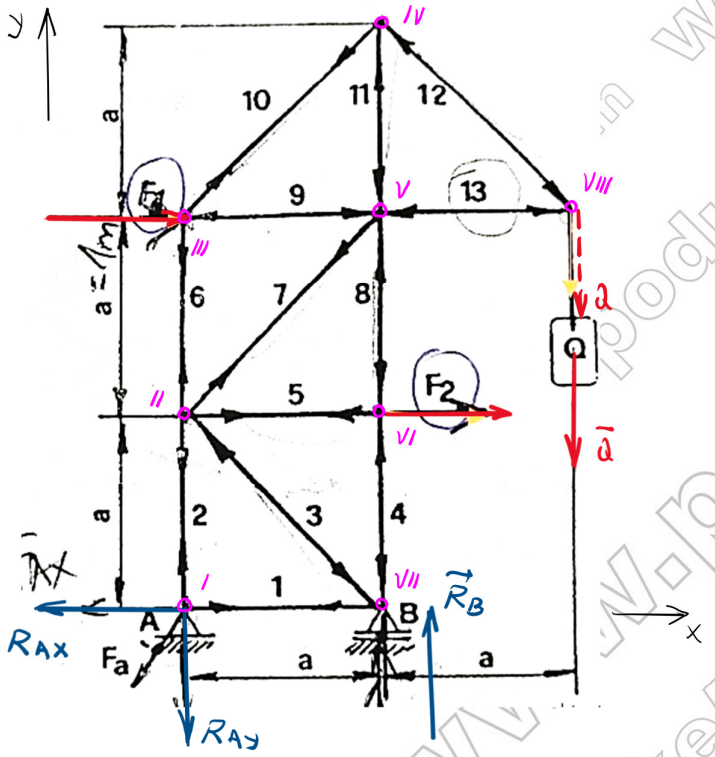
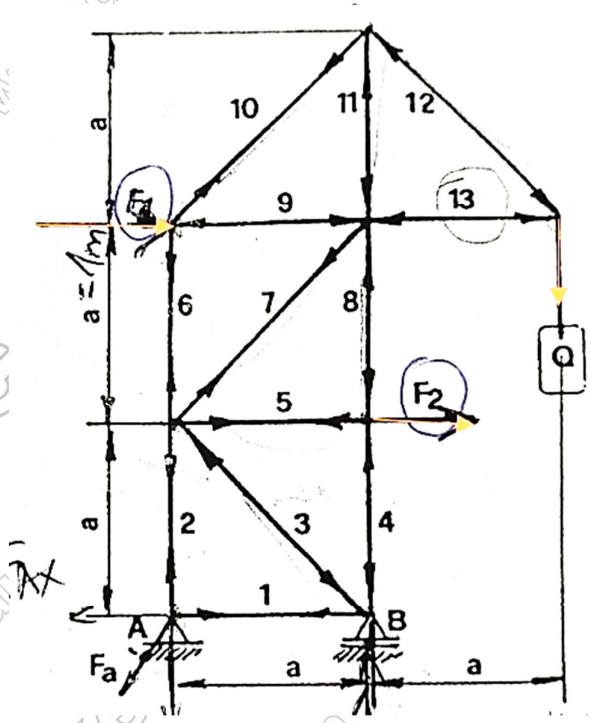
rešetkasti nosač djeluju dvije jednake sile: $F_1 = F_2 = 500$ N i teret težine Q
). Odredite otpore oslonaca u A i B i unutarnje sile u štapovima nosača, al

$Q = 100 \cdot X$, $X = 18 \Rightarrow Q = 1800$ N, $F_1 = 500$ N, $F_2 = 500$ N, $a = 1$ m

