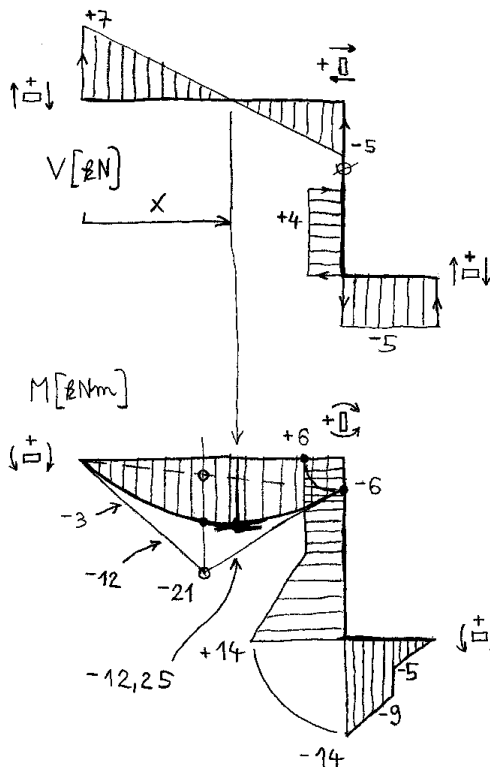
$$\sum F_x = 0 = F_1 - F_{Bx} \rightarrow \boxed{F_{Bx} = F_1 = 4 \text{ kN} (\leftarrow)}$$

$$\sum M_B = 0 = -F_{Ay} \cdot 8 + Q \cdot 5 - F_1 \cdot 2 + M_1$$

$$\boxed{F_{Ay} = \frac{5Q - 2F_1 + M_1}{8} = \frac{5 \cdot 12 - 2 \cdot 4 + 4}{8} = 7 \text{ kN} (\uparrow)}$$

$$\sum F_y = 0 = F_{Ay} - Q + F_{By}$$

$$\boxed{F_{By} = Q - F_{Ay} = 12 - 7 = 5 \text{ kN} (\uparrow)}$$



$$V(x) = +7 - qx = 0$$

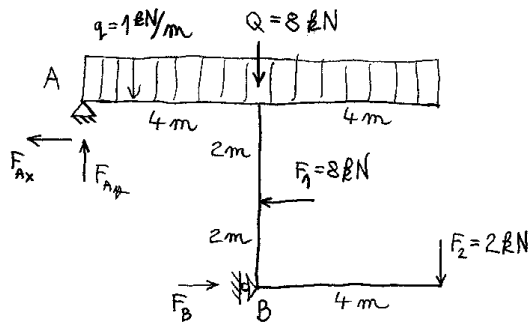
$$x = \frac{7}{q} = \frac{7}{2} = 3,5 \text{ m}$$

$$M_{\max} = M(x) = -F_{Ay} x + q x \frac{x}{2} =$$

$$= -7 \cdot 3,5 + 2 \cdot \frac{3,5^2}{2} = -12,25 \text{ kNm}$$

2. példa: A 2010.04.02.-ai gyakorlat 2. feladata.

Számítsuk ki a reakcióerőket és rajzoljuk meg az igénybevételi ábrákat!



