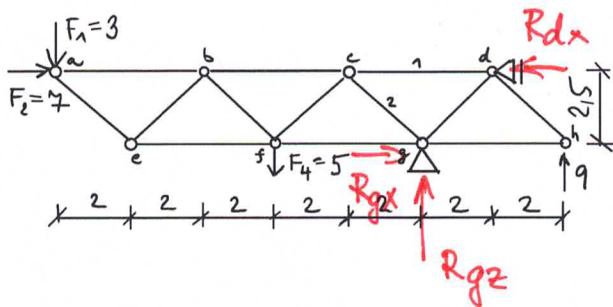




[kN, m]

Vypočítejte složky vnějších reakcí a osově síly v prutech 1 a 2 průsečnou metodou v Ritterově úpravě. Rozkreslete potřebné řezy a rozepište postupy včetně dosazení.

$$\sum M_{ig} = 0 \quad \oplus: -F_2 \cdot 2,5 + F_1 \cdot 10 + F_4 \cdot 4 + R_{dx} \cdot 2,5 + 9 \cdot 4 = 0$$

$$R_{dx} = \frac{7 \cdot 2,5 - 3 \cdot 10 - 5 \cdot 4 - 9 \cdot 4}{2,5} = \underline{\underline{-27,4 \text{ kN}}} \quad (\rightarrow)$$

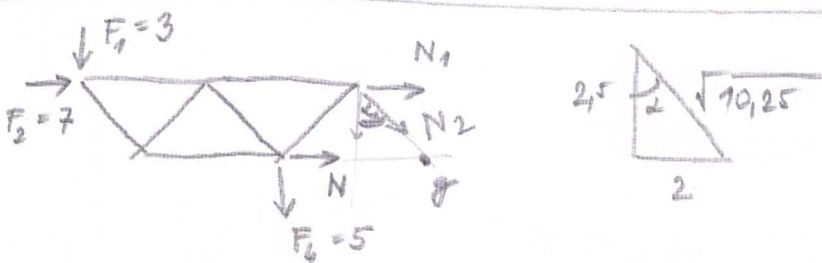
$$\sum F_{ic-d} = 0 \quad \oplus: F_1 \cdot 10 + F_4 \cdot 4 + R_{gx} \cdot 2,5 + 9 \cdot 4 = 0$$

$$R_{gx} = \frac{-3 \cdot 10 - 5 \cdot 4 - 9 \cdot 4}{2,5} = \underline{\underline{-34,4 \text{ kN}}} \quad (\leftarrow)$$

$$\sum F_{ix} = 0: 7 + 27,4 - 34,4 = 0 \quad \checkmark$$

$$\sum F_{iz} = 0: R_{gz} + 9 - F_4 - F_1 = 0$$

$$R_{gz} = -9 + 5 + 3 = \underline{\underline{-1 \text{ kN}}} \quad (\downarrow)$$



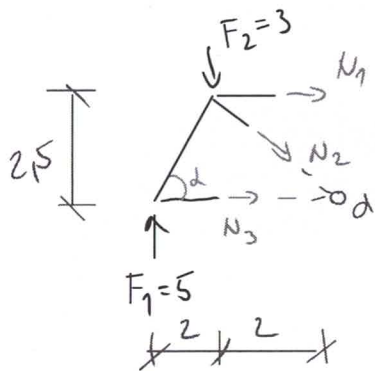
$$\sum M_{ig} = 0 \quad \oplus: -N_1 \cdot 2,5 + F_4 \cdot 4 + F_1 \cdot 10 - F_2 \cdot 2,5 = 0$$

$$N_1 = \frac{5 \cdot 4 + 3 \cdot 10 - 7 \cdot 2,5}{2,5} = \underline{\underline{13 \text{ kN}}} \quad (\text{TAH})$$

$$\sum F_{iz} = 0: F_1 + F_4 + N_{2z} = 0$$

$$F_1 + F_4 + N_2 \cdot \cos \alpha = 0$$

$$N_2 = \frac{-3 - 5}{\frac{2,5}{\sqrt{10,25}}} = \underline{\underline{-19,245 \text{ kN}}} \quad (\text{TLAK})$$



