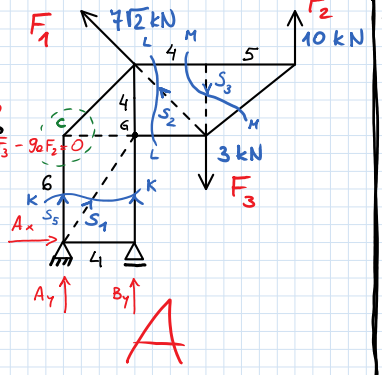
KRATOWNICE - KARTKÓWKA_1_2016

piątek, 18 marca 2016 10:22



$A_x - F_{1x} = 0$

$A_y + B_y + F_{1y} + F_2 - F_3 = 0$

$\Sigma M^B: A_y \cdot 4a - 10a F_{1x} + 4a F_3 - 9a F_2 = 0$

$A_x = F_{1x} = 7\,kN$

$4A_y = 10F_{1x} - 4F_3 + 9F_2$

$4A_y = 70 - 12 + 90$

$4A_y = 148$

$A_y = 148/4 = 37\ kN$

$B_y = F_3 - F_2 - F_{1y} - A_y$

$B_y = 3 - 10 - 7 - 37$

$B_y = -51\ kN$

$\Sigma M^D: -6A_x - 4A_y - 8B_y + 12F_3 - 4F_{1x} - 8F_{1y} - 17F_2 = 0$

$-42 - 148 + 408 + 36 - 28 - 56 - 170 = 0$

Przekrój K-K

$A_x + S_{1x} = 0$

$S_{1x} = -A_x = -7\,kN$

$\frac{S_{1x}}{S_1} = \frac{4}{\sqrt{4^2+6^2}} = \frac{4}{\sqrt{16+36}} = \frac{4}{\sqrt{52}}$

$S_{1x}\sqrt{52} = 4S_1$

$S_1 = -\frac{7}{4}\sqrt{52}\ kN = -12,619$

$\Sigma M^C: 4aS_5 - 6aA_x + 4A_y = 0$

$4S_5 = 6A_x - 4A_y$

$4S_5 = 42 - 148$

$S_5 = -26,5\ kN$

Przekrój L-L

$S_{2y} - F_3 + F_2 = 0$

$S_{2y} = 3 - 10 = -7\,kN$

$S_2 = -7\sqrt{2}\ kN = -9,889$

Przekrój M-M

$S_3 = 0$ -> to jest pręt zerowy

Węzeł C

$S_{Ay} - S_C = 0$

$S_{Ay} = S_C$

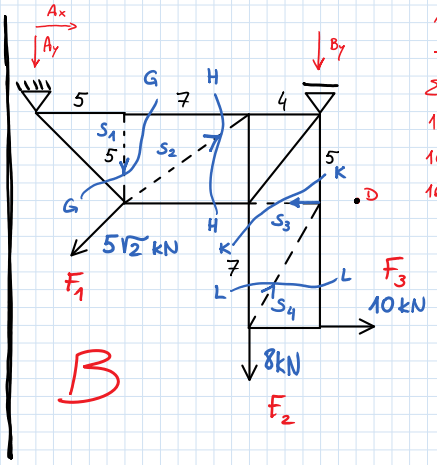
$S_C = -26,5\,kN$

$S_A = -26,5\sqrt{2}\ kN =$

$S_{Ax} + S_B = 0$

$S_{Ax} = S_{Ay} = -26,5\,kN$

$S_B = 26,5\,kN$



$A_x - F_{1x} + F_3 = 0$ $\quad A_x = F_{1x} - F_3 = 5 - 10 = -5\,kN$

$-A_y - B_y - F_{1y} - F_2 = 0$

$\Sigma M^A: 16a B_y + 5\sqrt{2}a \cdot F_1 + 12a F_2 - 12a F_3 = 0$

$16B_y = 12F_3 - 12F_2 - 5\sqrt{2}F_1$

$16B_y = 120 - 96 - 50$

$16B_y = -26$

$B_y = -\frac{26}{16} = -\frac{13}{8}\ kN$

$A_y = -B_y - F_{1y} - F_2 = \frac{13}{8} - 5 - 8 = -11\frac{3}{8} = -\frac{91}{8}\,kN$

$\Sigma M^D: 5A_x - 18A_y - F_{1y} \cdot 13 - 6F_2 - 7F_3 - 2B_y = 0$

$-25 + 204,75 - 65 - 48 - 70 + 3,25 = 0$

$0 = 0$

Przekrój G-G

$5aS_1 = 0$

$S_1 = 0$ -> S_1 to pręt zerowy

Przekrój H-H

$S_{2y} - F_{1y} - A_y = 0$

$S_{2y} = A_y + F_{1y}$

$S_{2y} = -11\frac{3}{8} + 5$

$S_{2y} = -6\frac{3}{8}\ kN$

$\frac{S_{2y}}{S_2} = \frac{5}{\sqrt{5^2+7^2}} = \frac{5}{\sqrt{25+49}} = \frac{5}{\sqrt{74}}$

$\frac{S_{2y}\sqrt{74}}{5} = S_2$

$S_2 = \frac{-\frac{51}{8}\sqrt{74}}{5} = -\frac{51}{8}\sqrt{74} \cdot \frac{1}{5}$

$S_2 = -\frac{51}{40}\sqrt{74}\ kN = -10,968$

Przekrój K-K

$-S_3 + F_3 = 0$

$S_3 = F_3 = 10\,kN$

Przekrój L-L

$S_{4x} + F_3 = 0$

$S_{4x} = -F_3$

$S_{4x} = -10\ kN$

$\frac{S_{4x}}{S_4} = \frac{4}{\sqrt{4^2+7^2}} = \frac{4}{\sqrt{16+49}} = \frac{4}{\sqrt{65}}$

$\frac{S_{4x}\sqrt{65}}{4} = S_4$

$S_4 = \frac{-10\sqrt{65}}{4} = -2,5\sqrt{65}\ kN$

$S_4 = -20,156\ kN$