TEHNIČKA MEHANIKA

Inženjerstvo zaštite životne sredine

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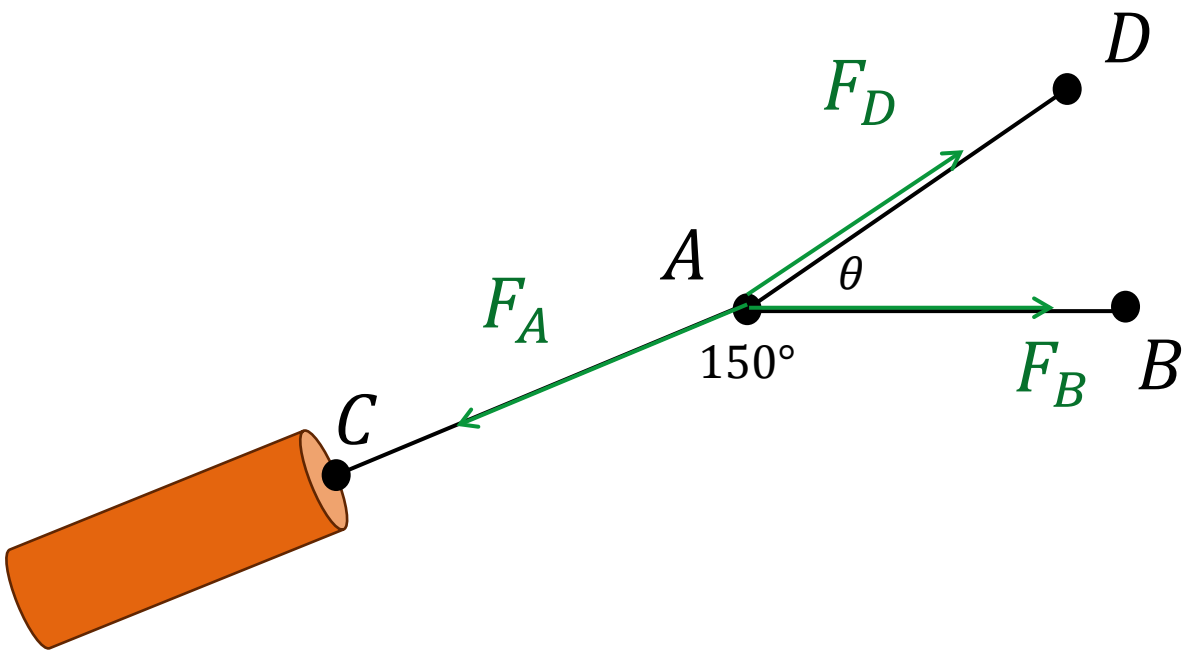
ZADATAK 1.

- Čovek pokušava da privuče stablo pomoću sistema od tri užeta koja su vezana u tački A. Sila kojom čovek vuče uže AD iznosi 400N, a sila u užetu AC (za koje je zakačeno stablo) iznosi 700N. Za položaj na slici (kada uže AB zauzima horizontalni položaj) odrediti ugao θ i sili u užetu AB.



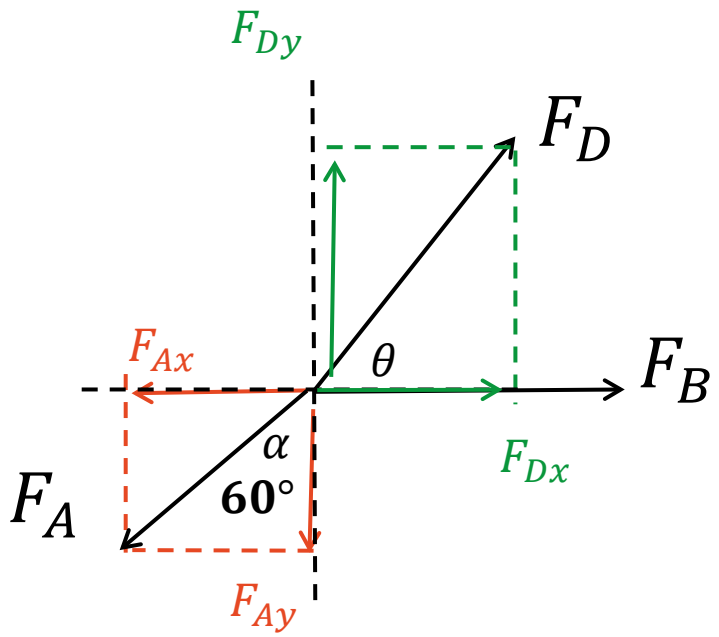
$F_D = 400N$

$F_A = 700N$

ZADATAK 1.