$$\sum m_{di} = 0 \quad (+) \downarrow$$

$$F_1 \cdot 4 - F_2 \cdot 2 + N_1 \cdot 2,5 = 0$$

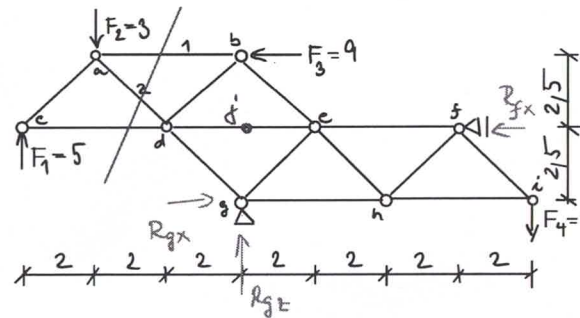
$$N_1 = \frac{-5.4 + 3 \cdot 2}{2.5} = -5.6 \text{ kN}$$

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

$$-F_1 + F_2 + N_2 z = 0$$

$$N_{2z} = F_1 - F_2 = 5 - 3 = 2 \text{ kN}$$

$$N_2 = \frac{N_{2z}}{\sin \theta} = \underline{\underline{2156.12 \text{ N}}}$$



[kN, m]

Vypočítejte složky vnějších reakcí a osově síly v prutech 1 a 2 průsečnou metodou v Ritterově úpravě. Rozkreslete potřebné řezy a rozepište postupy včetně dosazení.

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

$$F_1 - F_2 + R_{gz} - F_4 = 0 \quad R_{gz} = F_4 + F_2 - F_1 = 4 + 3 - 5 = \underline{5 \text{ kN}}$$

$$\Sigma M_g = 0 \oplus 7$$

$$-F_1 \cdot 6 + F_2 \cdot 4 + F_3 \cdot 5 + R_{gx} \cdot 2,5 - F_4 \cdot 8 = 0$$

$$R_{gx} = \frac{5 \cdot 6 - 3 \cdot 4 - 9 \cdot 5 + 7 \cdot 8}{215} = \underline{11,6 \text{ kN}}$$

$$\sum n_{ji} = 0 \quad (+) \quad \text{⑤}$$

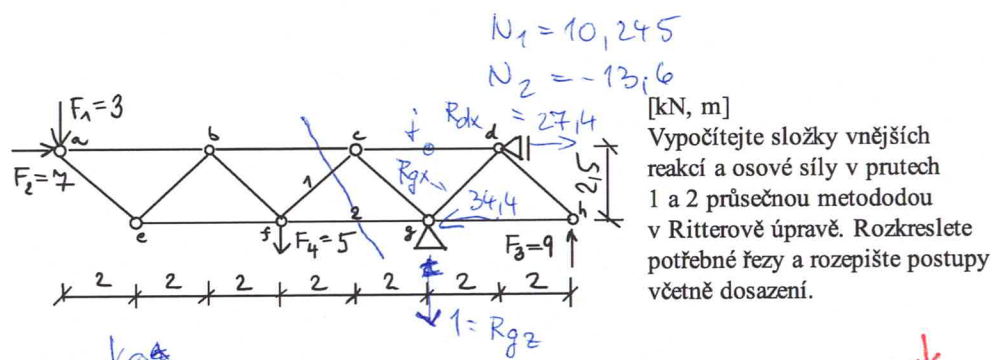
$$-F_1 \cdot 6 + F_2 \cdot 4 + R_{gx} \cdot 2.5 + F_3 \cdot 2.5 - F_4 \cdot 8 = 0$$

$$R_{gx} = \frac{5.6 - 3.4 - 9.25 + 7.8}{2.5} = \underline{\underline{20.62 \text{ N}}}$$

$$\sum F_{xi} = 0 \quad (+) \rightarrow$$

$$R_{gx} - F_3 - R_{fx} = 0 \quad 20,6 - 9 - 11,6 = 0 \checkmark$$

$$\sin \alpha = \frac{2,5}{\ell} = \frac{2,5}{\sqrt{2^2 + 2,5^2}} = 0,7808688$$



$$\sum F_{zi} = 0: F_1 + R_{gz} - F_3 + F_4 = 0: R_{gz} = 9 - 3 - 5 = 1 \text{ kN} (\downarrow)$$