$$\sum F_y = 0 = F_{Ay} - Q - F_2$$

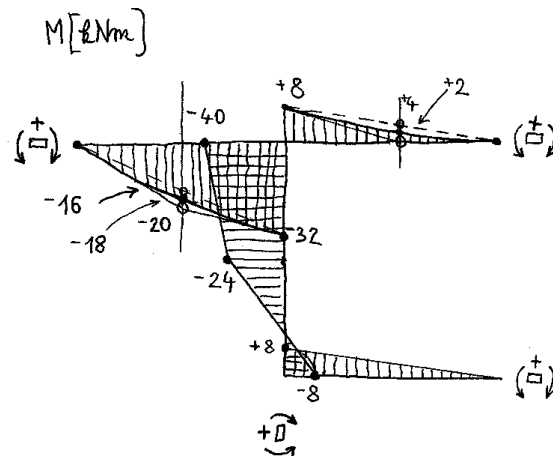
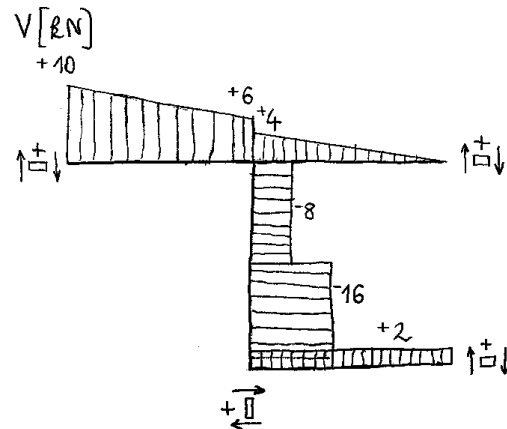
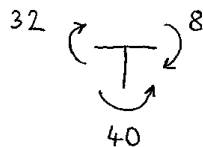
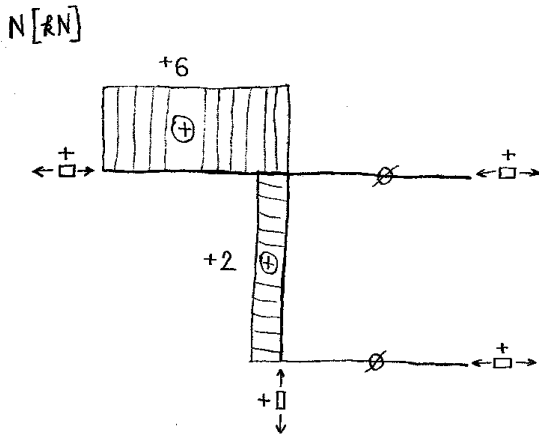
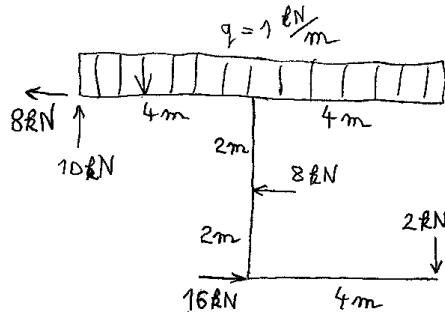
$$F_{Ay} = Q + F_2 = 8 + 2 = 10 \text{ kN (↑)}$$

$$\sum M_A = 0 = -Q \cdot 4 - F_1 \cdot 2 + F_B \cdot 4 - F_2 \cdot 8$$

$$F_B = \frac{4Q + 2F_1 + 8F_2}{4} = 16 \text{ kN (→)}$$

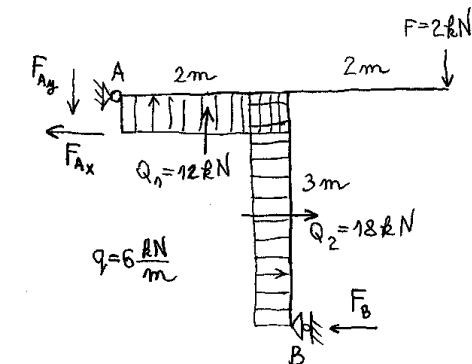
$$\sum F_x = 0 = -F_{Ax} - F_1 + F_B$$

$$F_{Ax} = F_B - F_1 = 16 - 8 = 8 \text{ kN (←)}$$



3. példa:

Számítsuk ki a reakcióerőket és rajzoljuk meg az igénybevételi ábrákat!