$F_D = 400N$

$F_A = 700N$



$\alpha = 150° - 90° = 60°$

$F_{Ax} = F_A * sin60 = 606.22\ N$

$F_{Ay} = F_A * cos60 = 350\ N$

$$\sum_{i=1}^{n} X_i = 0$$

$F_{Dx} - F_{Ax} + F_B = 0$

$400\ cos\theta\ - 606.22 + F_B = 0$

$F_B = -400\cos(61.04) + 606.22$

$F_B = 206.234\ N$

$F_{Dx} = F_D * cos\theta = 400\ cos\theta$

$F_{Dy} = F_D * \sin\theta = 400\ sin\theta$

$$\sum_{i=1}^{n} Y_i = 0$$

$F_{Dy} - F_{Ay} = 0$

$400\ sin\theta - 350 = 0$

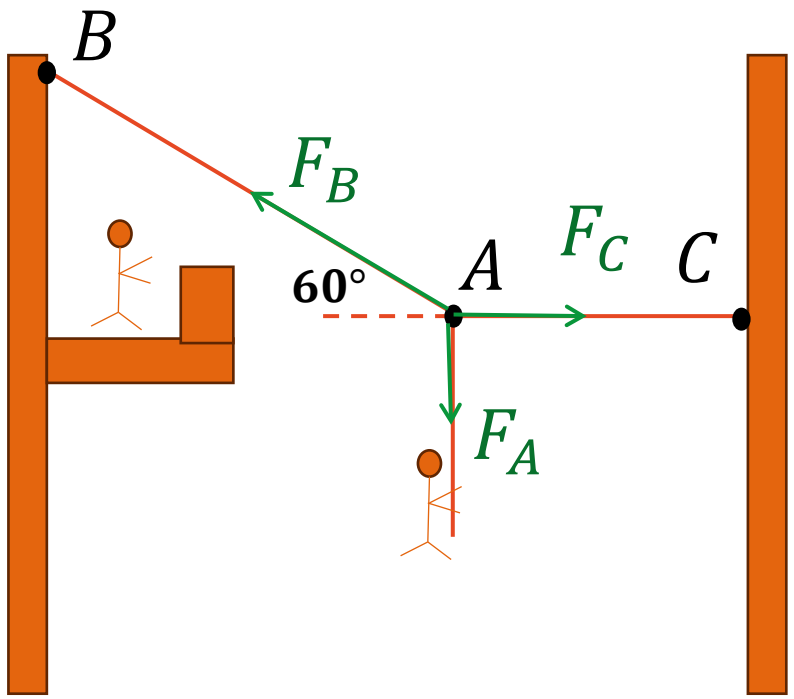
$$sin\theta = \frac{350}{400}$$

$sin\theta = 0.875$

$\theta = arcsin0.875 = 61.04°$

ZADATAK 2.

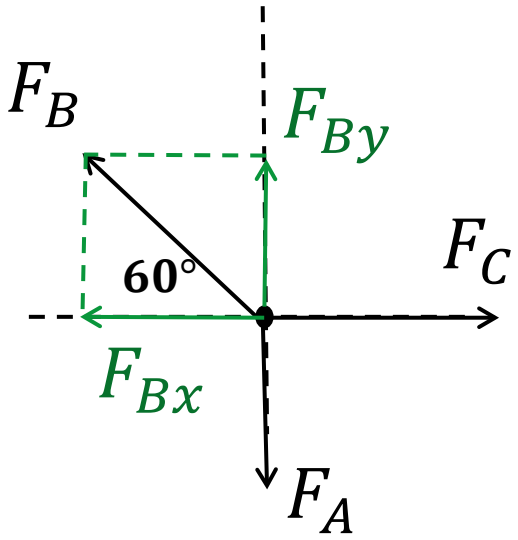
- Romeo pokušava da dodje do Julije penjanjem uz uže koje je vezano u tački A. Za istu tačku A vezano je horizontalno uže AC i uže AB koje sa horizontalom zaklapa ugao 60°. Težina Romea je 75kg a užad može da izdrži silu od 1kN pre kidanja. Odrediti da li će Romeo stići do Julije pri datim uslovima.