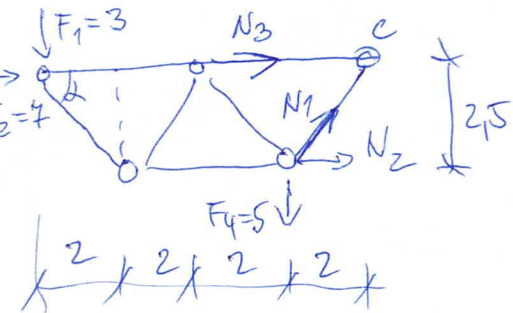
$$\sum M_{gi} = 0: -F_1 \cdot 10 + F_2 \cdot 2,5 - F_4 \cdot 4 + R_{dx} \cdot 2,5 - F_3 \cdot 4 = 0$$

$$R_{dx} = \frac{3 \cdot 10 - 7 \cdot 2,5 + 5 \cdot 4 + 9 \cdot 4}{2,5} = 27,4 \text{ kN} (\rightarrow)$$

$$\sum M_{ji} = 0: -F_1 \cdot 10 - F_4 \cdot 4 + R_{gx} \cdot 2,5 - F_3 \cdot 4 = 0$$

$$R_{gx} = \frac{3 \cdot 10 + 5 \cdot 4 + 9 \cdot 4}{2,5} = 34,4 \text{ kN} (\leftarrow)$$

$$\sum F_{xi} = 0: F_2 - R_{gx} + R_{dx} = 0: 7 - 34,4 + 27,4 = 0 \checkmark$$



$$\sum M_{ci} = 0: N_2 \cdot 2,5 + F_4 \cdot 2 + F_1 \cdot 8 = 0$$

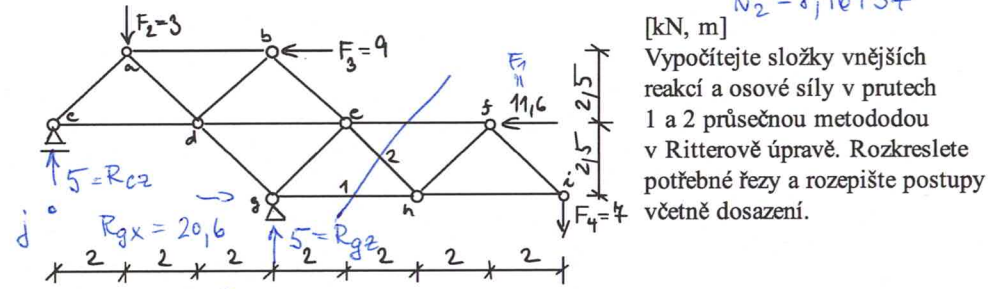
$$N_2 = \frac{-5 \cdot 2 - 3 \cdot 8}{2,5} = -13,6 \text{ kN} (\text{TLAK})$$

$$\sum M_{\infty} = 0 \Rightarrow \sum F_{zi} = 0: -F_1 + N_{12} - F_4 = 0$$

$$N_{12} = F_1 + F_4 = 3 + 5 = 8 \text{ kN}$$

$$N_1 = \frac{8}{\sin \alpha} = 10,245 \text{ kN} (\text{TÁH})$$

$$\sin \alpha = \frac{2,5}{\sqrt{2^2 + 2,5^2}}$$



$$\sum F_{xi} = 0: R_{gx} - F_3 - F_1 = 0 \rightarrow R_{gx} = 9 + 11,6 = 20,6 \text{ kN} (\rightarrow)$$

$$\sum M_{gi} = 0: R_{cz} \cdot 6 - F_2 \cdot 4 - F_3 \cdot 5 - F_1 \cdot 2,5 + F_4 \cdot 8 = 0$$

