TEHNIČKA MEHANIKA

Inženjerstvo zaštite životne sredine

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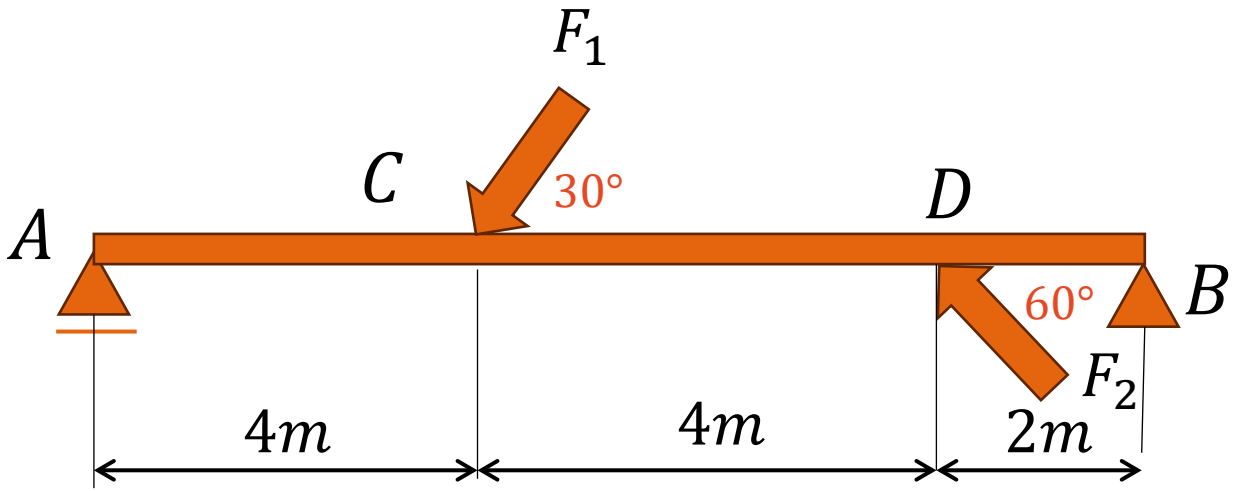
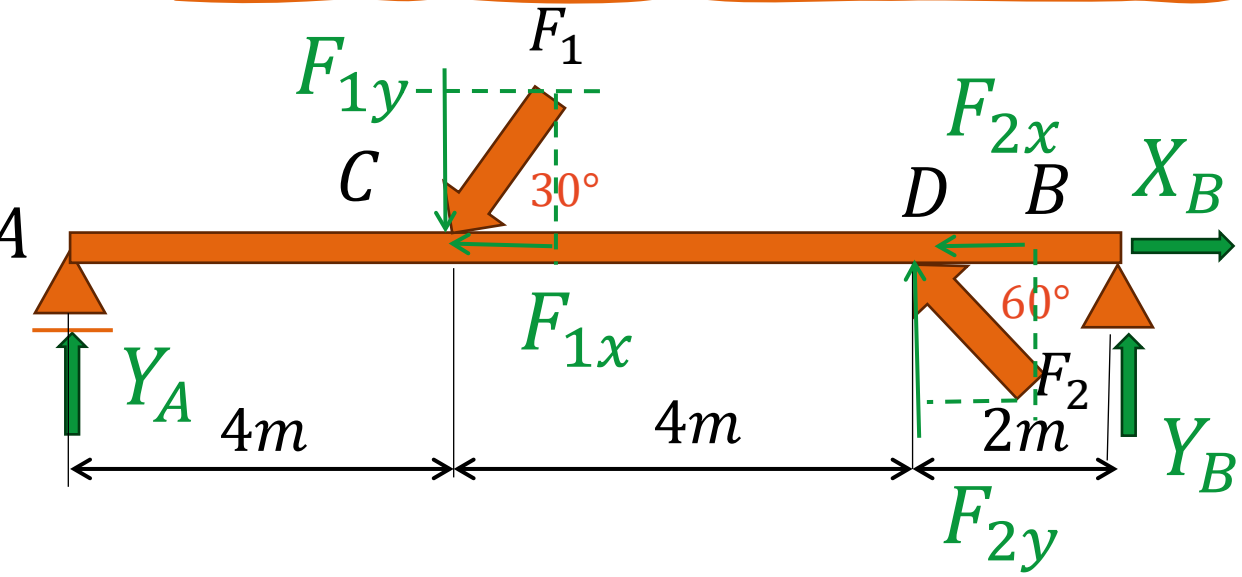
ZADATAK 1.

