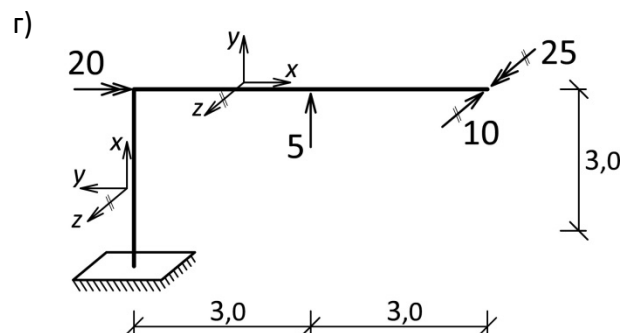
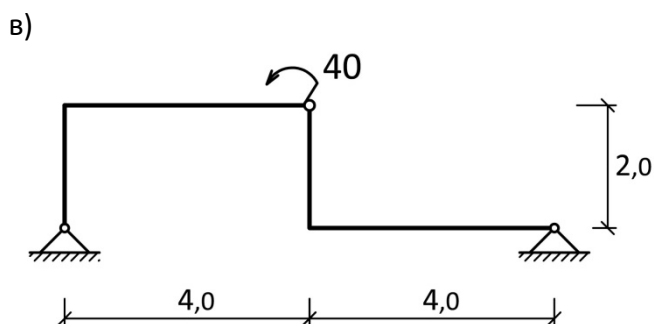
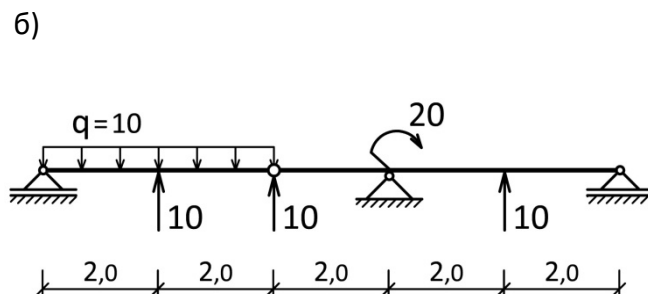
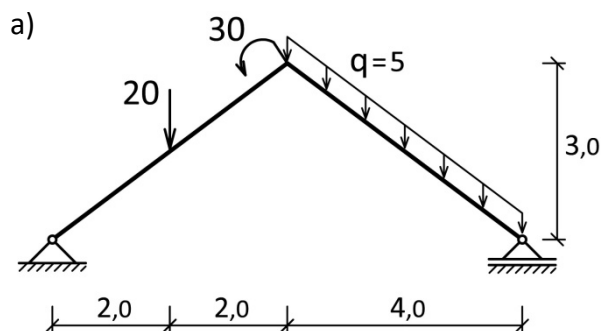


ГРАЂЕВИНСКИ ФАКУЛТЕТ УНИВЕРЗИТЕТА У БЕОГРАДУ
 Други (теоријски) део испита из **ТЕХНИЧКЕ МЕХАНИКЕ 1**
 (писмени део одржан 20.08.2021.)

1. ЗАДАТАК (условни 50 %)

Нацртати дијаграме сила у пресеку за приказане носаче.

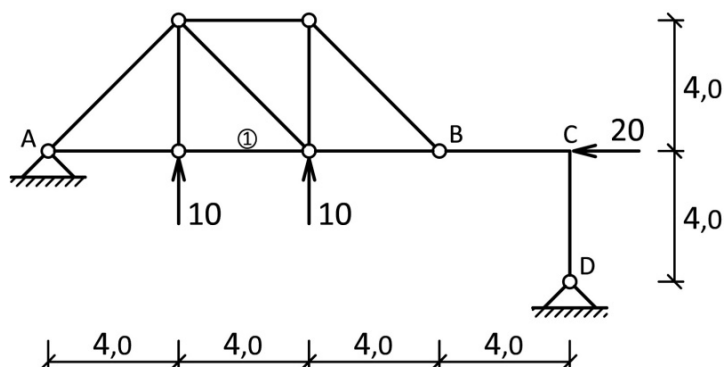


2. ЗАДАТАК (32 %)

а) За какве везе се каже да су идеалне?

