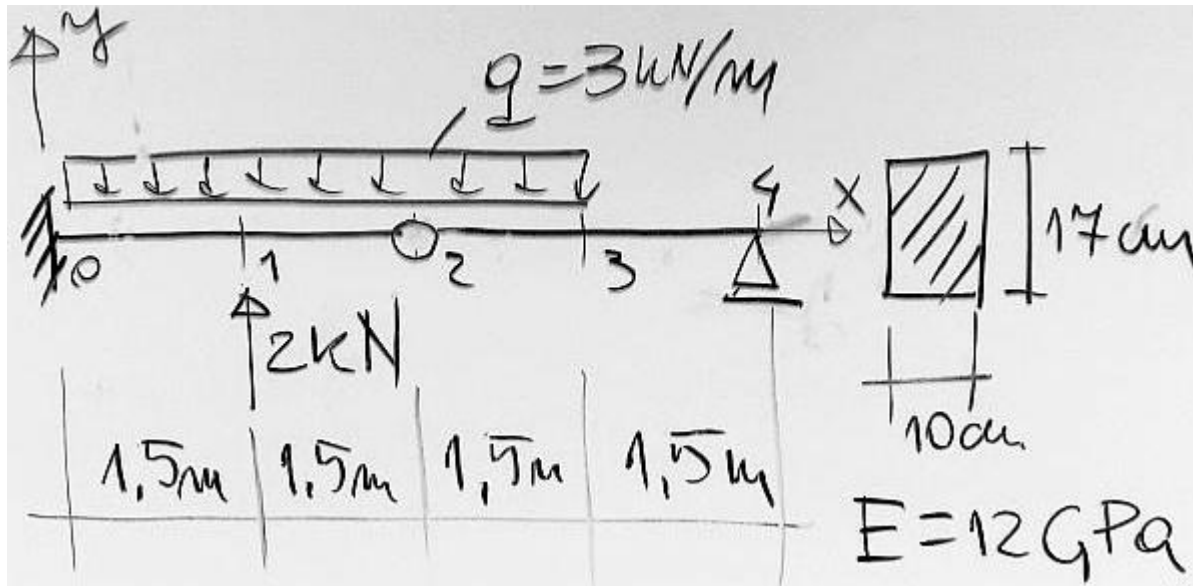


## Metoda różnic skończonych - ugięcie belki



$$R4 := \frac{q \cdot (1.5\text{m})^2}{2 \cdot 3\text{m}} = 1.125 \cdot \text{kN}$$

$$M3(x) := R4 \cdot (L - x) \quad M2(x) := M3(x) - q \cdot \frac{(4.5\text{m} - x)^2}{2}$$

$$M1(x) := M2(x) + P \cdot (1.5\text{m} - x)$$

$$P := 2\text{kN} \quad q := 3 \frac{\text{kN}}{\text{m}} \quad E := 12\text{GPa}$$

$$b := 10\text{cm} \quad h := 17\text{cm}$$

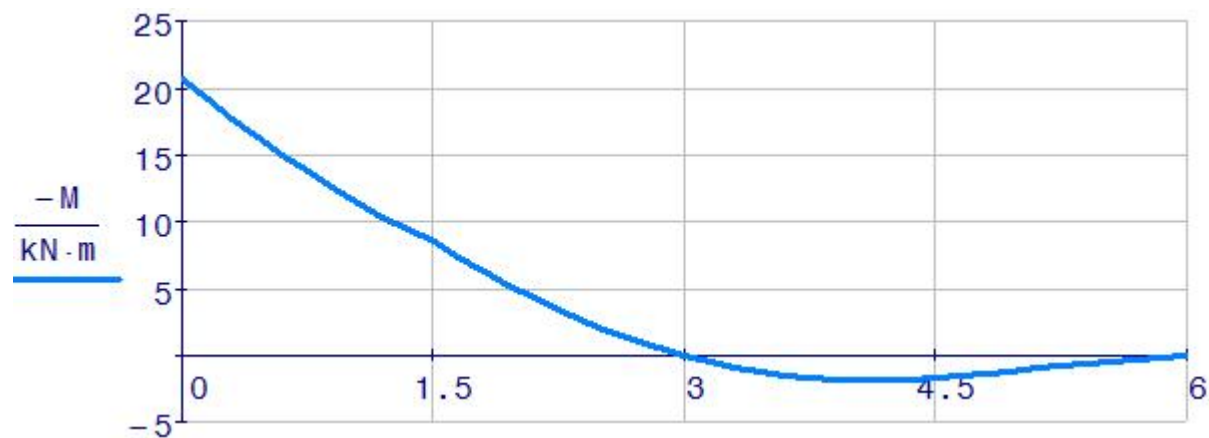
$$L := 6\text{m} \quad J := b \cdot \frac{h^3}{12} = 4094.1667 \cdot \text{cm}^4$$

$$n := 4 \quad \Delta := \frac{L}{n} = 1.5\text{m}$$

$$\alpha := \frac{\Delta^2}{E \cdot J} = 4.57969 \cdot \frac{1}{\text{MN}}$$

dokładność  $y \pm 0.005\text{mm}$

$\frac{M}{\text{kN} \cdot \text{m}} =$		0	$\frac{X}{\text{m}} =$		0
	0	-20.625		0	0
	1	-8.438		1	1.5
	2	0		2	3
	3	1.688		3	4.5
	4	0		4	6



*Warunki brzegowe*

$$y_0 = 0 \quad \varphi_0 = 0 \quad \text{-----} \rightarrow \quad 2 y_1 = \alpha M_0 \quad y_4 = 0$$

*Równania MRS*

$$2 y_1 = \alpha M_0$$

$$y_0 - 2 y_1 + y_2 = \alpha M_1$$

$$y_2 - 2 y_3 + y_4 = \alpha M_3$$

$y =$		0	$\cdot \text{mm}$
	0	-0.000	
	1	-47.228	
	2	-133.097	
	3	-70.413	
	4	0.000	

$$\alpha = 4.57969 \cdot \frac{1}{\text{MN}}$$