$$m = 75kg$$

$$F_A = 75 * 10 = 750N$$

ZADATAK 2.



$$F_{Bx} = F_B * cos60 = \frac{1}{2} F_B$$

$$F_{By} = F_B * sin60 = \frac{\sqrt{3}}{2} F_B$$

$$\sum_{i=1}^{n} X_i = 0$$

$$F_C - F_{Bx} = 0$$

$$F_C - \frac{1}{2} F_B = 0 \quad / * 2$$

$$2F_C - F_B = 0$$

$$F_B = 2F_C$$

$$\sum_{i=1}^{n} Y_i = 0$$

$$F_{By} - F_A = 0$$

$$\frac{\sqrt{3}}{2} F_B - F_A = 0 \quad / * 2$$

$$\sqrt{3} F_B - 2F_A = 0$$

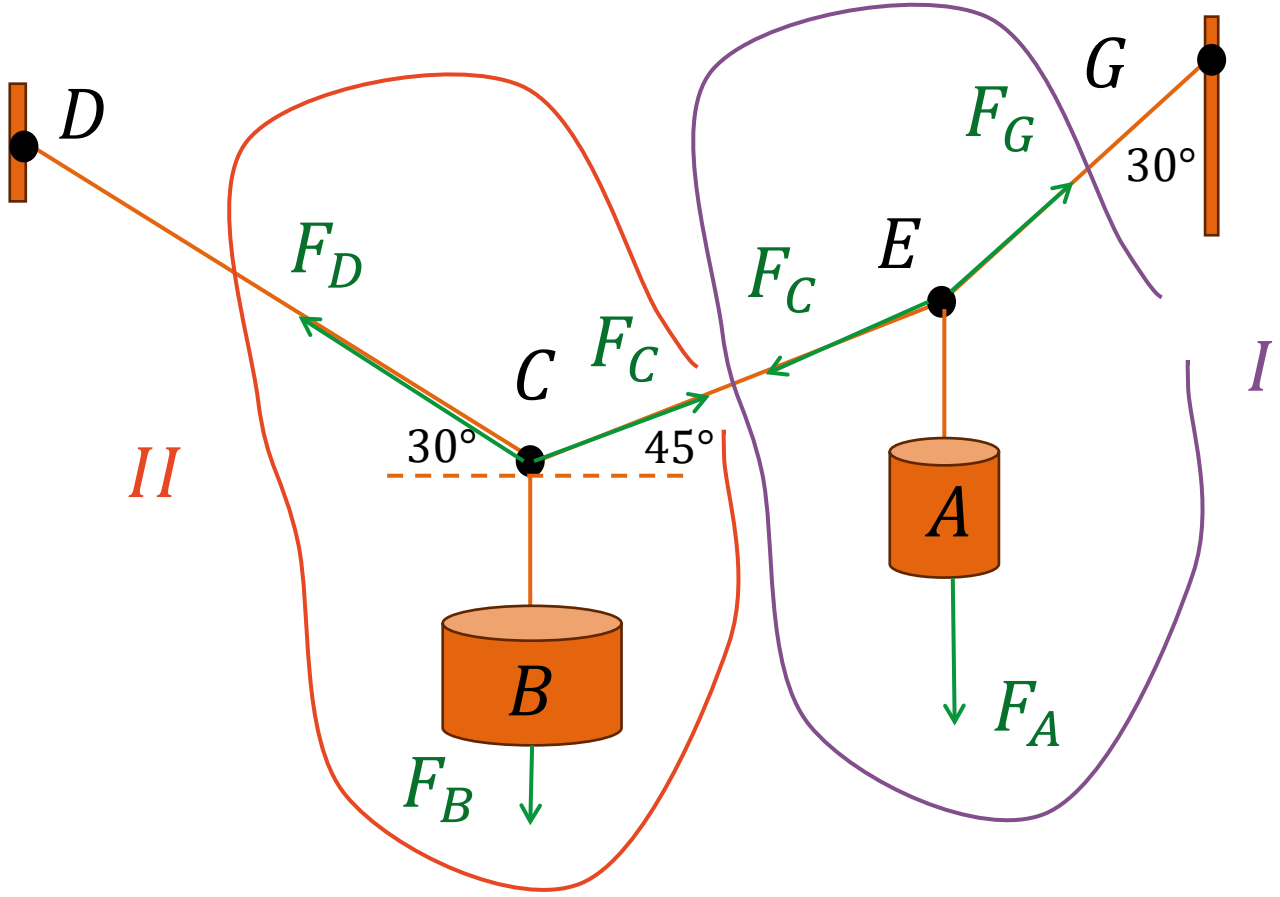
$$F_B = \frac{2 * 750}{\sqrt{3}}$$

$$F_B = 866.025N$$

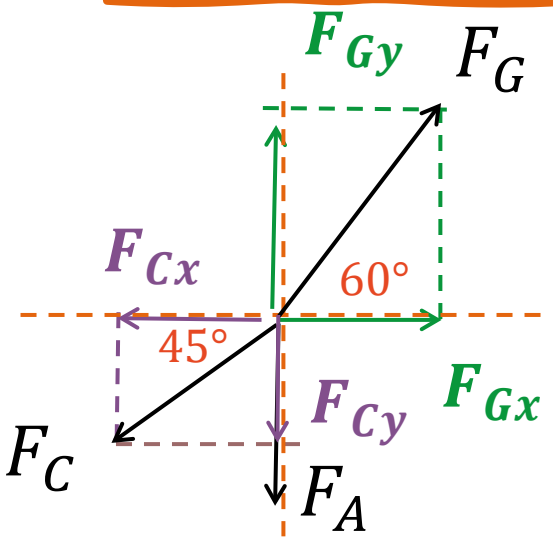
$$F_C = 424.78N$$

ZADATAK 3.

- Odrediti težinu tereta B da bi sistem na slici bio u ravnoteži, $F_A = 20N$.



ZADATAK 3.



