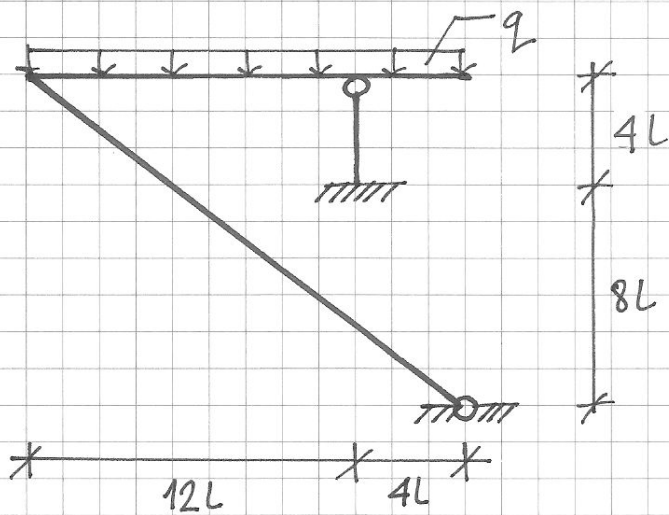
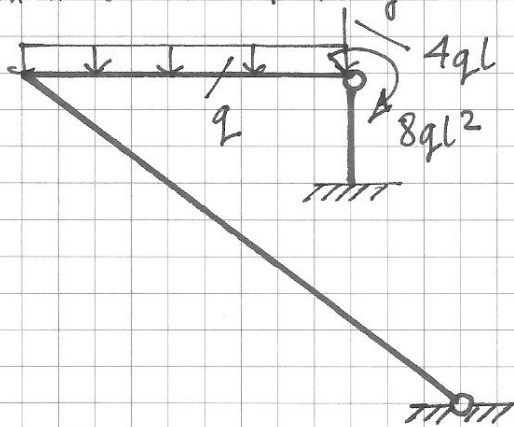


MK1 kolokrium 2.1a, r. ak. 2014/2015

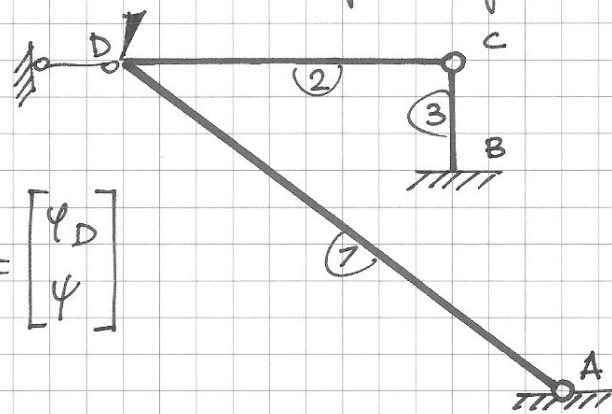
Narysować wykres M  $EJ = \text{const.}$ ,  $EA = \infty$



Schemat zredukowany

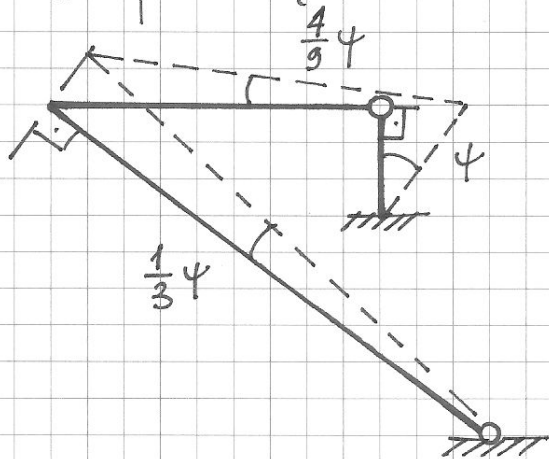


Schemat geometrycznie wyznaczalny



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

Plan przesunięć:



Równania równowagi:

$$1) \Phi_D^{(1)} + \Phi_D^{(2)} = 0$$

$$2) \Phi_D^{(1)} \cdot \frac{1}{3} \bar{\psi} + \Phi_D^{(2)} \cdot \frac{4}{9} \bar{\psi} + \Phi_B^{(3)} \cdot \bar{\psi} + \bar{L}\psi = 0$$

$$\bar{L}\psi = q \cdot 12L \cdot 6L \cdot \frac{4}{9} \bar{\psi} + 8ql^2 \cdot \frac{4}{9} \bar{\psi}$$

Wzory transformacyjne:

$$\Phi_D^{(1)} = \frac{3EJ}{20L} \left[ \varphi_D - \frac{1}{3} \psi \right]$$

$$= 4,847 ql^2$$

$$\varphi_D = 19,435 \frac{ql^3}{EJ}$$

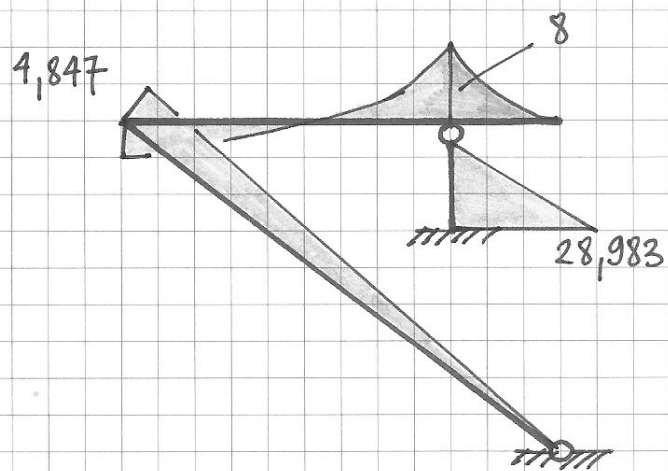
$$\Phi_D^{(2)} = \frac{3EJ}{12L} \left[ \varphi_D - \frac{4}{9} \psi \right] - \frac{1}{8} q (12L)^2 + 4ql^2 = -4,847 ql^2$$

$$\psi = -38,644 \frac{ql^3}{EJ}$$

$$\Phi_B^{(3)} = \frac{3EJ}{4L} [-\psi]$$

$$= 28,983 ql^2$$

Wykres M:

