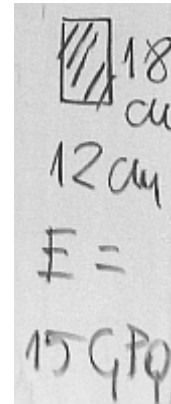
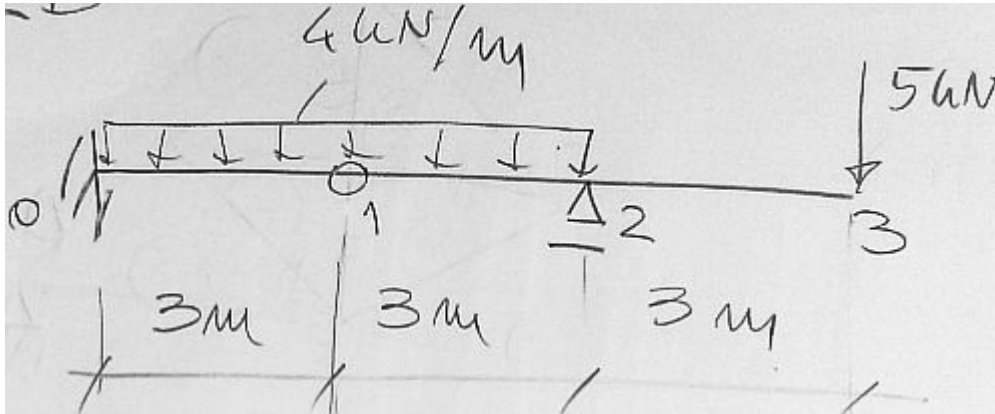


## Metoda różnic skończonych - ugięcie belki



$$P := 5 \text{ kN} \quad q := 4 \frac{\text{kN}}{\text{m}} \quad E := 15 \text{ GPa}$$

$$L := 9 \text{ m} \quad b := 12 \text{ cm} \quad h := 18 \text{ cm} \quad J := b \cdot \frac{h^3}{12} = 5.832 \times 10^3 \cdot \text{cm}^4$$

$$R2 := \frac{P \cdot 6 \text{ m} + q \cdot 3 \text{ m} \cdot 1.5 \text{ m}}{3 \text{ m}} = 16 \cdot \text{kN}$$

$$n := 3 \quad \Delta := \frac{L}{n} = 3 \text{ m} \quad \alpha := \frac{\Delta^2}{E \cdot J} \quad \alpha = 10.288 \cdot \frac{1}{\text{MN}}$$

$$M2(x) := -P \cdot (L - x)$$

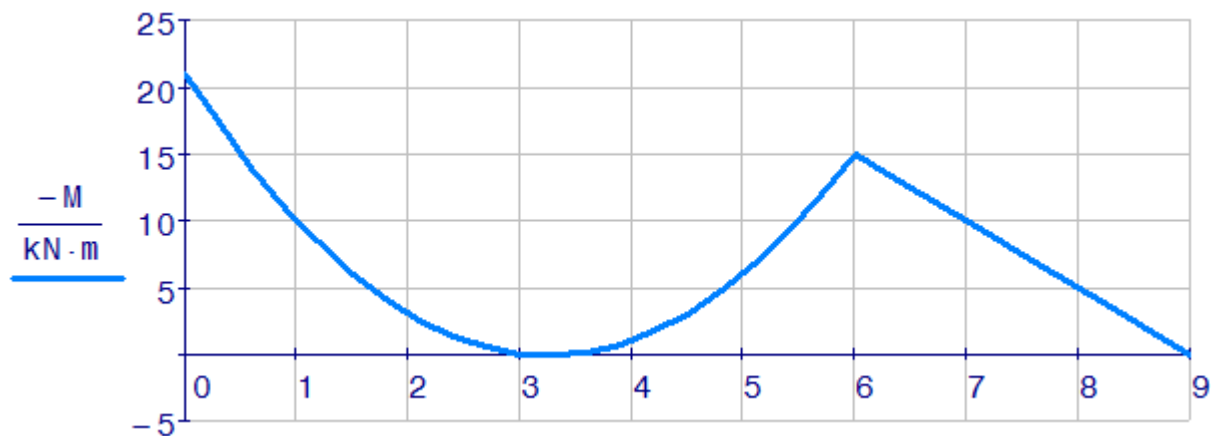
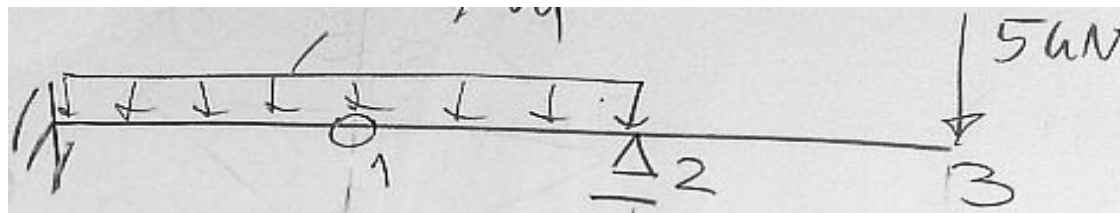
$$M1(x) := M2(x) + R2 \cdot (6 \text{ m} - x) - q \cdot \frac{(6 \text{ m} - x)^2}{2}$$

$$i := 0..n \quad X_i := i \cdot \Delta$$

$$i := 0..2 \quad M_i := M1(X_i)$$

$$i := 2..n \quad M_i := M2(X_i)$$

M =		0		· kN · m	X =		0		m
		0	-21				0	0	
		1	0				1	3	
		2	-15				2	6	
		3	0				3	9	



*Równania MRS*

$$y_0 = 0 \quad \varphi_0 = 0 \quad y_2 = 0$$

$$2y_1 = \alpha M_0$$

$$y_1 - 2y_2 + y_3 = \alpha M_2$$

$$\alpha = 10.28807 \cdot \frac{1}{\text{MN}}$$

M =		0		· kN · m	y =		0		· mm
		0	-21				0	0.00	
		1	0				1	-108.02	
		2	-15				2	0.00	
		3	0				3	-46.30	