$$F_{Gx} = F_G * cos60 = F_G \frac{1}{2}$$

$$F_{Gy} = F_G * sin60 = F_G \frac{\sqrt{3}}{2}$$

$$\sum_{i=1}^{n} X_i = 0$$

$$F_{Gx} - F_{Cx} = 0$$

$$F_G \frac{1}{2} - F_C \frac{\sqrt{2}}{2} = 0 \quad / * 2$$

$$F_G - F_C\sqrt{2} = 0$$

$$F_G = \sqrt{2}F_C$$

$$F_{Cx} = F_C * cos45 = F_C \frac{\sqrt{2}}{2}$$

$$F_{Cy} = F_C * sin45 = F_c \frac{\sqrt{2}}{2}$$

$$\sum_{i=1}^{n} Y_i = 0$$

$$F_{Gy} - F_{Cy} - F_A = 0$$

$$F_G \frac{\sqrt{3}}{2} - F_C \frac{\sqrt{2}}{2} - F_A = 0 \quad / * 2$$

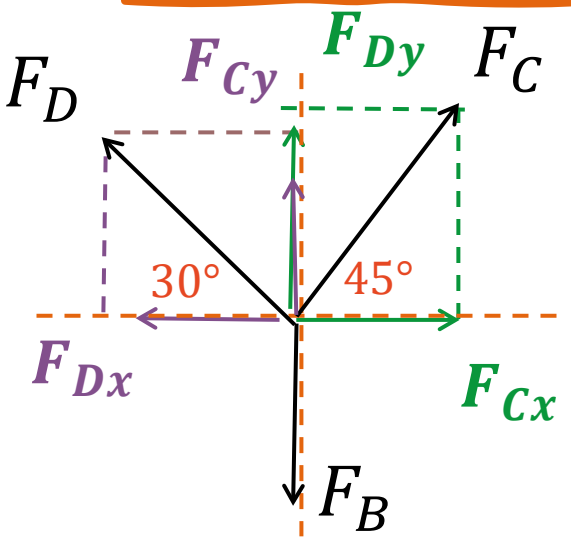
$$F_G\sqrt{3} - F_C\sqrt{2} - 40 = 0$$

$$F_G\sqrt{3} - F_G - 40 = 0$$

$$F_G = 54.64\ N$$

$$F_c = 38.64N$$

ZADATAK 3.