- Neka je prosta greda AB dužine 10m, u tačkama C i D opterećena koncentrisanim silama $F_1 = 12kN$ *i* $F_2 = 20\ kN,$ prema slici. Analitičkim putem odrediti otpore oslonaca.



ZADATAK 3.



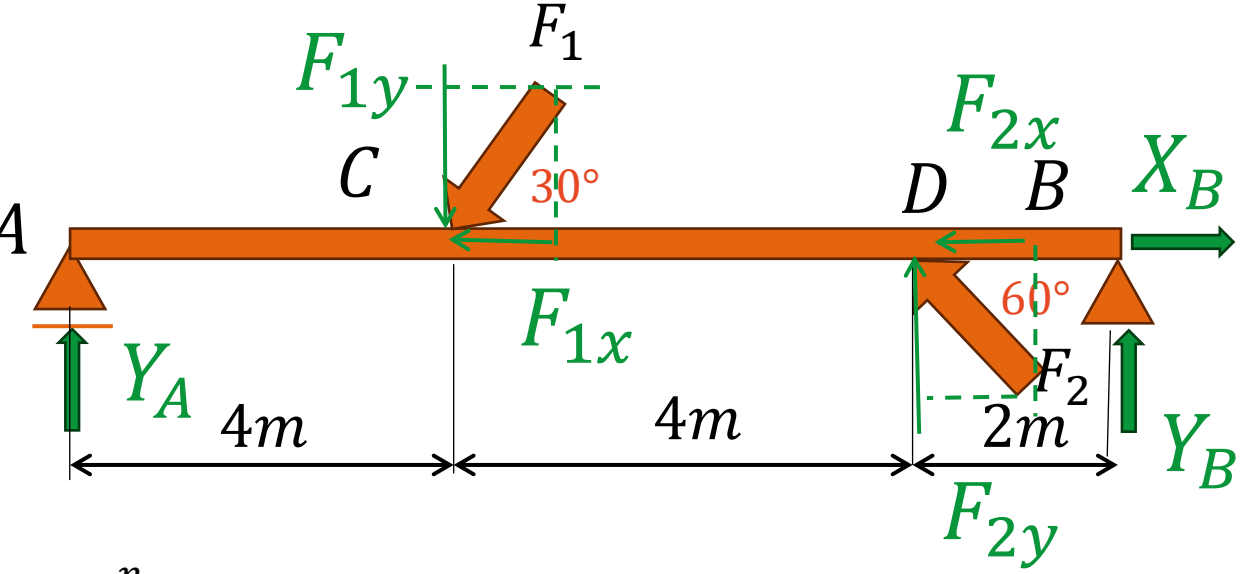
$$F_{1x} = F_1 * cos30 = 6\sqrt{3}\ kN$$

$$F_{1y} = F_1 * sin30 = 6\ kN$$

$$F_{2x} = F_2 * cos60 = 10kN$$

$$F_{2y} = F_2 * sin60 = 10\sqrt{3}\ kN$$

ZADATAK 1.



