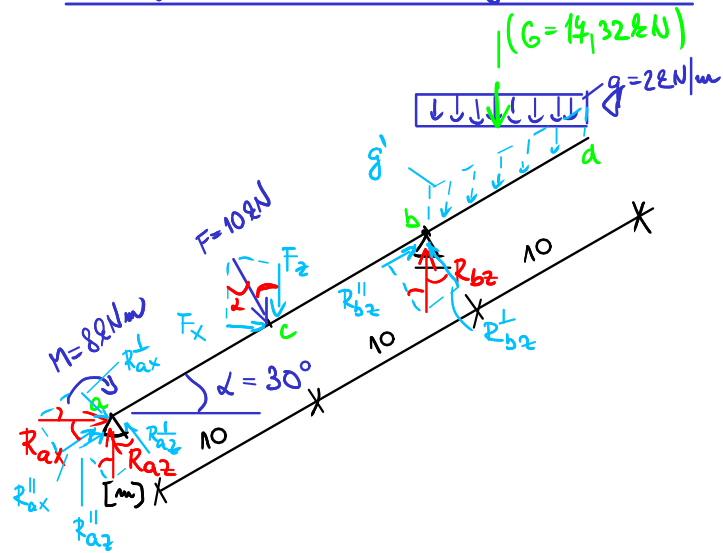


# Šikmý nosník s převislým koncem



## 1) reakce

$$\sum F_{xi} = 0 \quad \oplus \rightarrow$$

$$R_{ax} + F_x = 0 \Rightarrow R_{ax} = -F_x = -5 \text{ kN}$$

$$R_{ax}'' = R_{ax} \cdot \cos \alpha = -4,33 \text{ kN}$$

$$R_{ax}^\perp = R_{ax} \cdot \sin \alpha = -2,5 \text{ kN}$$

$$\sum M_{ai} = 0 \quad \oplus \curvearrowright$$

$$M + F \cdot 10 - R_{bz}^\perp \cdot 20 + Q \cdot 25 = 0 \Rightarrow R_{bz}^\perp = 24,15 \text{ kN}$$

$$R_{bz} = \frac{R_{bz}^\perp}{\cos \alpha} = 27,886 \text{ kN}$$

$$R_{bz}'' = R_{bz} \cdot \sin \alpha = 13,943 \text{ kN}$$

$$\sum M_{bi} = 0 \quad \oplus \curvearrowright$$

$$R_{az}^\perp \cdot 20 - R_{ax}^\perp \cdot 20 + M - F \cdot 10 + Q \cdot 5 = 0 \Rightarrow R_{az}^\perp = -1,65 \text{ kN}$$

$$R_{az} = \frac{R_{az}^\perp}{\cos \alpha} = -1,905 \text{ kN}$$

$$R_{az}'' = R_{az} \cdot \sin \alpha = -0,953 \text{ kN}$$

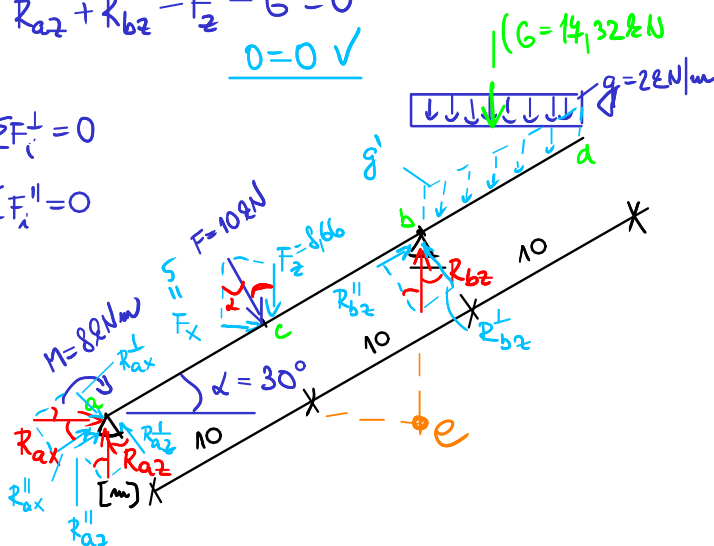
$$\sum F_{zi} = 0 \quad \oplus \uparrow$$