$$F_{Dx} = F_D * cos30 = F_D \frac{\sqrt{3}}{2}$$

$$F_{Dy} = F_D * sin30 = F_D \frac{1}{2}$$

$$\sum_{i=1}^{n} X_i = 0$$

$$F_{Cx} - F_{Dx} = 0$$

$$27.33 - F_D \frac{\sqrt{3}}{2} = 0 \quad / * 2$$

$$F_D = 31{,}56N$$

$$F_{Cx} = F_C * cos45 = 27.33\ N$$

$$F_{Cy} = F_C * sin45 = 27.33N$$

$$\sum_{i=1}^{n} Y_i = 0$$

$$F_{Dy} + F_{Cy} - F_B = 0$$

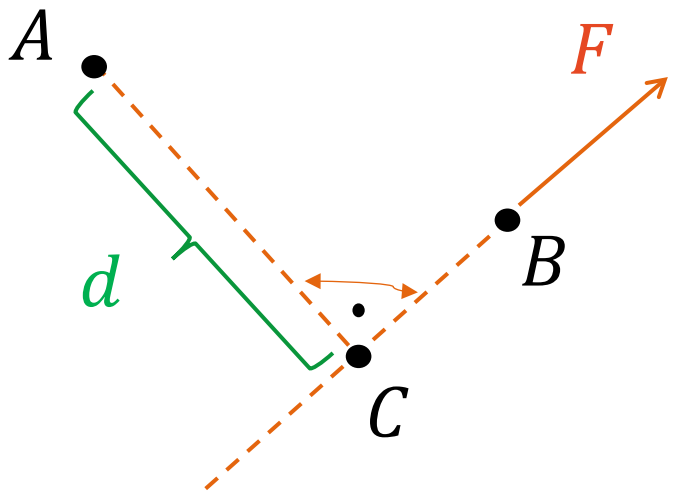
$$\frac{31.56}{2} + 27.33 - F_B = 0$$

$$F_B = 43.11\ N$$

MOMENT SILE ZA TAČKU

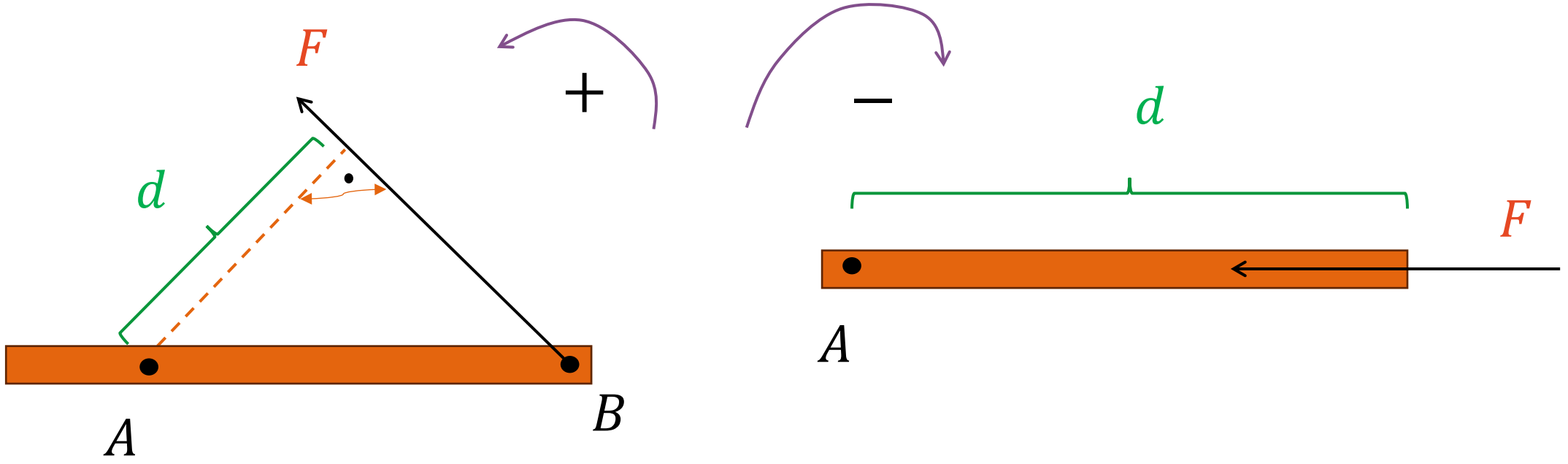
MOMENT

- Moment (M) je vektorska veličina.
- *M=F*d (Nm)* - *proizvod sile i rastojanja do momentne tačke*



