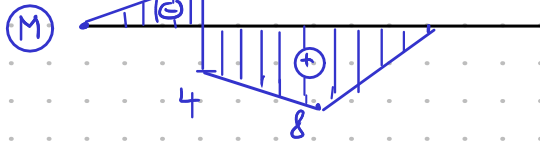
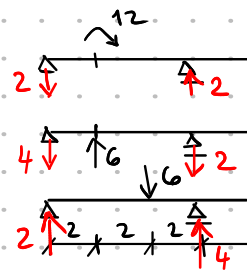


$$w_{\text{el}}, \varphi(x=2) = ?$$

$$[m, kN, kNm]$$



$$\rightarrow \sum M_{\text{el}}^L = 0$$

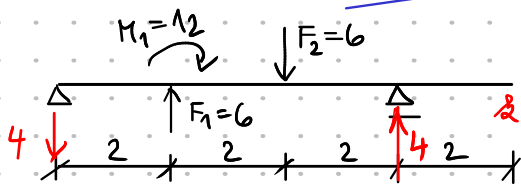
$$R \cdot 6 + \frac{1}{2} \cdot 8 \cdot 2 \cdot \left(\frac{1}{3} \cdot 2 + 4 \right) - \frac{1}{2} \cdot 4 \cdot 2 \cdot \left(\frac{2}{3} \cdot 2 + 2 \right) - \frac{1}{2} \cdot 8 \cdot 2 \cdot \left(\frac{1}{3} \cdot 2 + 2 \right) - \frac{1}{2} \cdot 8 \cdot 2 \cdot \left(\frac{2}{3} \cdot 2 \right) = 0$$

$$R = \frac{8}{6} = \frac{4}{3} \text{ kN} = 1,33 \text{ kN}$$

$$\varphi(x=2) = \frac{\tilde{V}}{EI} = \left[\uparrow \right] = \left(R + \frac{1}{2} \cdot 8 \cdot 2 \right) \cdot \frac{1}{EI} = \frac{9,33}{EI}$$

$$w_{\text{el}} = \frac{\tilde{M}}{EI} = \left[R \cdot 8 + \frac{1}{2} \cdot 8 \cdot 2 \cdot \left(\frac{1}{3} \cdot 2 + 6 \right) - \frac{1}{2} \cdot 4 \cdot 2 \cdot \left(\frac{2}{3} \cdot 2 + 4 \right) - \frac{1}{2} \cdot 8 \cdot 2 \cdot \left(\frac{1}{3} \cdot 2 + 4 \right) - \frac{1}{2} \cdot 8 \cdot 2 \cdot \left(\frac{2}{3} \cdot 2 + 2 \right) \right] \frac{1}{EI}$$

$$w_{\text{el}} = \frac{-21,33}{EI}$$



$$w_{\text{el}}, \varphi(x=2) = ?$$

$$[m, kN, kNm]$$

$$\uparrow \left[M(x) = -4 \cdot x \Big|_{x>2} + 12 + 6 \cdot (x-2) \Big|_{x>4} - 6 \cdot (x-4) \Big|_{x>6} + 4 \cdot (x-6) \right]$$

$$EI w'' = -M(x)$$

$$EI w'' = 4x \Big|_{x>2} - 12 - 6(x-2) \Big|_{x>4} + 6(x-4) \Big|_{x>6} - 4(x-6)$$

$$EI w' = C_1 + 2x^2 \Big|_{x>2} - 12(x-2) - 3(x-2)^2 \Big|_{x>4} + 3(x-4)^2 \Big|_{x>6} - 2(x-6)^2$$

$$EI w = C_2 + C_1 x + \frac{2}{3} x^3 \Big|_{x>2} - 6(x-2)^2 - (x-2)^3 \Big|_{x>4} + (x-4)^3 \Big|_{x>6} - \frac{2}{3} (x-6)^3$$

$$w(x=0) = 0 \Rightarrow C_2 = 0$$

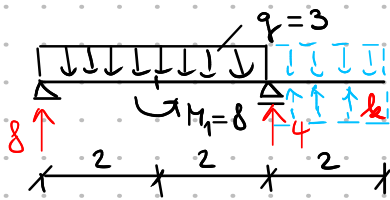
$$w(x=6) = 0 \Rightarrow 6C_1 + \frac{2}{3} 6^3 - 6 \cdot 4^2 - 4^3 + 2^3 = 0 \Rightarrow C_1 = \frac{8}{6} = 1,33$$

$$w'(x) = \varphi = \left[1,33 + 2x^2 \Big|_{x>2} - 12(x-2) - 3(x-2)^2 \Big|_{x>4} + 3(x-4)^2 \Big|_{x>6} - 2(x-6)^2 \right] \cdot \frac{1}{EI}$$