б) Применом опште једначине статике одредити:

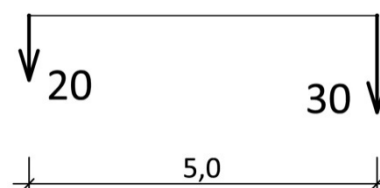
- * вертикалну реакцију у ослоњу D,
- * силу у штапу 1,
- * моменат савијања у крутом углу C.



3. ЗАДАТАК (18 %)

а) Приказати и објаснити израз за промену редукционог момента са променом редукционе тачке.

б) Наћи интензитет и положај резултанте датог система од две паралелне силе.

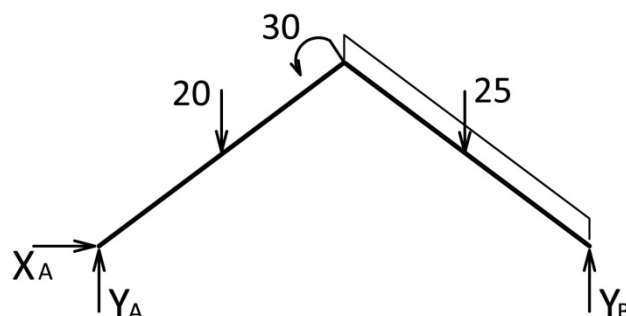
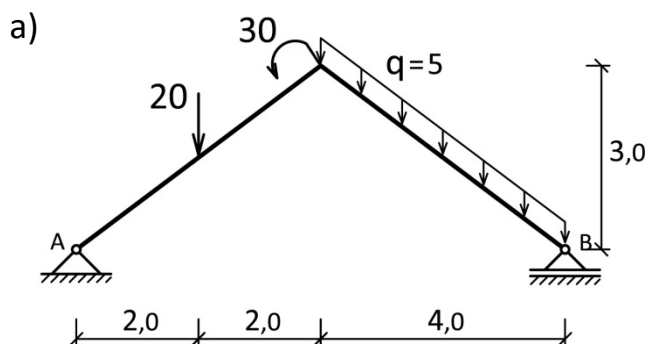


Напомена: У свим задацима димензије за дужине и силе су: m, kN

ГРАЂЕВИНСКИ ФАКУЛТЕТ УНИВЕРЗИТЕТА У БЕОГРАДУ
Други (теоријски) део испита из **ТЕХНИЧКЕ МЕХАНИКЕ 1**
(писмени део одржан 20.08.2021.)