$$M_A = F * d$$

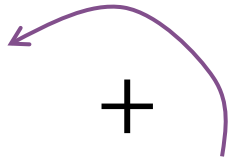
MOMENT



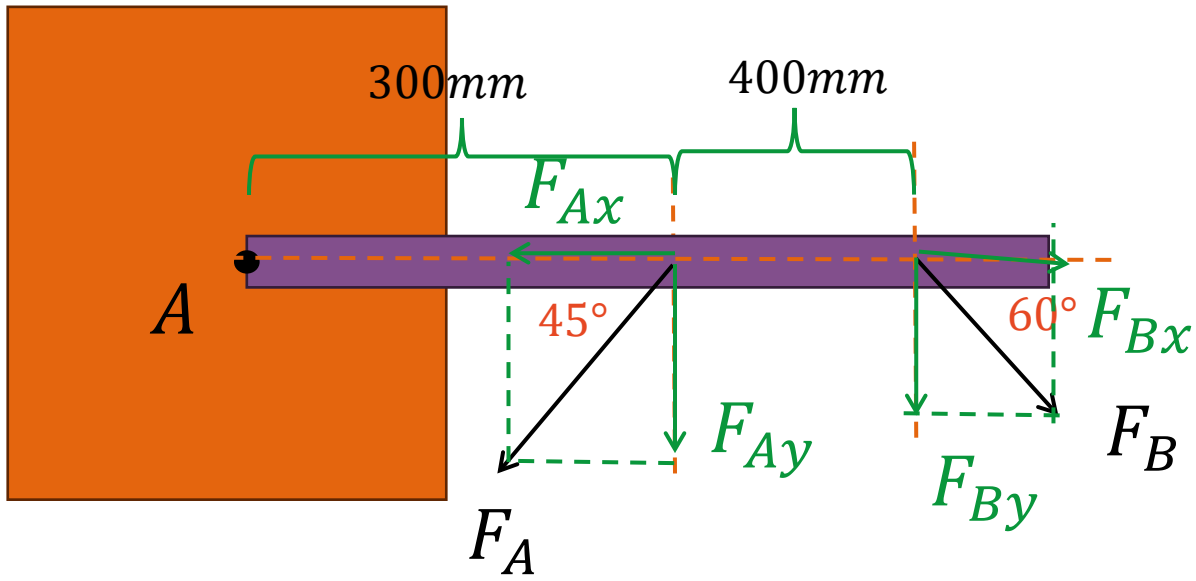
$$M_A = F * d$$

$$M_A = F * d = F * 0 = 0$$

ZADATAK 1



- Odrediti rezultujući moment u tački A za sistem na slici, ako je $F_A = 52N \; i \; F_B = 30N$.



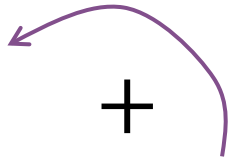
$$F_{Ay} = F_A * cos45 = 36{,}769 \; N$$