$$\sum F_y = 0 = -F_{Ay} + Q_1 - F$$

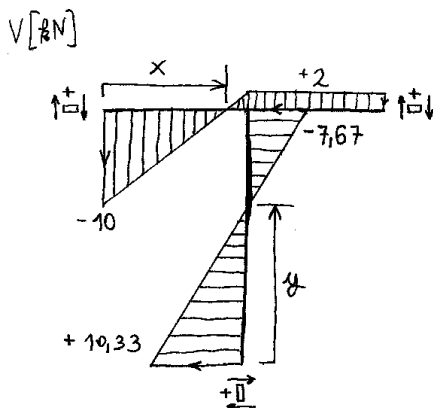
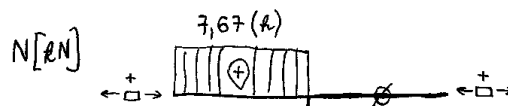
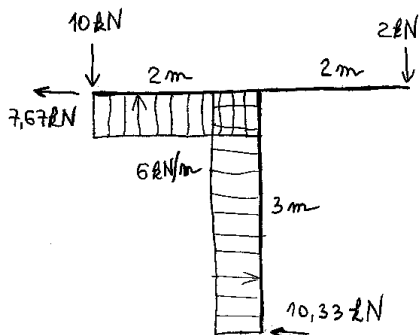
$$F_{Ay} = Q_1 - F = 12 - 2 = 10 \text{ kN} (\downarrow)$$

$$\sum M_A = 0 = Q_1 \cdot 1 - F \cdot 4 + Q_2 \cdot 1,5 - F_B \cdot 3$$

$$F_B = \frac{Q_1 - 4F + 1,5Q_2}{3} = \frac{12 - 4 \cdot 2 + 1,5 \cdot 18}{3} = 10,33 \text{ kN} (\leftarrow)$$