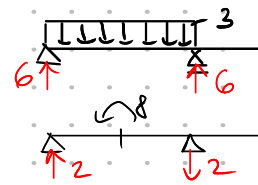
$$w(x) = \left[1,33x + \frac{2}{3} x^3 \Big|_{x>2} - 6(x-2)^2 - (x-2)^3 \Big|_{x>4} + (x-4)^3 \Big|_{x>6} - \frac{2}{3} (x-6)^3 \right] \cdot \frac{1}{EI}$$

$$\varphi(x=2) = \frac{1}{EI} \left[1,33 + 2 \cdot 2^2 \right] = \frac{9,33}{EI}$$

$$w_{\text{el}} = w(x=8) = \left[-1,33 \cdot 8 + \frac{2}{3} \cdot 8^3 - 6 \cdot 6^2 - 6^3 + 4^3 - \frac{2}{3} \cdot 2^3 \right] \frac{1}{EI} = \frac{-21,33}{EI}$$



$$w_R, \varphi(x=2)=?, \\ [m, \text{ kN}, \text{ kNm} | m, \text{ kNm}]$$



$$EI M(x) = 8 \cdot x - 3 \cdot \frac{x^2}{2} \Big|_{x=2} - 8 \Big|_{x=4} + 4(x-4) + 3 \frac{(x-4)^2}{2}$$

$$EI w'' = -M(x)$$

$$EI w'' = -8x + \frac{3}{2}x^2 \Big|_{x=2} + 8 \Big|_{x=4} - 4(x-4) - \frac{3}{2}(x-4)^2$$

$$EI w' = C_1 - 4x^2 + \frac{x^3}{2} \Big|_{x=2} + 8(x-2) \Big|_{x=4} - 2(x-4)^2 - \frac{1}{2}(x-4)^3$$

$$EI w = C_2 + C_1 x - 4 \frac{x^3}{3} + \frac{x^4}{8} \Big|_{x=2} + 4(x-2)^2 \Big|_{x=4} - 2 \frac{(x-4)^3}{3} - \frac{(x-4)^4}{8}$$

$$w(x=0) = 0 \Rightarrow C_2 = 0$$

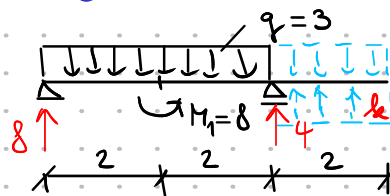
$$w(x=4) = 0 \Rightarrow 4C_1 - \frac{4}{3}4^3 + \frac{4^4}{8} + 4 \cdot 2^2 = 0 \Rightarrow C_1 = 9\sqrt{3}$$

$$\varphi = w'(x) = \left[9\sqrt{3} - 4x^2 + \frac{x^3}{2} \Big|_{x=2} + 8(x-2) \Big|_{x=4} - 2(x-4)^2 - \frac{1}{2}(x-4)^3 \right] \frac{1}{EI}$$

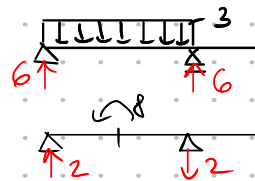
$$w(x) = \left[9\sqrt{3}x - \frac{4}{3}x^3 + \frac{x^4}{8} \Big|_{x=2} + 4(x-2)^2 \Big|_{x=4} - \frac{2}{3}(x-4)^3 - \frac{(x-4)^4}{8} \right] \frac{1}{EI}$$

$$\varphi(x=2) = \left[9\sqrt{3} - 4 \cdot 2^2 + \frac{2^3}{2} \right] \frac{1}{EI} = -\frac{2\sqrt{6}}{EI}$$

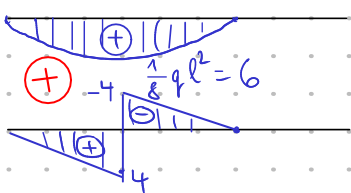
$$w_R = w(x=6) = \left[9\sqrt{3} \cdot 6 - \frac{4}{3}6^3 + \frac{6^4}{8} + 4 \cdot 4^2 - \frac{2}{3}2^3 - \frac{2^4}{8} \right] \frac{1}{EI} = -\frac{13\sqrt{3}}{EI}$$



$$w_R, \varphi(x=2)=?, \\ [m, \text{ kN}, \text{ kNm} | m, \text{ kNm}]$$



(M)



$$\sum M_R = 0$$

$$\textcircled{1} R_1 \cdot 4 - \frac{2}{3} \cdot 4 \cdot 6 \cdot 2 = 0 \Rightarrow R_1 = 8 \text{ kN}$$

$$\textcircled{2} R_2 \cdot 4 - \frac{1}{2} \cdot 4 \cdot 2 \cdot \left(\frac{1}{3}2 + 2\right) + \frac{1}{2} \cdot 4 \cdot 2 \cdot \left(\frac{2}{3}2\right) = 0 \Rightarrow R_2 = 1\sqrt{3} \text{ kN}$$

$$\varphi(x=2) = \frac{\tilde{V}_1 + \tilde{V}_2}{EI} = \frac{1}{EI} \left[R_1 - \frac{2}{3}2 \cdot 6 + R_2 - \frac{1}{2}4 \cdot 2 \right] = -\frac{2\sqrt{6}}{EI}$$

$$w_R = w(x=6) = \frac{\tilde{M}_1 + \tilde{M}_2}{EI} = \frac{1}{EI} \left[R_1 \cdot 6 - \frac{2}{3}6 \cdot 4 \cdot 4 + R_2 \cdot 6 - \frac{1}{2}4 \cdot 2 \cdot \left(\frac{1}{3}2 + 4\right) + \frac{1}{2}4 \cdot 2 \cdot \left(\frac{2}{3}2 + 2\right) \right] = -\frac{13\sqrt{3}}{EI}$$