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

$$X_B - F_{1x} - F_{2x} = 0$$

$$X_B = F_{1x} + F_{2x}$$

$$X_B = 30{,}78\ kN$$

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

$$Y_B + F_{2y} - F_{1y} + Y_A = 0$$

$$Y_B + Y_A = F_{1y} - F_{2y}$$

$$Y_B + Y_A = -11{,}32$$

$$Y_A = -11{,}32 - Y_B$$

$$Y_A = -11{,}32 + 11{,}456$$

$$Y_A = 0{,}136\ kN$$

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

$$+Y_B * 10m + F_{2y} * 8m - F_{1y} * 4m = 0$$

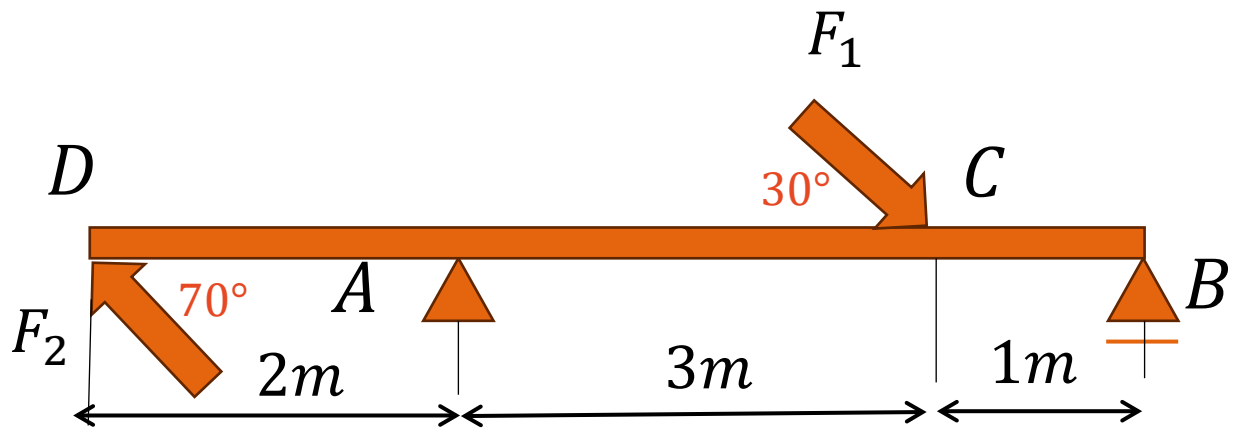
$$Y_B * 10 = -F_{2y} * 8 + F_{1y} * 4$$

$$Y_B = \frac{-F_{2y} * 8 + F_{1y} * 4}{10}$$

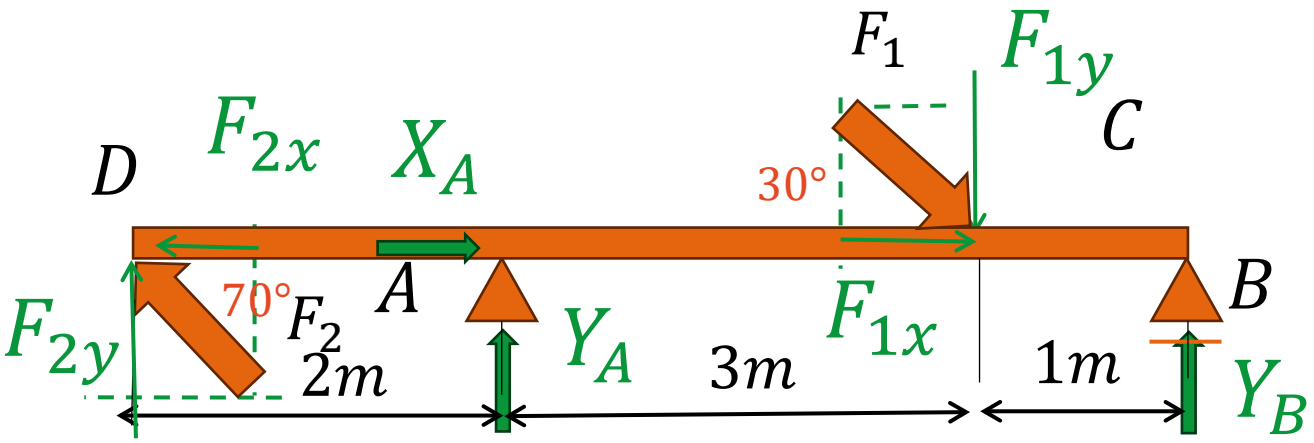
$$Y_B = -11{,}456\ kN$$

ZADATAK 2.