$$\sum F_x = 0 = -F_{Ax} + Q_2 - F_B$$

$$F_{Ax} = Q_2 - F_B = 18 - 10,33 = 7,67 \text{ kN} (\leftarrow)$$

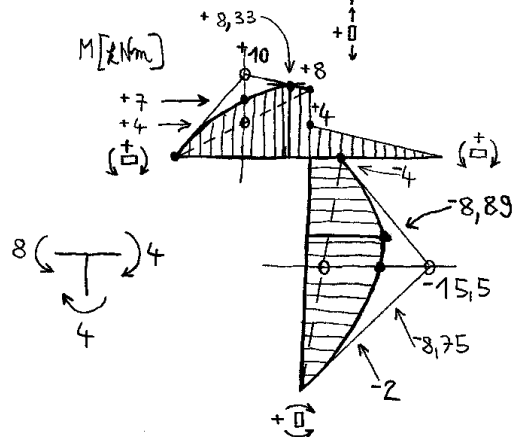


$$V_1(x) = -10 + q \cdot x = 0$$

$$x = \frac{10}{q} = \frac{10}{6} = 1,67 \text{ m}$$

$$M_{max1} = M_1(x) = F_{Ay} \cdot x - q \cdot x \cdot \frac{x}{2} =$$

$$= 10 \cdot 1,67 - 6 \cdot \frac{1,67^2}{2} = 8,33 \text{ kNm}$$



$$V_2(y) = +10,33 - q \cdot y = 0$$

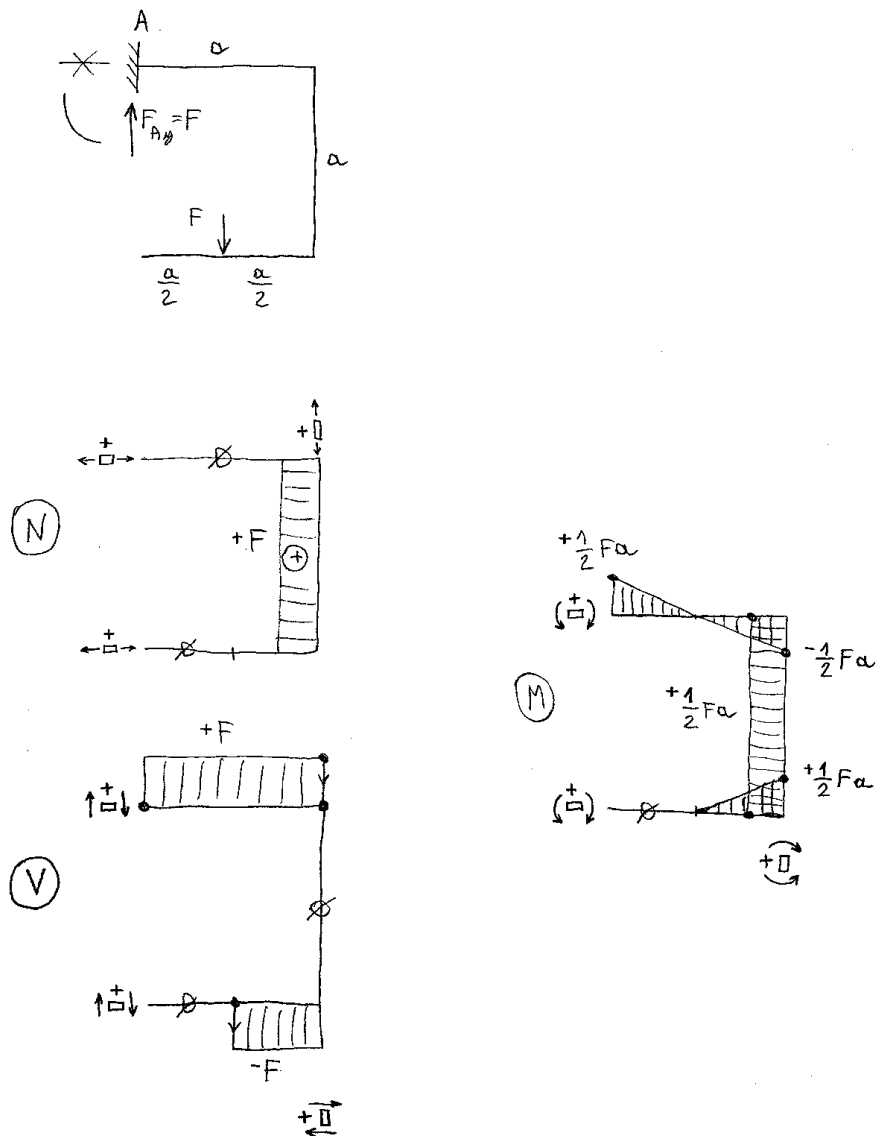
$$y = \frac{10,33}{q} = \frac{10,33}{6} = 1,72 \text{ m}$$

$$M_{max2} = M_2(y) = F_B \cdot y + q \cdot y \cdot \frac{y}{2} =$$

$$= 10,33 \cdot 1,72 + 6 \cdot \frac{1,72^2}{2} = -8,89 \text{ kNm}$$

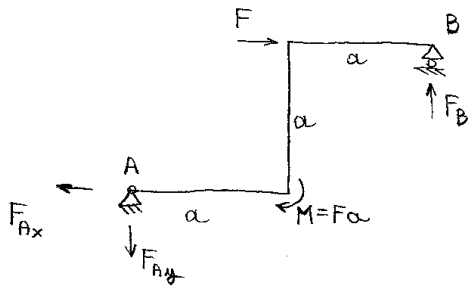
4. példa: A 2010.04.02.-ai gyakorlat 3. feladata.

Számítsuk ki a reakcióerőket és rajzoljuk meg az igénybevételi ábrákat!



5. példa: A 2010.04.02.-ai gyakorlat 4. feladata.

Számítsuk ki a reakcióerőket és rajzoljuk meg az igénybevételi ábrákat!