- Р Е Ш Е Њ А -

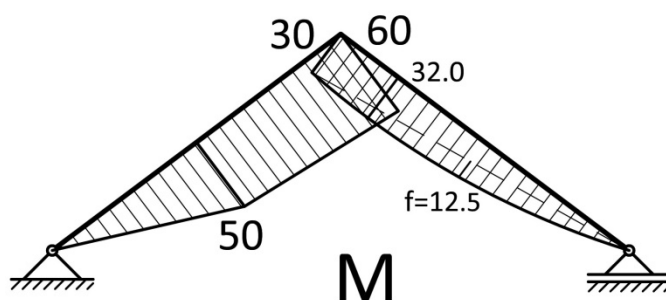
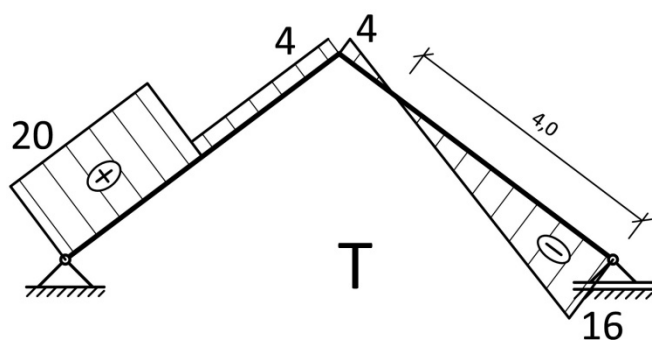
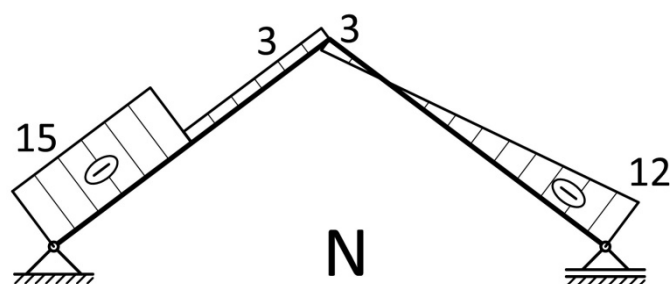
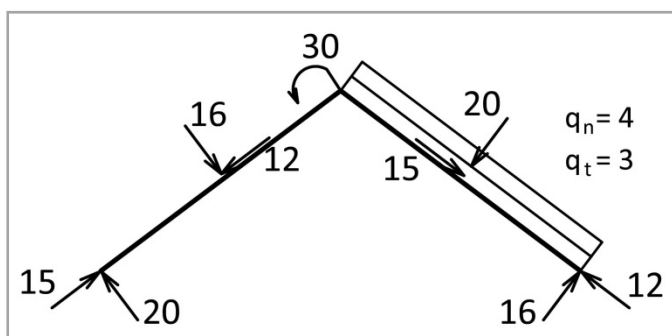
1. ЗАДАТАК (условни 50 %)



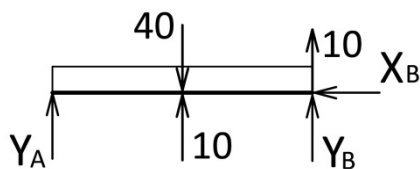
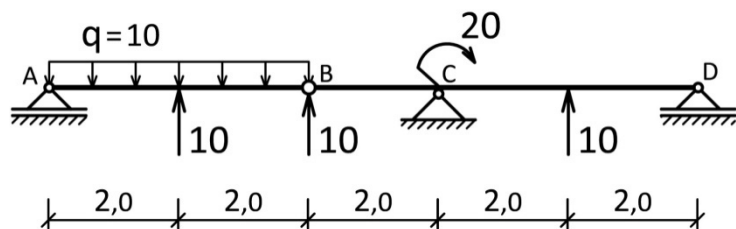
$$\sum F_x = 0 : \underline{X_A = 0}$$

$$\sum M_A = 0 : Y_B \cdot 8 - 25 \cdot 6 + 30 - 20 \cdot 2 = 0 \rightarrow \underline{Y_B = 20}$$

$$\sum F_y = 0 : Y_A + Y_B - 25 - 20 = 0 \rightarrow \underline{Y_A = 25}$$



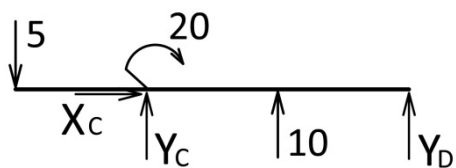
6)



$$\sum F_X = 0 : \underline{X_B = 0}$$

$$\sum M_A = 0 : Y_B \cdot 4 + 10 \cdot 4 - 40 \cdot 2 + 10 \cdot 2 = 0 \rightarrow \underline{Y_B = 5}$$