1. Reakcije oslonaca





3 NV: R_{AX}, R_{AY}, R_B

3 JR: 1) $\sum M_A = 0$ $R_B = \dots$

2) $\sum M_B = 0$ $R_{AY} = \dots$

3) $\sum F_{ix} = 0$ $R_{AX} = \dots$

1) $\sum M_A = 0$

$-F_1 \cdot 2a - F_2 \cdot a + R_B \cdot a - Q \cdot 2a = 0$ (1) $| : a$

$R_B = 2F_1 + F_2 + 2Q$

$R_B = 2 \cdot 500 + 500 + 2 \cdot 1800$

$R_B = 5\,100\ N$

2) $\sum M_B = 0$

$R_{Ay} \cdot a - F_1 \cdot 2a - F_2 \cdot a - Q \cdot a = 0 \mid :a \quad (2)$

$R_{Ay} = 2F_1 + F_2 + Q$

$R_{Ay} = 2 \cdot 500 + 500 + 1\,800$

$R_{Ay} = 3\,300\ N$

3) $\sum F_{ix} = 0$

$-R_{Ax} + F_1 + F_2 = 0 \quad (3)$

$R_{Ax} = F_1 + F_2$

$R_{Ax} = 500 + 500$

$R_{Ax} = 1\,000\ N$

2. Provjera ispravnosti reakcija oslonaca

$\sum F_{iy} = 0$

$-R_{Ay} + R_B - Q = 0 \quad (4)$

$-3\,300 + 5\,100 - 1\,800 = 0$

$5\,100 - 5\,100 = 0$

$0 = 0$

Reakcije su točne.

3. Otpor u osloncu A, RA

$R_{Ax} \perp R_{Ay} \Rightarrow R_A = \sqrt{R_{Ax}^2 + R_{Ay}^2} \ [N] \quad (5)$

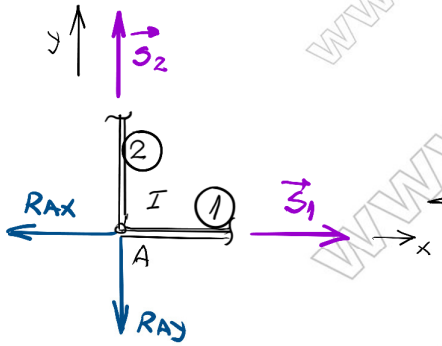
$R_A = \sqrt{1000^2 + 3300^2}$

$R_A = 3\,448,19\ N$

S_1	S_2	S_3	S_4	S_5	S_6	S_7	S_8	S_9	S_{10}	S_{11}	S_{12}	S_{13}
V	V	V	V	V	V	V	V	V	V	V	V	V

4. Sile u štapovima

1) Ravnoteža čvora I



1) $\sum F_{ix} = 0$

$S_1 - R_{AX} = 0 \quad (6)$

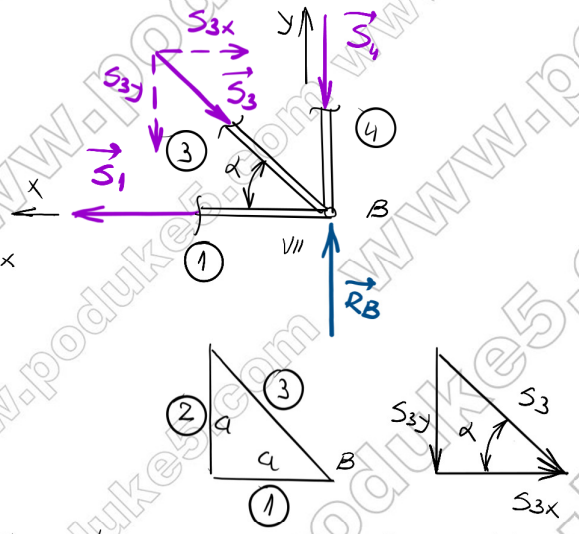
$S_1 = 1\,000\ N$ (vlačna sila)

2) $\sum F_{iy} = 0$

$S_2 - R_{AY} = 0 \quad (7)$

$S_2 = 3\,300\ N$ (VS)

2) Ravnoteža čvora VII



$tg\alpha = \frac{a}{a} \quad (8)$

$\alpha = 45°$

1) $\sum F_{ix} = 0$

$S_1 - S_{3x} = 0 \quad (9)$

$S_{3x} = S_3 \cdot \cos\alpha$

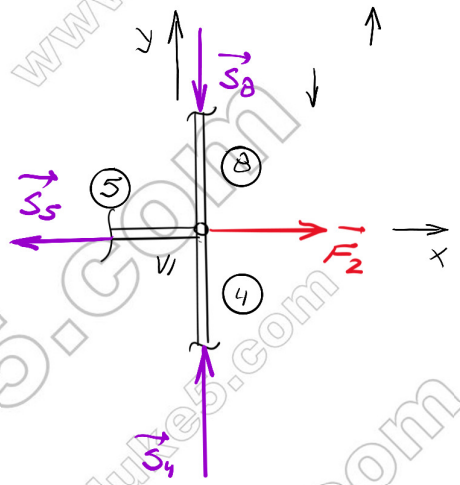
$S_1 = S_3 \cos\alpha \quad | : \cos\alpha$

$S_3 = \frac{S_1}{\cos\alpha} \quad (10)$

$S_3 = \frac{1\,000}{\cos 45°}$

$S_3 = 1\,414,21\ N$ (Tlačna sila)