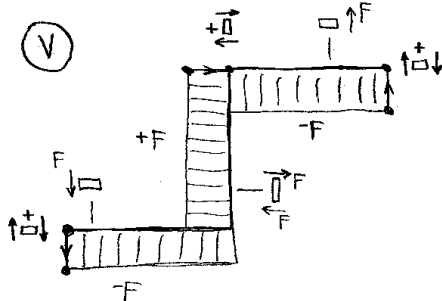
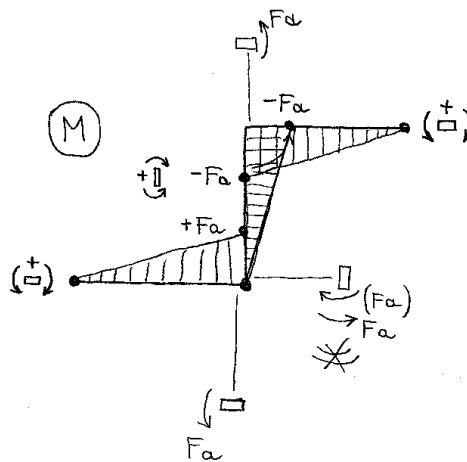
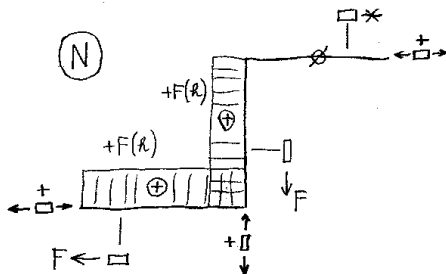
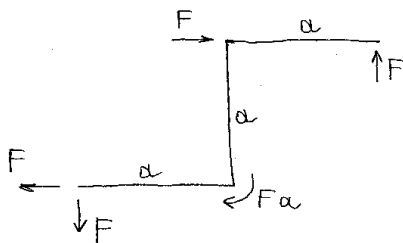
$$\sum F_x = 0 \rightarrow F_{Ax} = F (\leftarrow)$$

$$\begin{aligned} \sum M_A = 0 &= -M - F \cdot a + F_B \cdot 2a = \\ &= -(Fa) - F \cdot a + F_B \cdot 2a \end{aligned}$$

$$F_B = F (\uparrow)$$

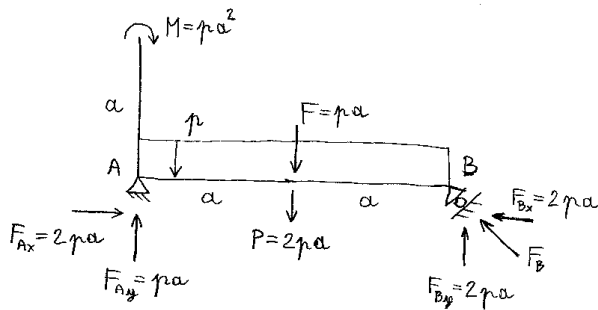
$$\sum F_y = 0 = -F_{Ay} + F_B$$

$$F_{Ay} = F (\downarrow)$$



6. példa:

Számítsuk ki a reakcióerőket és rajzoljuk meg az igénybevételi ábrákat!



$$\begin{aligned}\sum M_A = 0 &= -M - F \cdot a - P \cdot a + F_{By} \cdot 2a = \\ &= -(pa^2) - (pa) \cdot a - (2pa) \cdot a + F_{By} \cdot 2a\end{aligned}$$