$$F_{By} = F_B * sin60 = 25{,}98 \; N$$

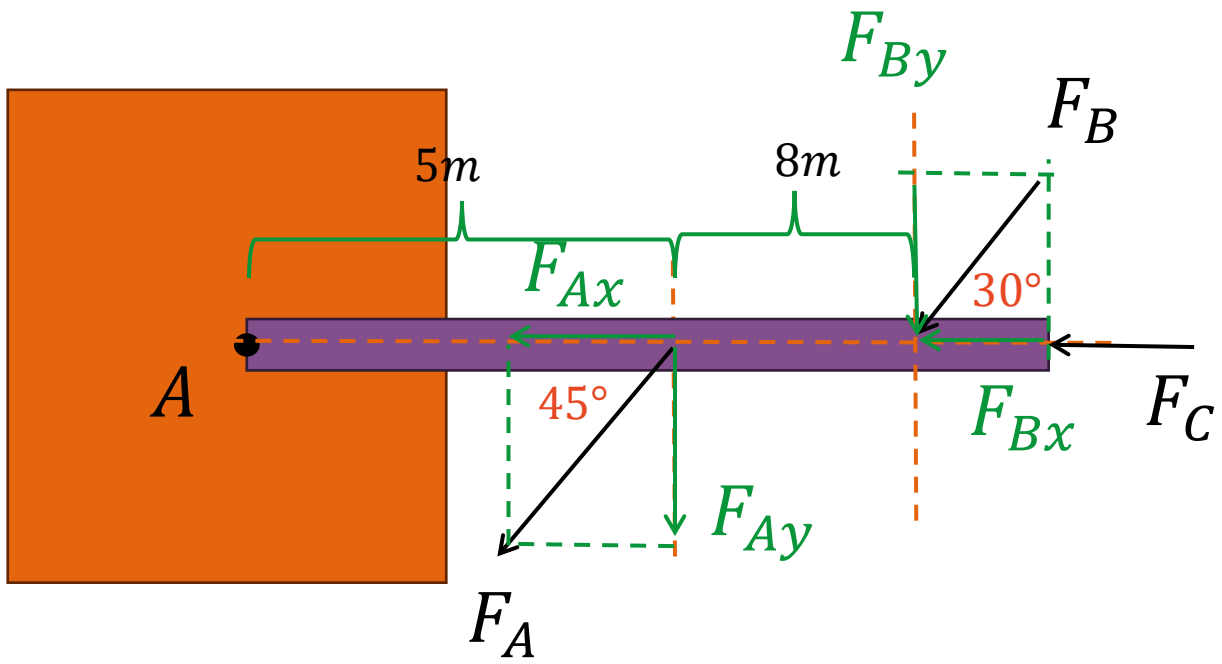
$$M_A = -F_{Ay} * 300 - F_{By} * 700$$

$$M_A = -29.216{,}7 \; Nmm$$

ZADATAK 2



- Odrediti rezultujući moment u tački A za sistem na slici, ako je $F_A = 100N, F_B = 40N, F_c = 80N$



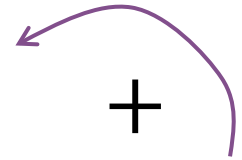
$$F_{Ay} = F_A * sin45 = 70{,}71\ N$$

$$F_{By} = F_B * sin30 = 20\ N$$

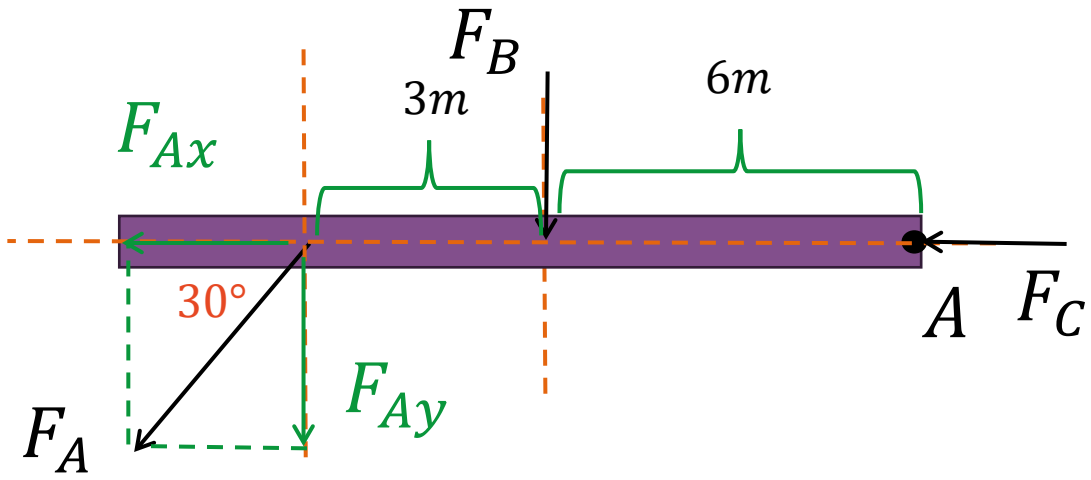
$$M_A = -F_{Ay} * 5 - F_{By} * 13$$

$$M_A = -613{,}55Nm$$

ZADATAK 3.



- Odrediti rezultujući moment u tački A za sistem na slici, ako je $F_A = 90N, F_B = 45N, F_c = 45N$



$$F_{Ay} = F_A * sin30 = 45\ N$$

$$F_{By} = F_B = 45\ N$$

$$M_A = F_{Ay} * 9 + F_B * 6$$

$$M_A = 675Nm$$

HVALA NA PAŽNJI!

PITANJA?