- Neka je prosta greda AB dužine 6m, u tačkama C i D opterećena kosom koncentrisanom silom $F_1 = 10kNi\ F_2 = 40kN,$ prema slici. Analitičkim putem odrediti otpore oslonaca.



ZADATAK 2.



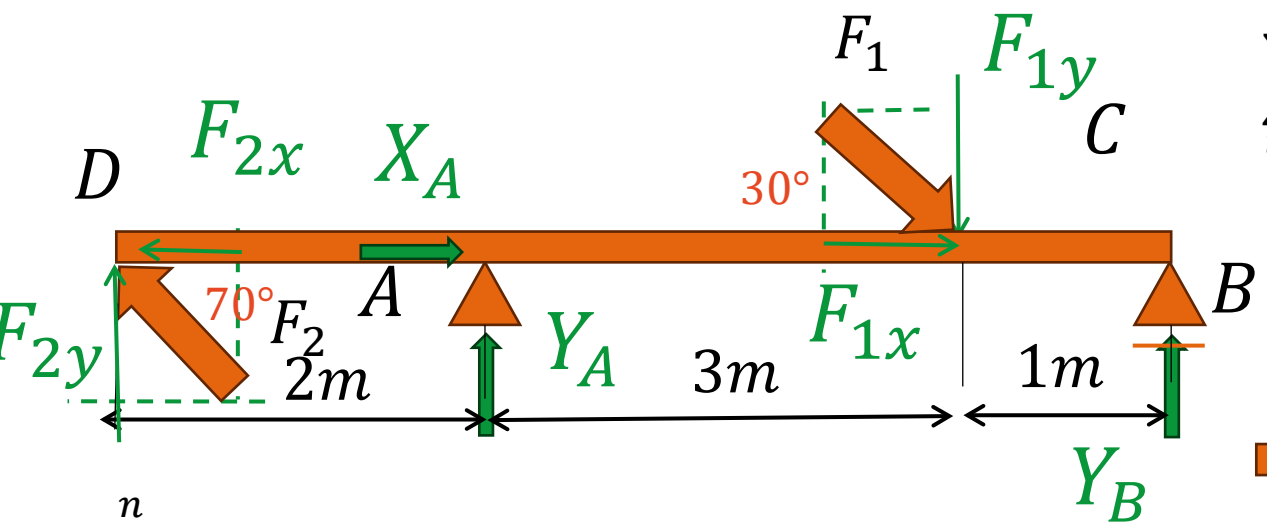
$$F_{1x} = F_1 * cos30 = 5\sqrt{3}\ kN$$

$$F_{1y} = F_1 * sin30 = 5\ kN$$

$$F_{2x} = F_2 * cos70 = 13{,}68\ kN$$

$$F_{2y} = F_2 * sin70 = 37{,}58\ kN$$

ZADATAK 2.