$$R_{az} + R_{bz} - F_z - G = 0$$

$$0 = 0 \quad \checkmark$$

$$\sum F_i^\perp = 0$$

$$\sum F_i'' = 0$$



$$F_x = F \sin \alpha = 5 \text{ kN}$$

$$F_z = F \cos \alpha = 8,66 \text{ kN}$$

• rozklad spojitého zatížení'

$$g' = g \cos \alpha = 1,732 \text{ kN/m}$$

$$G' = g' \cdot 10 = 17,32 \text{ kN} = G$$

$$n = g \cdot \sin \alpha \cos \alpha = 0,866 \text{ kN/m}$$

$$q = g \cos^2 \alpha = 1,5 \text{ kN/m}$$

$$N = n \cdot 10 = 8,66 \text{ kN}$$

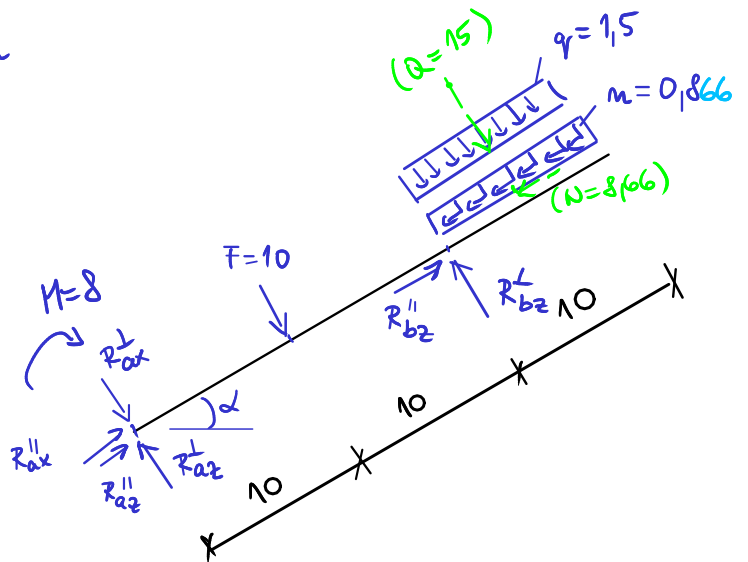
$$Q = q \cdot 10 = 15 \text{ kN}$$

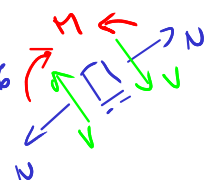
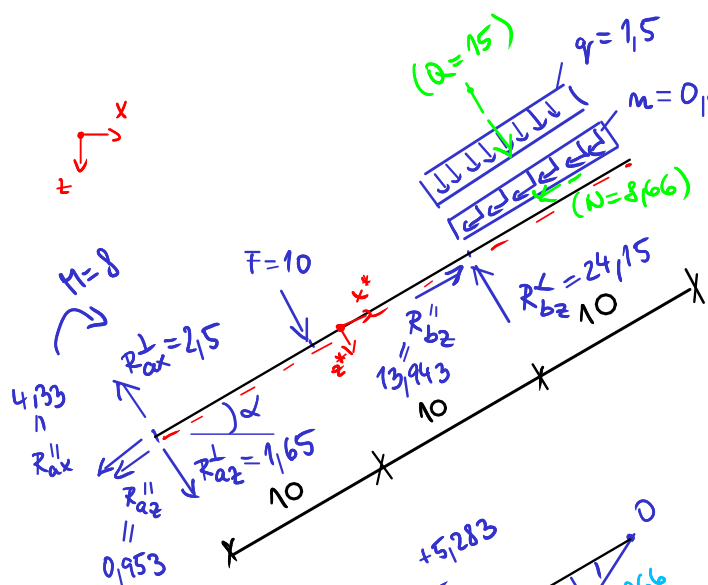
• rozklady reakcí