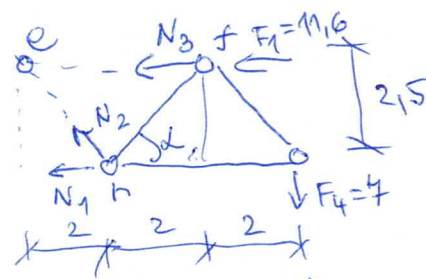
$$R_{cz} = \frac{3 \cdot 4 + 9 \cdot 5 + 11,6 \cdot 2,5 - 7 \cdot 8}{6} = 5 \text{ kN} (\uparrow)$$

$$\sum M_{ji} = 0: -F_2 \cdot 2 + F_3 \cdot 5 + F_1 \cdot 2,5 + R_{gz} \cdot 6 - F_4 \cdot 4 = 0$$

$$R_{gz} = \frac{3 \cdot 2 - 9 \cdot 5 - 11,6 \cdot 2,5 + 7 \cdot 4}{6} = 5 \text{ kN} (\uparrow)$$

$$\sum F_{zi} = 0: R_{cz} - F_2 + R_{gz} - F_4 = 0$$

$$5 - 3 + 5 - 7 = 0 \checkmark$$



$$\sum M_{ci} = 0: N_1 \cdot 2,5 + F_4 \cdot 2 = 0$$

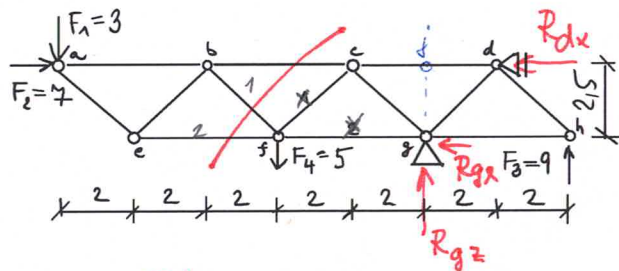
$$N_1 = \frac{-7 \cdot 2}{2,5} = -16,8 \text{ kN} (\text{TLAK})$$

$$\sum F_{zi} = 0: N_{2z} - F_4 = 0$$

$$N_{2z} = F_4 = 7$$

$$N_2 = \frac{7}{\sin \alpha} = \frac{7 \cdot \sqrt{2^2 + 2,5^2}}{2,5} = 8,96437 \text{ kN} (\text{TÁH})$$

$$\sin \alpha = \frac{2,5}{\sqrt{2^2 + 2,5^2}}$$



[kN, m]
Vypočítejte složky vnějších reakcí a osově síly v prutech 1 a 2 průsečnou metodou v Ritterově úpravě. Rozkreslete potřebné řezy a rozepište postupy včetně dosazení.

$$\sum F_{xi} = 0 \oplus \rightarrow R_{gx} + F_3 - F_4 - F_1 = 0$$

$$R_{gx} = -9 + 5 + 3 = -1 \text{ kN}$$

$$\sum M_{gi} = 0 \oplus \rightarrow F_1 \cdot 10 - F_2 \cdot 2,5 + F_4 \cdot 4 + R_{dx} \cdot 2,5 + F_3 \cdot 4 = 0$$

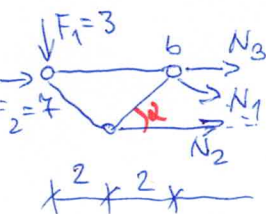
$$R_{dx} = \frac{-3 \cdot 10 + 7 \cdot 2,5 - 5 \cdot 4 - 9 \cdot 4}{2,5} = -27,4 \text{ kN}$$

$$\sum M_{ji} = 0 \oplus \rightarrow -F_1 \cdot 10 - F_4 \cdot 4 + R_{gx} \cdot 2,5 - F_3 \cdot 4 = 0$$