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

$$X_A + F_{1x} - F_{2x} = 0$$

$$X_A = -F_{1x} + F_{2x}$$

$$X_A = 5{,}019\ kN$$

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

$$Y_B + F_{2y} - F_{1y} + Y_A = 0$$

$$Y_B + Y_A = F_{1y} - F_{2y}$$

$$Y_B + Y_A = -32{,}58$$

$$Y_A = -32{,}58 - Y_B$$

$$Y_A = -32{,}58 - 22{,}54$$

$$Y_A = -55{,}12\ kN$$

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

$$+Y_B * 4m - F_{2y} * 2m - F_{1y} * 3m = 0$$

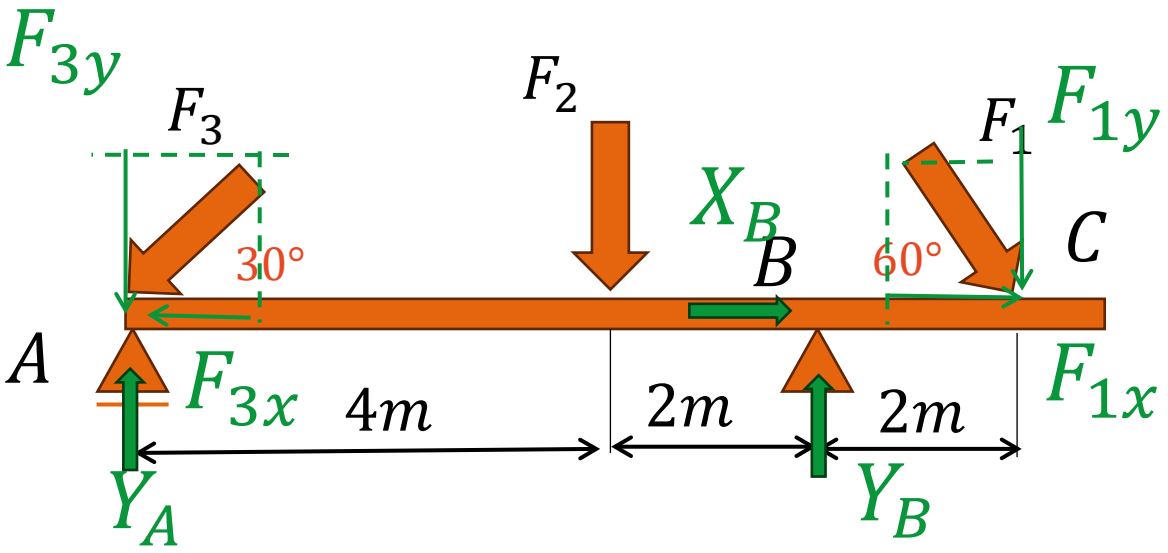
$$Y_B * 4 = F_{2y} * 2 + F_{1y} * 3$$

$$Y_B = \frac{F_{2y} * 2 + F_{1y} * 3}{4}$$

$$Y_B = 22{,}54\ kN$$

ZADATAK 3.

- Neka je prosta greda AB, opterećena koncentrisanim silama $F_1 = 10kN,\ F_2 = 6\ kN, F_3 = 16\ kN$ prema slici. Analitičkim putem odrediti otpore oslonaca.



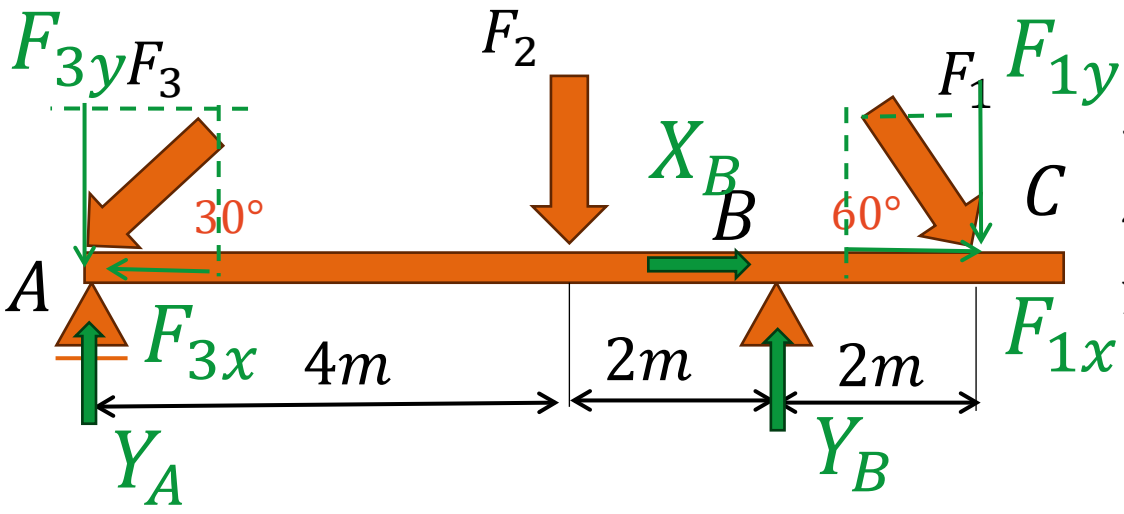
$$F_{1x} = F_1 * cos60 = 5\ kN$$

$$F_{1y} = F_1 * sin60 = 8{,}66\ kN$$

$$F_{3x} = F_3 * cos30 = 13{,}85\ kN$$

$$F_{3y} = F_3 * sin30 = 8\ kN$$

ZADATAK 3.