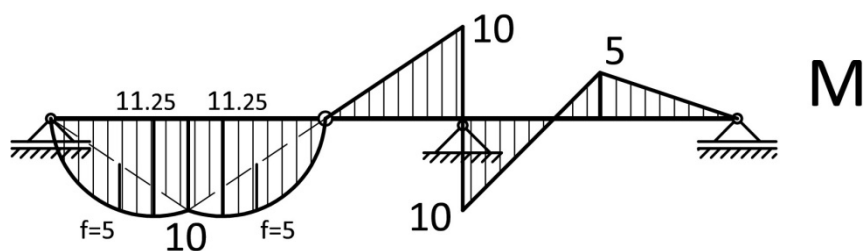
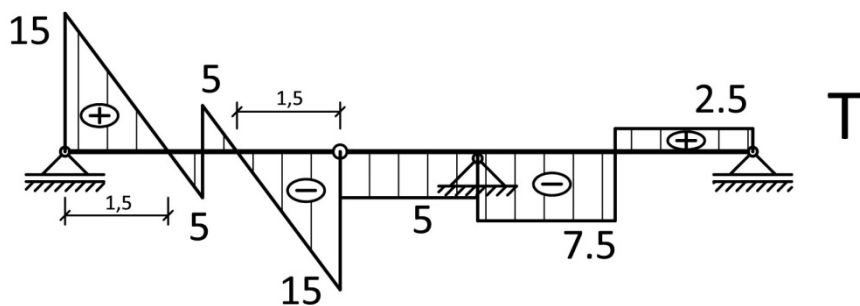
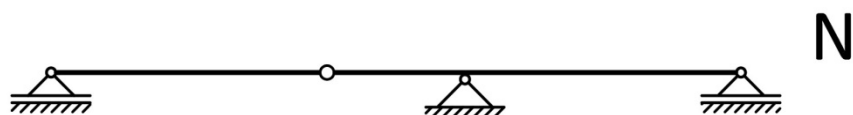
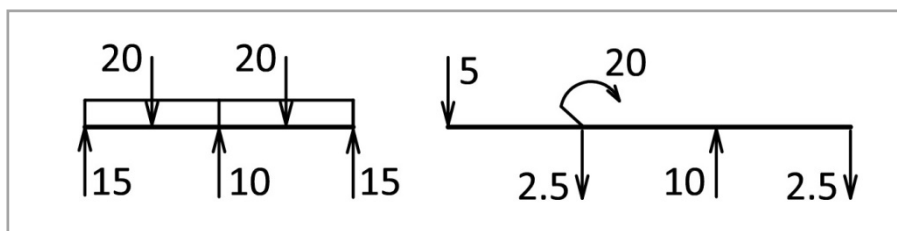
$$\sum F_Y = 0 : Y_A + Y_B + 10 - 40 + 10 = 0 \rightarrow \underline{Y_A = 15}$$

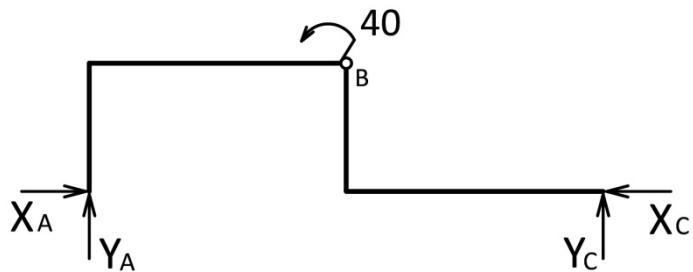
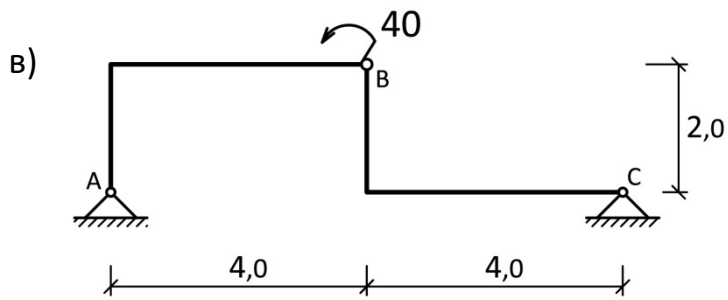


$$\sum F_X = 0 : \underline{X_C = 0}$$

$$\sum M_D = 0 : Y_C \cdot 4 - 5 \cdot 6 + 20 + 10 \cdot 2 = 0 \rightarrow \underline{Y_C = -2.5}$$