$$F_{By} = 2pa \quad (\uparrow)$$

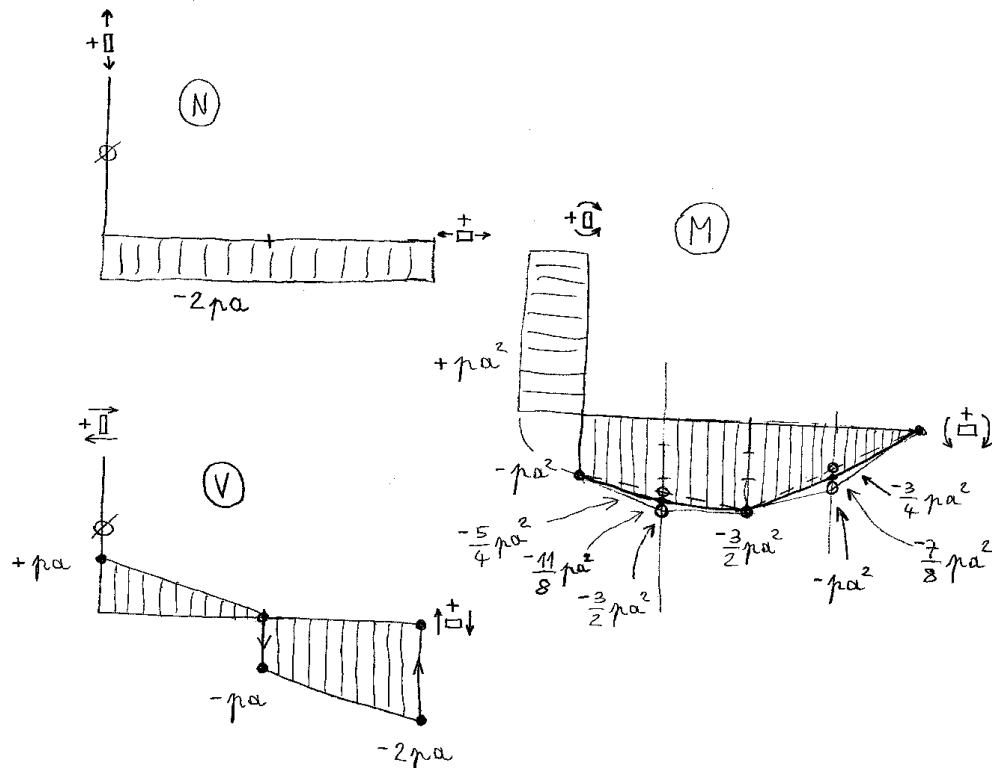
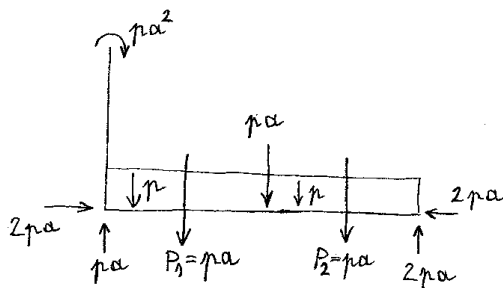
$$F_{Bx} = F_{By} = 2pa \quad (\leftarrow)$$

$$\sum F_y = 0 = F_{Ay} - F - P + F_{By} =$$

$$= F_{Ay} - (pa) - (2pa) + (2pa)$$

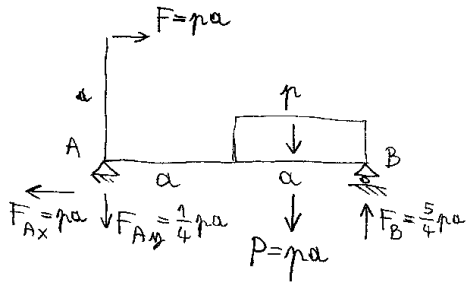
$$F_{Ay} = pa \quad (\uparrow)$$

$$\sum F_x = 0 \rightarrow F_{Ax} = F_{Bx} = 2pa \quad (\rightarrow)$$



7. példa:

Számítsuk ki a reakcióerőket és rajzoljuk meg az igénybevételi ábrákat!