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

$$X_B - F_{3x} + F_{1x} = 0$$

$$X_B = F_{3x} - F_{1x} = 8{,}85kN$$

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

$$Y_B - F_{1y} - F_2 - F_{3y} + Y_A = 0$$

$$Y_B + Y_A = F_{1y} + F_2 + F_{3y}$$

$$Y_B + Y_A = 22{,}66$$

$$Y_A = 22{,}66 - Y_B$$

$$Y_A = 22{,}66 - 15{,}547$$

$$Y_A = 7{,}113\ kN$$

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

$$Y_B * 6m - F_{1y} * 8m - F_2 * 4m = 0$$

$$Y_B * 6 = F_{1y} * 8 + F_2 * 4$$

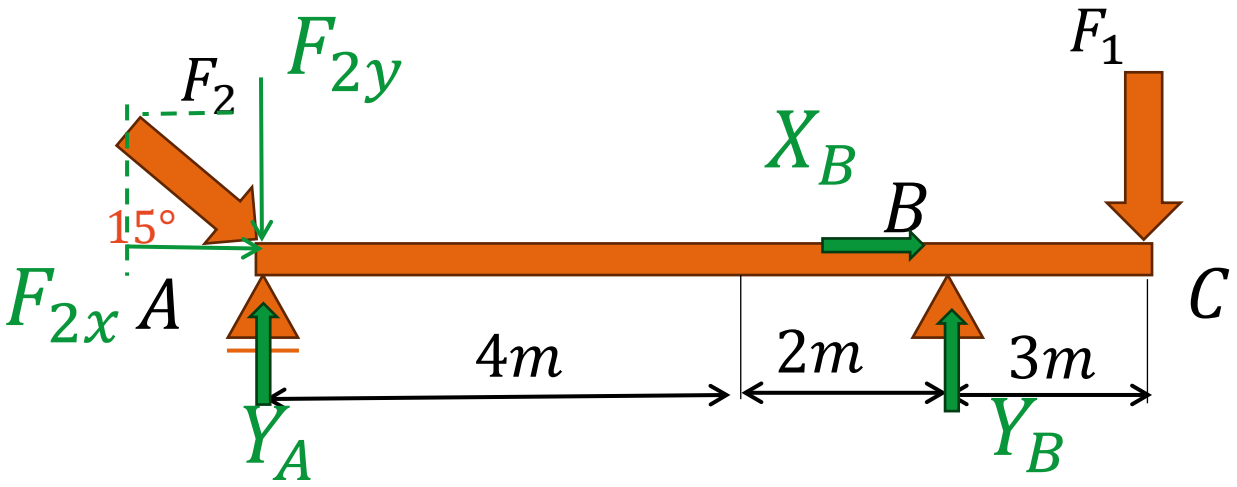
$$Y_B = \frac{F_{1y} * 8 + F_2 * 4}{6}$$

$$Y_B = \frac{8{,}66 * 8 + 6 * 4}{6}$$

$$Y_B = 15{,}547\ kN$$

ZADATAK 4.

