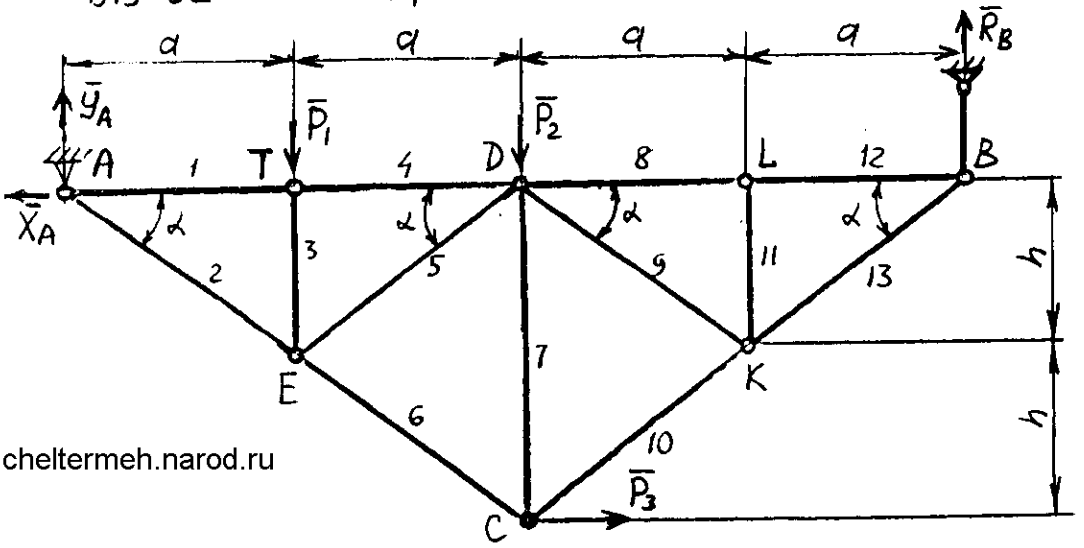
В13 С2 $P_1 = 4$ кН $P_2 = 6$ кН $P_3 = 2$ кН $a = 4{,}8$ м $h = 3{,}6$ м / S_4, S_5, S_{10} - ?



$AC = \sqrt{(2a)^2 + (2h)^2} = \sqrt{(2 \cdot 4{,}8)^2 + (2 \cdot 3{,}6)^2} = 12$ м

$\sin\alpha = \frac{2h}{AC} = \frac{2 \cdot 3{,}6}{12} = 0{,}6$

$\cos\alpha = \frac{2a}{AC} = \frac{2 \cdot 4{,}8}{12} = 0{,}8$

1. *Реакции опор фермы.*

$\Sigma X_i = 0$: $-X_A + P_3 = 0$ $\quad X_A = P_3 = 2$ кН

$\Sigma M_{iA} = 0$: $-P_1 \cdot a - P_2 \cdot 2a + R_B \cdot 4a + P_3 \cdot 2h = 0$

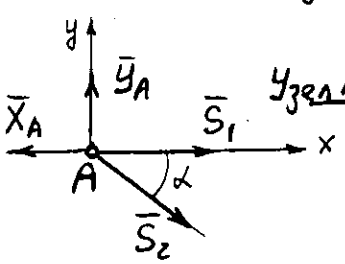
$R_B = \frac{1}{4}\left(P_1 + 2 \cdot P_2 - 2P_3 \frac{h}{a}\right) = \frac{1}{4}\left(4 + 2 \cdot 6 - 2 \cdot 2 \cdot \frac{3{,}6}{4{,}8}\right) = 3{,}25$ кН

$\Sigma y_i = 0$: $R_B + y_A - P_1 - P_2 = 0$ $\quad y_A = P_1 + P_2 - R_B = 4 + 6 - 3{,}25 = 6{,}75$ кН

Проверка: $\Sigma M_{iB} = -y_A \cdot 4a + P_1 \cdot 3a + P_2 \cdot 2a + P_3 \cdot 2h = a\left(-4 \cdot y_A + 3 \cdot P_1 + 2 \cdot P_2 + 2P_3 \frac{h}{a}\right) =$

$= a \cdot \left(-4 \cdot 6{,}75 + 3 \cdot 4 + 2 \cdot 6 + 2 \cdot 2 \cdot \frac{3{,}6}{4{,}8}\right) = 0$

г. *Метод вырезания узлов для определения усилий в стержнях*

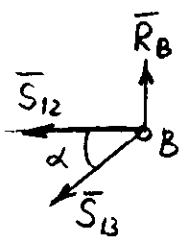


Узел A: $\Sigma y_i = 0$: $y_A - S_2 \cdot \sin\alpha = 0$

$S_2 = \frac{y_A}{\sin\alpha} = \frac{6{,}75}{0{,}6} = 11{,}25$ кН

$\Sigma X_i = 0$: $S_1 + S_2 \cdot \cos\alpha - X_A = 0$

$S_1 = X_A - S_2 \cdot \cos\alpha = 2 - 11{,}25 \cdot 0{,}8 = -7$ кН

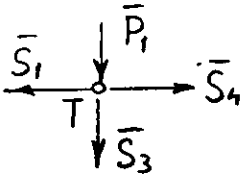


Узел B: $\Sigma y_i = 0$: $R_B - S_{13} \cdot \sin\alpha = 0$

$S_{13} = \frac{R_B}{\sin\alpha} = \frac{3{,}25}{0{,}6} = 5{,}417$ кН

$\Sigma X_i = 0$: $-S_{12} - S_{13} \cdot \cos\alpha = 0$

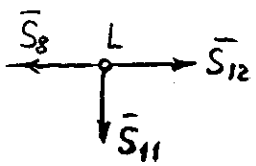
$S_{12} = -S_{13} \cdot \cos\alpha = -5{,}417 \cdot 0{,}8 = -4{,}333$ кН



Узел T: $\Sigma X_i = 0$: $-S_1 + S_4 = 0$

$S_4 = S_1 = -7$ кН

$\Sigma y_i = -P_1 - S_3 = 0$ $\quad S_3 = -P_1 = -4$ кН



Узел L: $\Sigma X_i = 0$: $S_{12} - S_8 = 0$

$S_8 = S_{12} = -4{,}333$ кН

$\Sigma y_i = 0$: $S_{11} = 0$