$$R_{gx} = \frac{3 \cdot 10 + 5 \cdot 4 + 9 \cdot 4}{2,5} = 34,4 \text{ kN}$$

kontrola: $\sum F_{xi} = 0 \oplus \rightarrow$

$$F_2 - R_{gx} - R_{dx} = 0 \quad 7 - 34,4 - (-27,4) = 0 \quad \checkmark$$



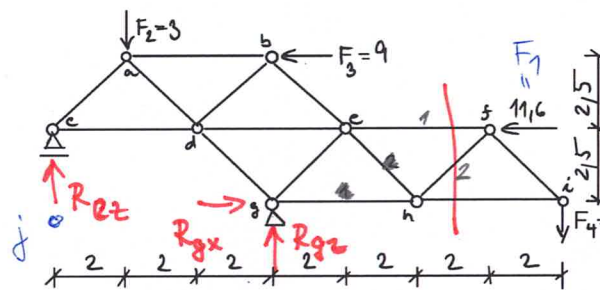
$$\sum M_{bi} = 0 \oplus \rightarrow N_2 \cdot 2,5 + F_1 \cdot 4 = 0$$

$$N_2 = -\frac{3 \cdot 4}{2,5} = -4,8 \text{ kN}$$

$\sum F_{zi} = 0 \oplus \downarrow$

$$F_1 + N_{1z} = 0 \quad N_{1z} = -F_1 \quad N_{1z} = N_1 \sin \alpha$$

$$N_1 = \frac{-3 \sqrt{2^2 + 2,5^2}}{2,5} = -3,842 \text{ kN (tlak)}$$



[kN, m]
Vypočítejte složky vnějších reakcí a osově síly v prutech 1 a 2 průsečnou metodou v Ritterově úpravě. Rozkreslete potřebné řezy a rozepište postupy včetně dosazení.

$$\sum F_{xi} = 0 \oplus \rightarrow R_{gx} - F_3 - F_1 = 0 \Rightarrow R_{gx} = 9 + 11,6 = 20,6 \text{ kN}$$

$$\sum M_{gi} = 0 \oplus \rightarrow R_{cz} \cdot 6 - F_2 \cdot 4 - F_3 \cdot 5 - F_1 \cdot 2,5 + F_4 \cdot 8 = 0$$

$$R_{cz} = \frac{3 \cdot 4 + 9 \cdot 5 + 11,6 \cdot 2,5 - 7 \cdot 8}{6} = 5 \text{ kN}$$

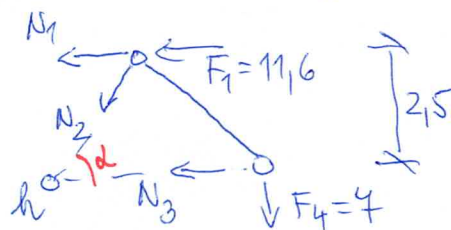
$$\sum M_{ji} = 0 \oplus \rightarrow -F_2 \cdot 2 + F_3 \cdot 5 + F_1 \cdot 2,5 + R_{gz} \cdot 6 - F_4 \cdot 14 = 0$$

$$R_{gz} = \frac{3 \cdot 2 - 9 \cdot 5 - 11,6 \cdot 2,5 + 7 \cdot 14}{6} = 5 \text{ kN}$$

kontrola: $\sum F_{zi} = 0 \oplus \uparrow$

$$-F_2 + R_{cz} + R_{gz} - F_4 = 0$$

$$-3 + 5 + 5 - 7 = 0 \quad \checkmark$$



$$\sum M_{hi} = 0 \oplus \rightarrow N_1 \cdot 2,5 - F_4 \cdot 4 = 0$$

$$N_1 = \frac{7 \cdot 4 - 11,6 \cdot 2,5}{2,5} = -9,4 \text{ kN (tlak)}$$



$$\sum F_{zi} = 0 \oplus \downarrow \quad F_4 + N_{2z} = 0 \quad N_{2z} = N_2 \sin \alpha$$

$$N_2 = \frac{-F_4}{\sin \alpha} = \frac{-4 \cdot \sqrt{2^2 + 2,5^2}}{2,5} = -8,964 \text{ kN (tlak)}$$