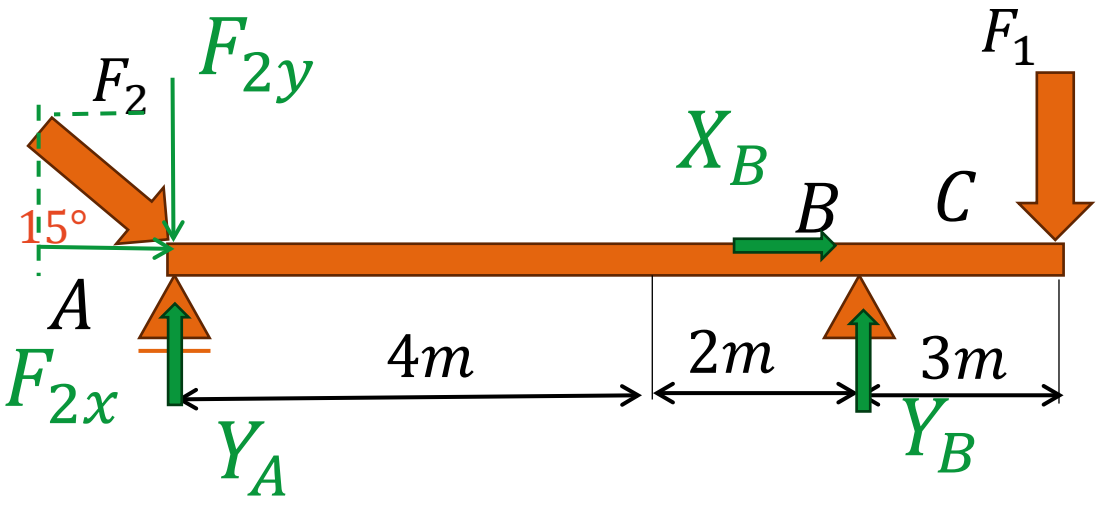
- Neka je prosta greda AB, opterećena koncentrisanim silama $F_1 = 16kN,\ F_2 = 21\ kN, F_3 = 12\ kN$ prema slici. Analitičkim putem odrediti otpore oslonaca.



$$F_{2x} = F_2 * cos15 = 20{,}284\ kN$$

$$F_{2y} = F_2 * sin15 = 5{,}435\ kN$$

ZADATAK 4.



