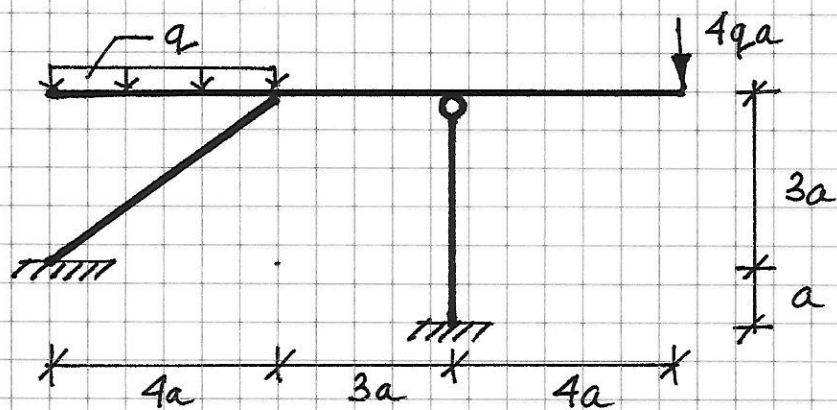


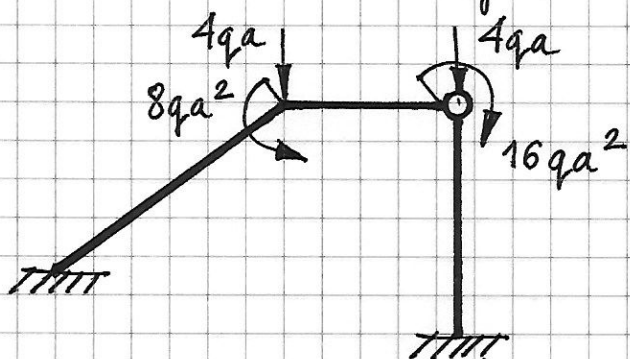
Narysuj wykres M. / Find the bending moment diagram.



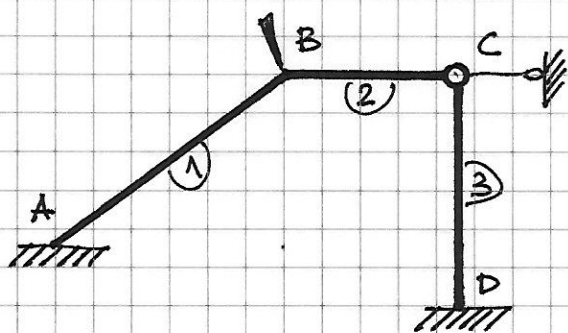
$EI = \text{const.}$

$EA = +\infty$

Schemat zredukowany / The reduced scheme



Schemat zastępczy / The primary structure



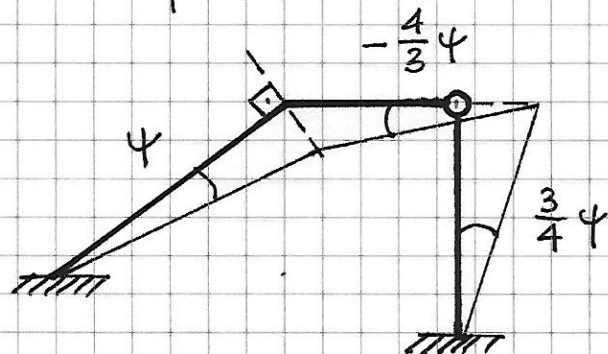
$$\mathbf{q} = \begin{bmatrix} \varphi_B \\ \psi \end{bmatrix}$$

Moment wyjściowy / The initial moment



$$\phi_B^{(2)} = 8qa^2$$

Plan przesunięć / The translation plan



$$\bar{L}\psi = 4qa \cdot 4a \cdot \bar{\psi} + 16qa^2 \cdot \left(-\frac{4}{3}\bar{\psi}\right)$$

Równania równowagi / Equations of equilibrium

$$\begin{cases} \phi_B^{(1)} + \phi_B^{(2)} + 8qa^2 = 0 \end{cases}$$

$$\begin{cases} [\phi_A^{(1)} + \phi_B^{(1)}] \cdot \bar{\psi} + \phi_B^{(2)} \cdot \left(-\frac{4}{3}\bar{\psi}\right) + \phi_D^{(3)} \cdot \frac{3}{4}\bar{\psi} + \bar{L}\psi = 0 \quad | \cdot (-1) \end{cases}$$

Wzory transformacyjne / Slope - deflection equations

$$\phi_A^{(1)} = \frac{2EJ}{5a} [\varphi_B - 3\psi] = 0,41 qa^2$$

$$\phi_B^{(1)} = \frac{2EJ}{5a} [2\varphi_B - 3\psi] = -3,05 qa^2$$

$$\phi_B^{(2)} = \frac{3EJ}{3a} [\varphi_B + \frac{4}{3}\psi] + 8ql^2 = -4,95 qa^2$$

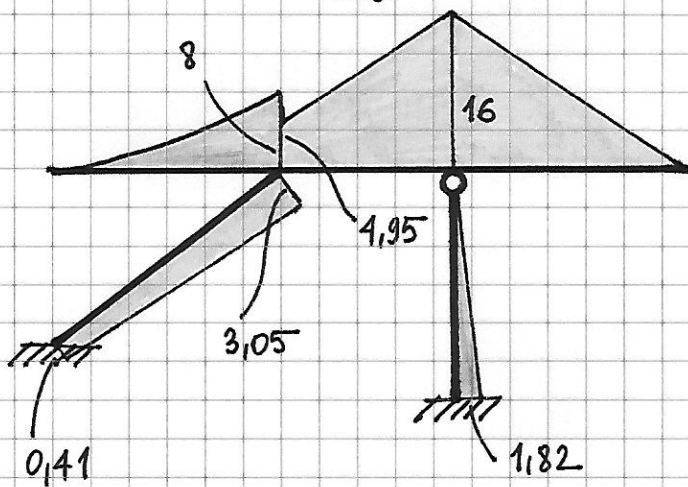
$$\phi_D^{(3)} = \frac{3EJ}{4a} [-\frac{3}{4}\psi] = 1,82 qa^2$$

Równania równowagi c.d. / Equations of equilibrium cont.

$$\frac{EJ}{a} \begin{bmatrix} 1,8 & 0,133 \\ 0,133 & 4,6 \end{bmatrix} \begin{bmatrix} \varphi_B \\ \psi \end{bmatrix} + \begin{bmatrix} 16 \\ 16 \end{bmatrix} qa^2 = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$$

$$\varphi_B = -8,65 \frac{qa^3}{EJ}$$

$$\psi = -3,23 \frac{qa^3}{EJ}$$



M [qa²]

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