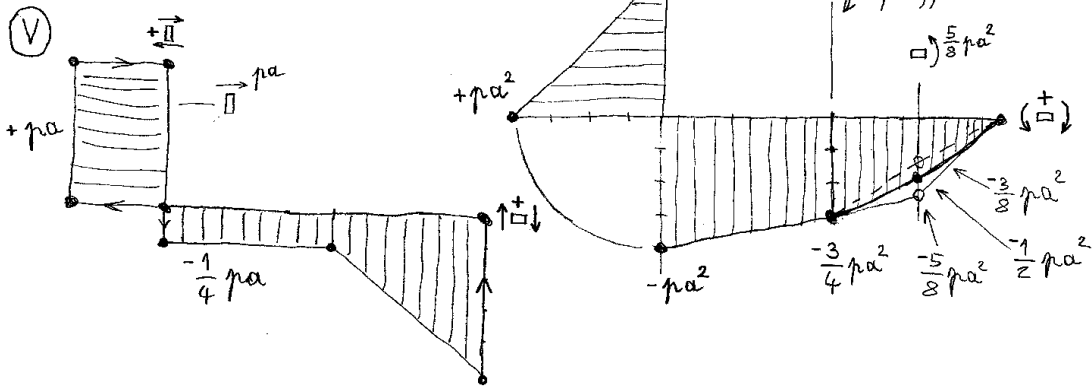
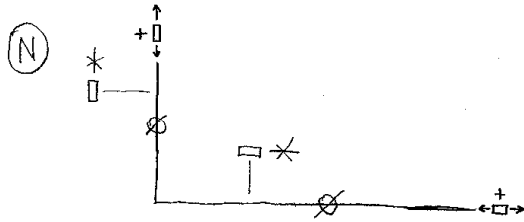
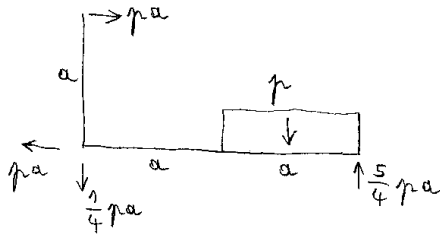
$$\sum F_x = 0 \Rightarrow F_{Ax} = pa (\leftarrow)$$

$$\begin{aligned} \sum M_A = 0 &= -F \cdot a - p \cdot \frac{3}{2}a + F_B \cdot 2a \\ &= -(pa) \cdot a - (pa) \cdot \frac{3}{2}a + F_B \cdot 2a \end{aligned}$$

$$F_B = \frac{5}{4} pa (\uparrow)$$

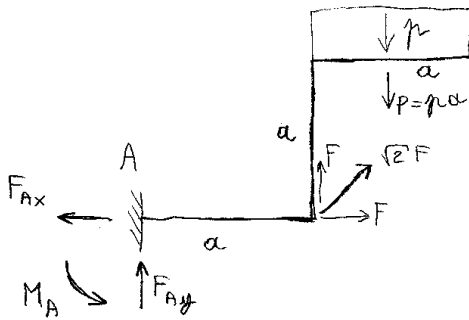
$$\sum F_y = 0 = -F_{Ay} - P + F_B$$

$$F_{Ay} = F_B - P = \left(\frac{5}{4} pa\right) - (pa) = \frac{1}{4} pa (\downarrow)$$



8. példa:

Számítsuk ki a reakcióerőket és rajzoljuk meg az igénybevételi ábrákat!