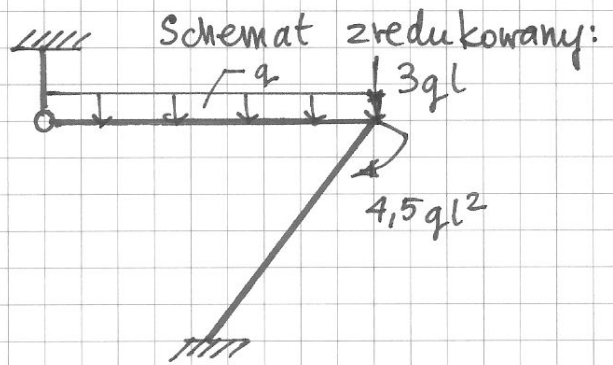
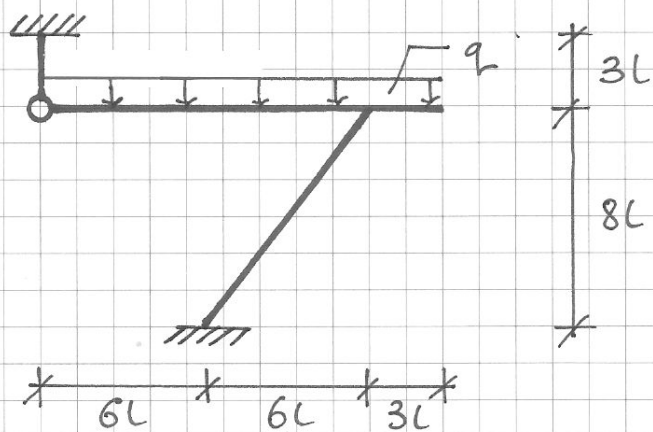


$$\frac{M}{qL^2}$$

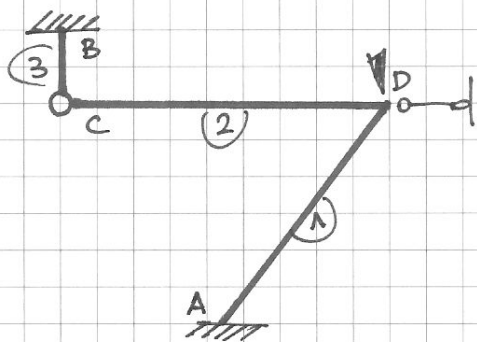
MK1 kolokwium 2.1b, r.ak. 2014/2015

Narysować wykres M

$EJ = \text{const.}$ ,  $EA = \infty$

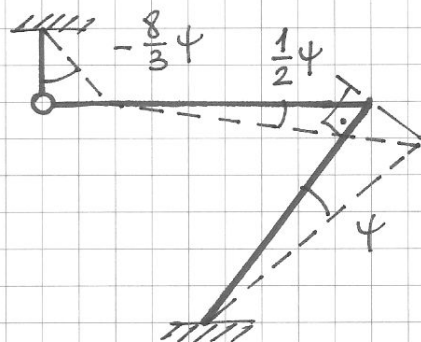


Schemat geometrycznie wyznaczalny



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

Plan przesunięć:



Równania równowagi:

$$\Phi_D^{(1)} + \Phi_D^{(2)} - 4,5 q l^2 = 0$$

$$[\Phi_A^{(1)} + \Phi_D^{(1)}] \cdot \bar{\psi} + \Phi_D^{(2)} \cdot \frac{1}{2} \bar{\psi} + \Phi_B^{(3)} \cdot \left(-\frac{8}{3} \bar{\psi}\right) + \bar{\psi} = 0$$

$$\bar{\psi} = 3qL \cdot 6L \cdot \bar{\psi} + q \cdot 12L \cdot 6L \cdot \frac{1}{2} \bar{\psi}$$

Wzory transformacyjne:

$$\Phi_A^{(1)} = \frac{2EJ}{10L} [\varphi_D - 3\psi] = -6,543 q l^2$$

$$\Phi_D^{(1)} = \frac{2EJ}{10L} [2\varphi_D - 3\psi] = -9,283 q l^2$$

$$\Phi_D^{(2)} = \frac{3EJ}{12L} \left[\varphi_D - \frac{1}{2}\psi\right] + \frac{1}{8} q (12L)^2 = 13,783 q l^2$$

$$\Phi_B^{(3)} = \frac{3EJ}{3L} \left[\frac{8}{3}\psi\right] = 16,9 q l^2$$

$$\varphi_D = -13,701 \frac{q l^3}{EJ}$$

$$\psi = 6,337 \frac{q l^3}{EJ}$$

Wgkres M