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

$$X_B + F_{2x} = 0$$

$$X_B = -F_{2x} = -20{,}284kN$$

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

$$Y_B - F_{2y} - F_1 + Y_A = 0$$

$$Y_B + Y_A = F_1 + F_{2y}$$

$$Y_B + Y_A = 21{,}435$$

$$Y_A = 21{,}435 - Y_B$$

$$Y_A = 21{,}435 - 24$$

$$Y_A = -2{,}565\ kN$$

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

$$Y_B * 6m - F_1 * 9m = 0$$

$$Y_B * 6 = F_1 * 9$$

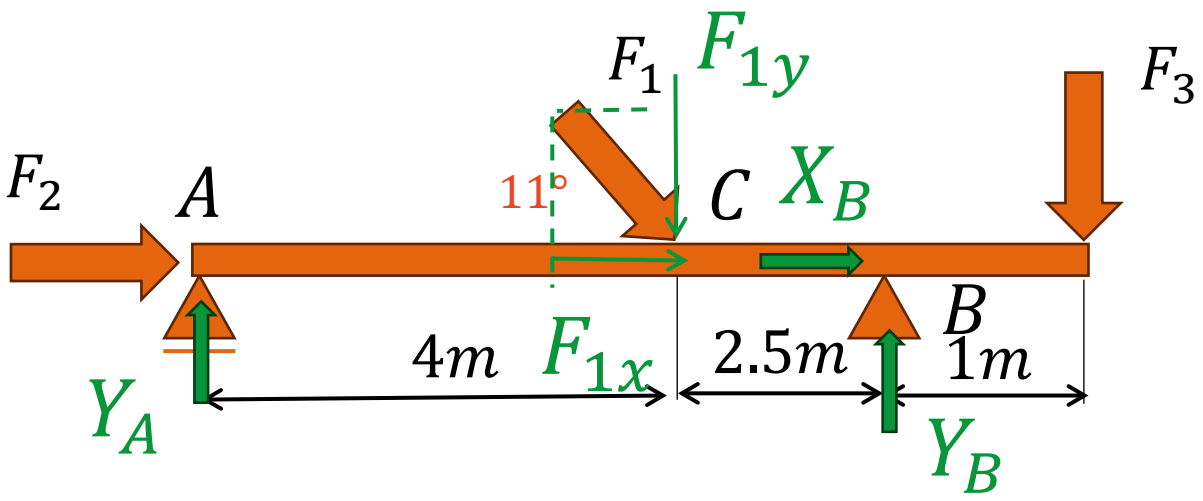
$$Y_B = \frac{F_1 * 9}{6}$$

$$Y_B = \frac{16 * 9}{6}$$

$$Y_B = 24\ kN$$

ZADATAK 5.

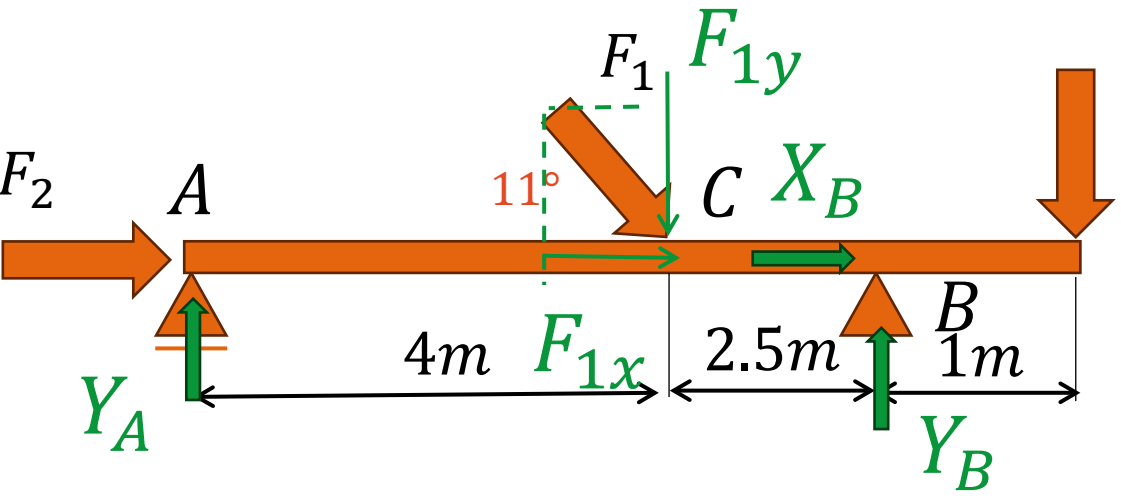
- Neka je prosta greda AB, opterećena koncentrisanim silama $F_1 = 19kN,\ F_2 = 9\ kN, F_3 = 24\ kN$ prema slici. Analitičkim putem odrediti otpore oslonaca.



$$F_{1x} = F_1 * cos11 = 18{,}65\ kN$$

$$F_{1y} = F_1 * sin11 = 3{,}625\ kN$$

ZADATAK 5.



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

$$X_B + F_{1x} + F_2 = 0$$

$$X_B = -F_{1x} - F_2 = -27{,}65kN$$

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

$$Y_B - F_{1y} - F_3 + Y_A = 0$$

$$Y_B + Y_A = F_{1y} + F_3$$

$$Y_B + Y_A = 27{,}625$$

$$Y_A = 27{,}625 - Y_B$$

$$Y_A = 27{,}625 - 29{,}923$$

$$Y_A = -2{,}298\ kN$$

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

$$Y_B * 6{,}5m - F_{1y} * 4m - F_3 * 7{,}5 = 0$$

$$Y_B * 6{,}5 = F_{1y} * 4 + F_3 * 7{,}5$$

$$Y_B = \frac{F_{1y} * 4 + F_3 * 7{,}5}{6{,}5}$$

$$Y_B = \frac{3{,}625 * 4 + 24 * 7{,}5}{6{,}5}$$

$$Y_B = 29{,}923\ kN$$

HVALA NA PAŽNJI!

PITANJA?