$$\sum F_x = 0 = -F_{Ax} + F = -F_{Ax} + (pa)$$

$$F_{Ax} = pa \quad (\leftarrow)$$

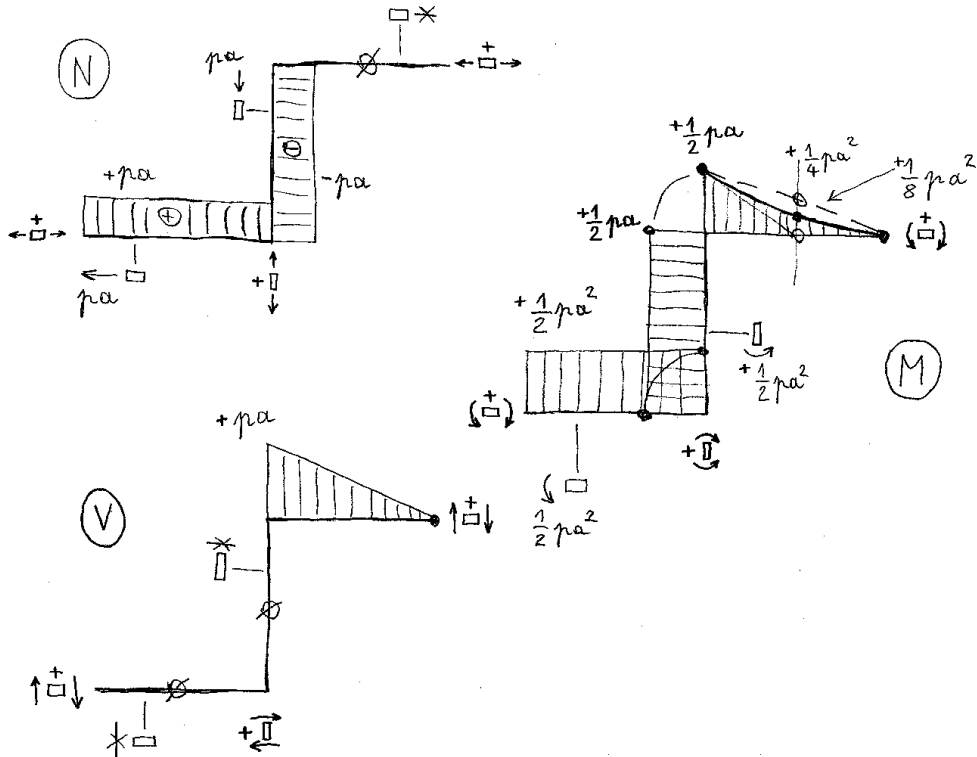
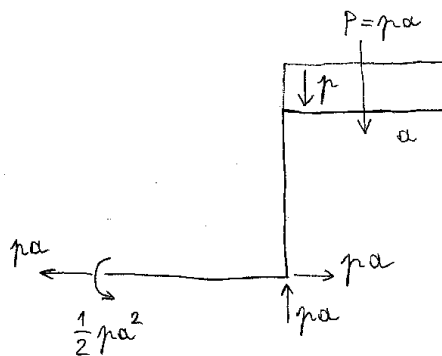
$$\sum F_y = 0 = F_{Ay} + F - P = F_{Ay} + (pa) - (pa)$$

$$F_{Ay} = 0$$

$$\sum M_A = 0 = M_A + F \cdot a - P \cdot \frac{3}{2}a =$$

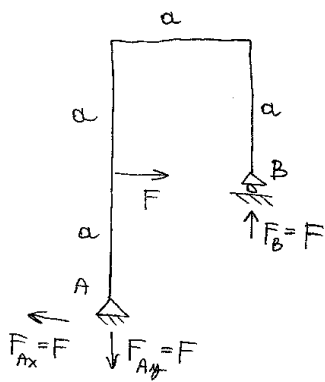
$$= M_A + (pa) \cdot a - (pa) \cdot \frac{3}{2}a$$

$$M_A = \frac{1}{2} pa^2 \quad (\curvearrowright)$$



9. példa:

Számítsuk ki a reakcióerőket és rajzoljuk meg az igénybevételi ábrákat!



$$\sum M_A = 0 = -F \cdot a + F_B \cdot a$$

$$F_B = F \quad (\uparrow)$$

$$\sum F_x = 0 \rightarrow F_{Ax} = F \quad (\leftarrow)$$

$$\sum F_y = -F_{Ay} + F_B$$

$$F_{Ay} = F \quad (\downarrow)$$

