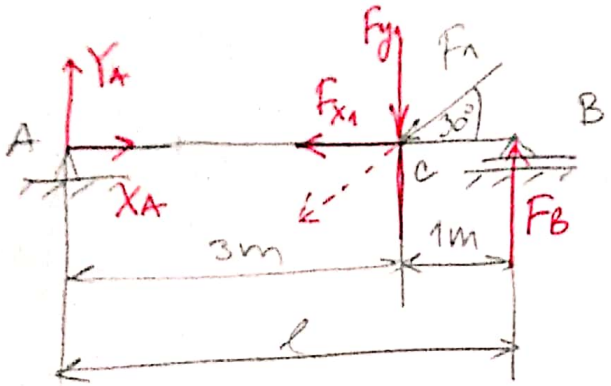
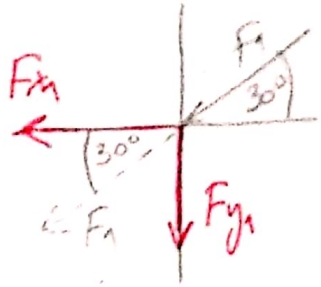
Zadatak 2 / Prosta greda opterećena kosom silom

Neka je prosta greda AB dužine $l = 4\,m$, u točki C opterećena kosom koncentriranom silom $F_1 = 10\,kN$, a prema slici. Analitičkim putem odredite otpore oslonaca.





$$F_{x_1} = F_1 \cdot \cos 30^\circ = 10 \cdot \frac{\sqrt{3}}{2} = 5\sqrt{3}$$

$$F_{y_1} = F_1 \cdot \sin 30^\circ = 10 \cdot \frac{1}{2} = 5$$

① $\Sigma X_i = 0 \quad X_A - F_{x_1} = 0$

$$\boxed{X_A = 5\sqrt{3}\ kN}$$

② $\Sigma Y_i = 0 \quad Y_A - F_{y_1} + F_B = 0$

$$\boxed{Y_A + F_B = 5}$$

③ $\Sigma M_C = 0 \quad -Y_A \cdot 3 + F_B \cdot 1 = 0$

$$-3Y_A = -F_B$$

$$\boxed{F_B = 3Y_A}$$

$$Y_A + 3Y_A = 5$$

$$4Y_A = 5$$

$$\boxed{Y_A = 1{,}25\ kN}$$

$$\boxed{F_B = 3{,}75\ kN}$$

$$F_A = \sqrt{X_A^2 + Y_A^2}$$

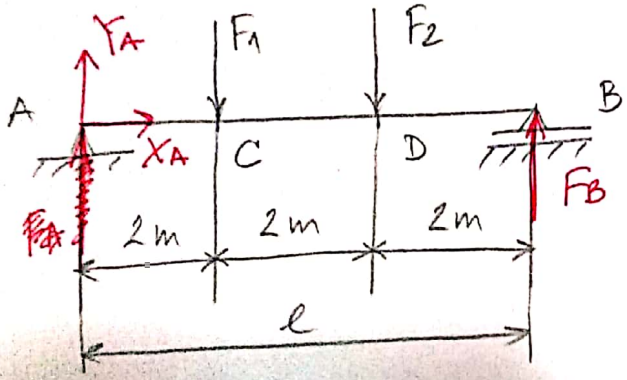
$$\boxed{F_A = 8{,}75\ kN}$$

provjera $\Sigma M_A = 0 \quad -F_{y_1} \cdot 3 + F_B \cdot 4 = 0 \quad -5 \cdot 3 + 3{,}75 \cdot 4 = 0$

$$\boxed{0 = 0}\ \checkmark$$

Zadatak 1. (Prosta greda opterećena vertikalnim koncentrisanim silama) (50)

Neka je prosta greda AB dužine $l = 6\,m$, u tačkama C i D opterećena vertikalnim koncentrisanim silama $F_1 = 5\,kN$ i $F_2 = 2\,kN$, a prema slici. Analitičkim putem odrediti otpore oslonaca.



1. $\Sigma X_i = 0$; $X_A = 0$

2. $\Sigma Y_i = 0$; $Y_A - F_1 - F_2 + F_B = 0$

$Y_A - 5 - 2 + F_B = 0$

$\boxed{Y_A + F_B = 7}$

3. $\curvearrowleft M_A = 0$ $-F_1 \cdot 2 - F_2 \cdot 4 + F_B \cdot 6 = 0$

$-5 \cdot 2 - 2 \cdot 4 + 6F_B = 0$

$6F_B = 18 \Rightarrow \boxed{F_B = 3\,kN}$

$Y_A + 3 = 7 \Rightarrow \boxed{Y_A = 4\,kN}$

$F_A = \sqrt{X_A^2 + Y_A^2} = \sqrt{0^2 + 4^2} \Rightarrow \boxed{F_A = 4\,kN}$

Provera: $\curvearrowleft M_B = 0$ $-Y_A \cdot 6 + F_1 \cdot 4 + F_2 \cdot 2 = 0$

$-4 \cdot 6 + 5 \cdot 4 + 2 \cdot 2 = 0$

$-24 + 20 + 4 = 0$

$\boxed{0 = 0}$ ✓