$$R_{ax}'' = R_{ax} \cos \alpha \quad R_{az}^\perp = R_{az} \cos \alpha$$

$$R_{ax}^\perp = R_{ax} \sin \alpha \quad R_{az}'' = R_{az} \sin \alpha$$

$$R_{bz}^\perp = R_{bz} \cos \alpha \quad R_{bz}'' = R_{bz} \sin \alpha$$



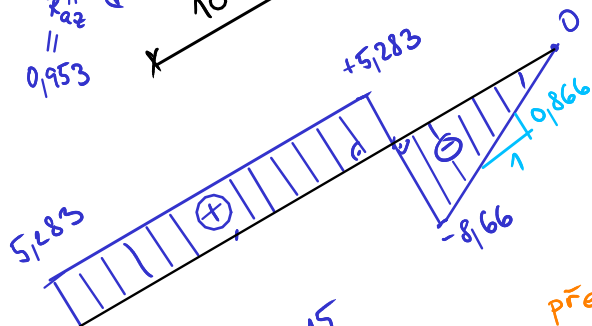


$$\frac{dN}{dx} = -n \quad \text{der } N \downarrow \text{int}$$

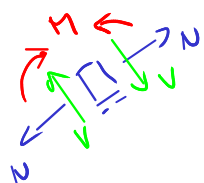
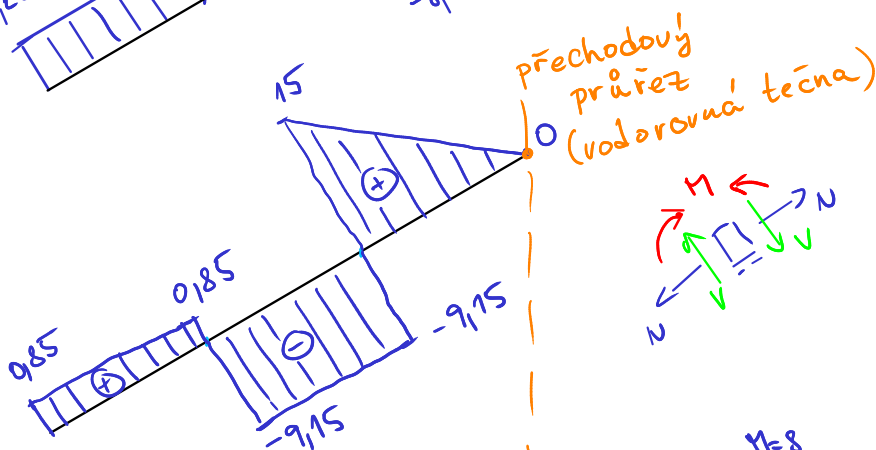
$$\frac{dV}{dx} = -q \quad \text{der } V \downarrow \text{int}$$

$$\frac{dN}{dx} = -n = -(-0.866) = 0.866$$

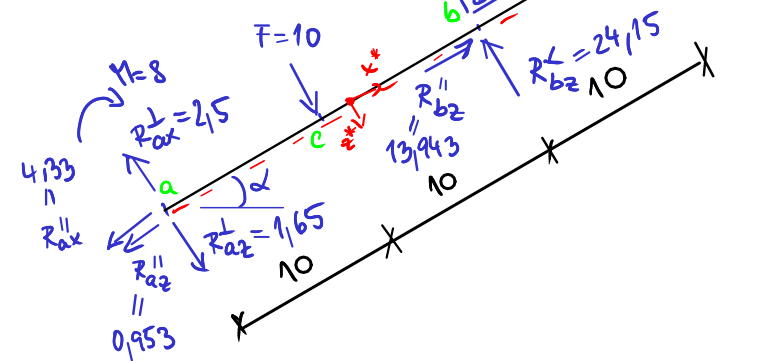
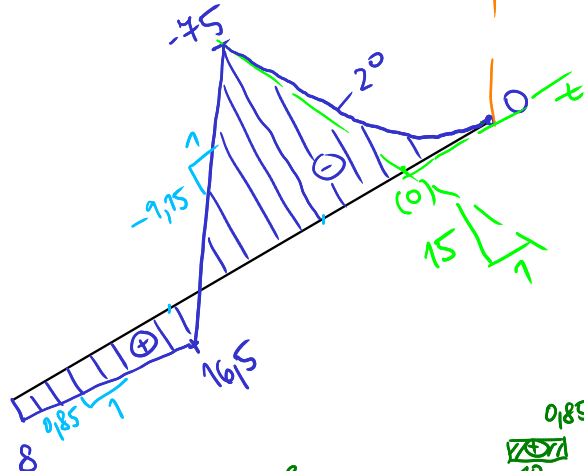
(N)