3) Ravnoteža čvora VI



2) $\sum F_{iy} = 0$

$R_B - S_4 - S_{3y} = 0 \quad (11)$

$S_{3y} = S_3 \cdot \sin\alpha \quad (12)$

$S_4 = R_B - S_3 \cdot \sin\alpha \quad (13)$

$S_4 = 5\,100 - 1414,21 \cdot \sin 45°$

$S_4 = 4\,100,00\ N$ (TS)

1) $\sum F_{ix} = 0$

$F_2 - S_5 = 0 \quad (13)$

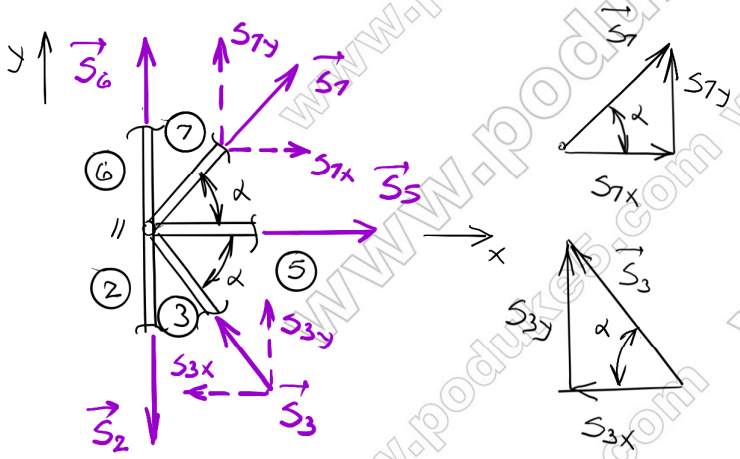
$S_5 = 500\ N$ (VS)

2) $F_{iy} = 0$

$S_4 - S_8 = 0 \quad (14)$

$S_8 = 4\,100,00\ N$ (TS)

4) Ravnoteža čvora II



1) $\sum F_{ix} = 0$

$S_5 + S_{7x} - S_{3x} = 0 \quad (15)$

$S_{7x} = S_7 \cos\alpha \quad (16)$

$S_{3x} = S_3 \cdot \cos\alpha \quad (17)$

$S_5 + S_7 \cos\alpha - S_3 \cos\alpha = 0$

$S_7 \cos\alpha = S_3 \cos\alpha - S_5 \quad | : \cos\alpha$

$S_7 = S_3 - \frac{S_5}{\cos\alpha}$

$S_7 = 1414{,}21 - \frac{500}{\cos 45°}$

$S_7 = 707{,}10\ N \ (VS)$

2) $\sum F_{iy} = 0$

$S_6 - S_2 + S_{7y} + S_{3y} = 0 \quad (18)$

$S_{7y} = S_7 \cdot \sin\alpha$

$S_{3y} = S_3 \cdot \sin\alpha$

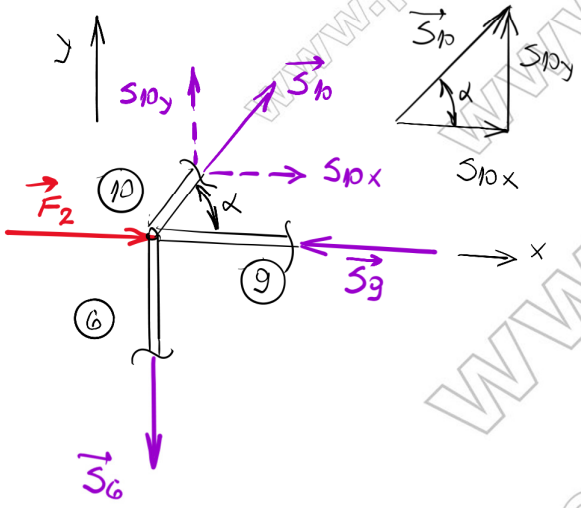
$S_6 - S_2 + S_7 \sin\alpha + S_3 \sin\alpha = 0$