(V)



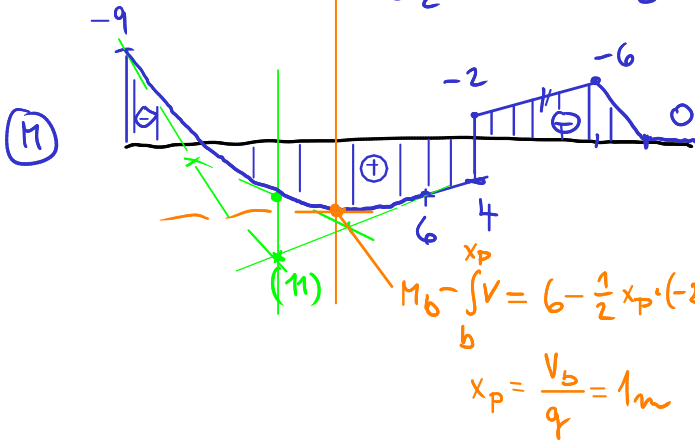
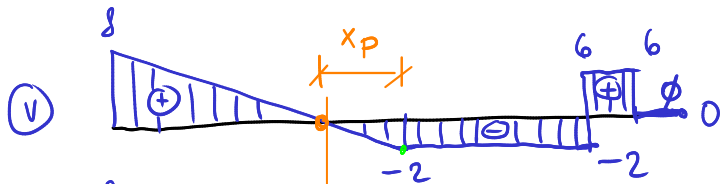
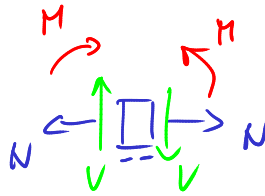
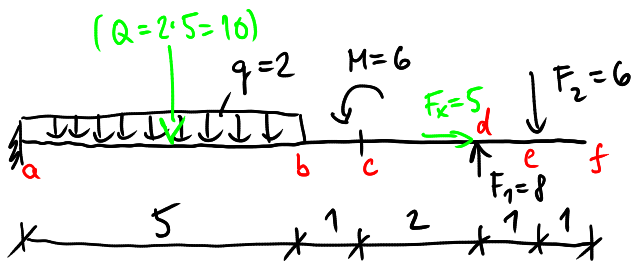
(M)



$$\frac{dM}{dx} = V = -9.15$$

$$M_c = M_a + \int_a^c V dx = 8 + 0.85 \cdot 10 = 16.5 \text{ kNm}$$

$$M_b = M_d - \int_d^b V dx = 0 - \frac{1}{2} \cdot 10 \cdot 15 = -75 \text{ kNm}$$



$$M_f = 0$$

$$M_e = 0$$

$$M_d = -F_2 \cdot 1 = -6 \text{ kNm}$$

$$M_{cd} = -F_2 \cdot 3 + F_1 \cdot 2 = -2 \text{ kNm}$$

$$M_{cb} = \text{---} \text{---} + M = 4 \text{ kNm}$$

$$M_b = -F_2 \cdot 4 + F_1 \cdot 3 + M = 6 \text{ kNm}$$

$$M_a = -F_2 \cdot 9 + F_1 \cdot 8 + M - Q \cdot 2.5 = -9 \text{ kNm}$$