$S_6 = S_2 - S_7 \cdot \sin\alpha - S_3 \sin\alpha$

$S_6 = 3300 - \sin 45° \cdot (707{,}1 + 1414{,}21)$

$S_6 = 1800{,}00\ N \ (VS)$

5) Ravnoteža čvora III



1) $\sum F_{ix} = 0$

$F_2 - S_9 + S_{10x} = 0 \quad (19)$

$S_{10x} = S_{10} \cdot \cos\alpha \quad (20)$

$F_2 - S_9 + S_{10} \cdot \cos\alpha = 0$

$S_9 = F_2 + S_{10} \cdot \cos\alpha \quad (23)$

$S_9 = 500 + 2545{,}58 \cdot \cos 45°$

$S_9 = 2300\ N \ (TS)$

2) $\sum F_{iy} = 0$

$S_{10y} - S_6 = 0 \quad (21)$

$S_{10y} = S_{10} \cdot \sin\alpha \quad (22)$

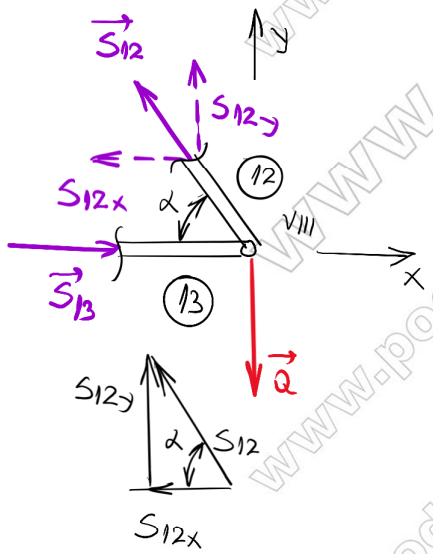
$S_{10} \cdot \sin\alpha = S_6 \quad | : \sin\alpha$

$S_{10} = \frac{S_6}{\sin\alpha} \quad (23)$

$S_{10} = \frac{1800}{\sin 45°}$

$S_{10} = 2545{,}58\ N \ (VS)$

6) Ravnoteža čvora VIII



1) $\Sigma F_{ix} = 0$

$S_{13} - S_{12x} = 0 \quad (24)$

$S_{12x} = S_{12} \cdot \cos\alpha \quad (25)$

$S_{13} = S_{12} \cdot \cos\alpha \quad (26)$

$S_{13} = 2545{,}58 \cdot \cos 45°$

$S_{13} = 1800\,N \quad (T5)$

2) $\Sigma F_{iy} = 0$

$S_{12y} - Q = 0 \quad (27)$

$S_{12y} = S_{12} \cdot \sin\alpha \quad (28)$

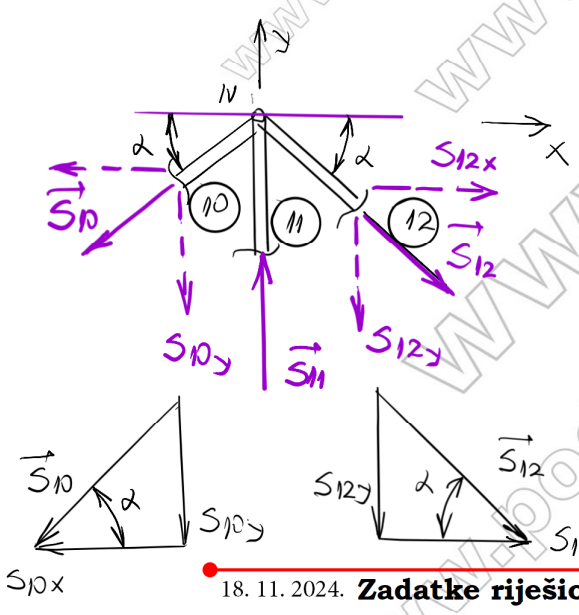
$Q = S_{12} \cdot \sin\alpha \mid : \sin\alpha$

$S_{12} = \frac{Q}{\sin\alpha} \quad (29)$

$S_{12} = \frac{1800}{\sin 45°}$

$S_{12} = 2545{,}58\,N \quad (V5)$

7) Ravnoteža čvora IV



Od ranije izračunato:

$S_{10} = 2545{,}58\,N \quad (V5)$

$S_{12} = 2545{,}58\,N \quad (V5)$ $\Rightarrow$

$\Sigma F_{iy} = 0$

$S_{11} - S_{12y} - S_{10y} = 0 \quad (31)$

$S_{10y} = S_{10} \cdot \sin\alpha \quad (32)$

$S_{12y} = S_{12} \cdot \sin\alpha \quad (33)$

Provjera sila u štapovima:

$\Sigma F_{ix} = 0$

$S_{12} \cdot \cos\alpha - S_{10} \cdot \cos\alpha = 0 \quad (30)$

Ispunjeno $\Rightarrow$ sile u štapovima su točne

$S_{11} = S_{12}\sin\alpha + S_{10}\cdot\sin\alpha$

$S_{11} = 2\,545{,}58\cdot\sin 45° + 2\,545{,}58\cdot\sin 45°$

$S_{11} = 3600\,N\ (TS)$