$$\sum F_Y = 0 : Y_C + Y_D + 10 - 5 = 0 \rightarrow \underline{Y_D = -2.5}$$



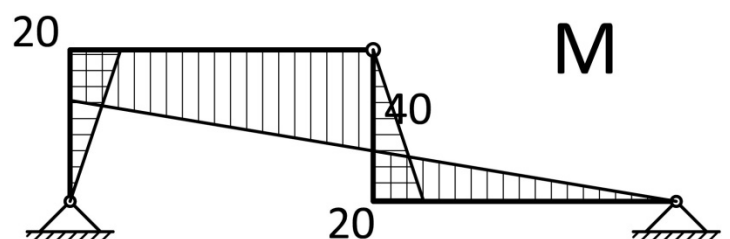
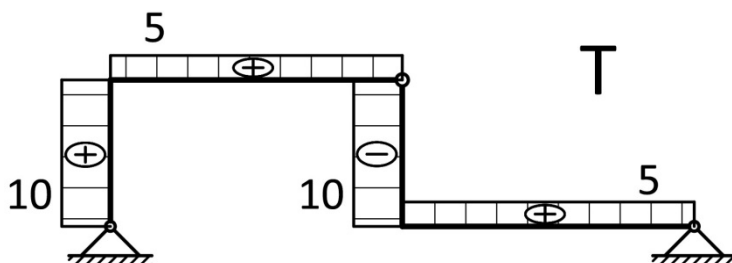
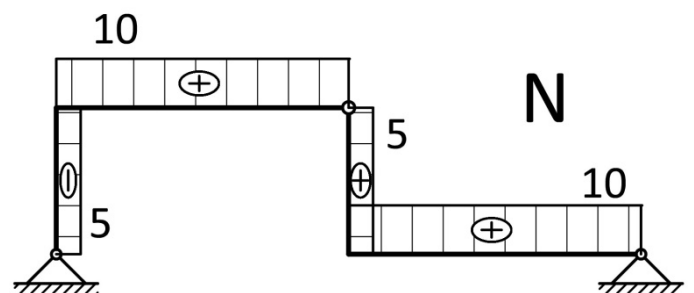
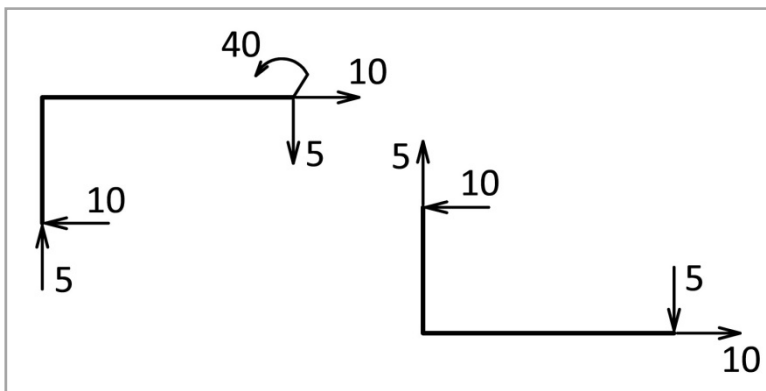


$$\sum M_A = 0 : Y_C \cdot 8 + 40 = 0 \rightarrow \underline{Y_C = 5}$$

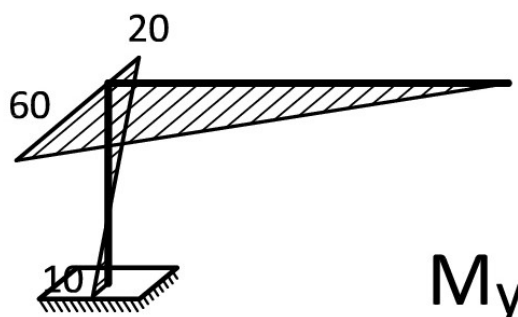
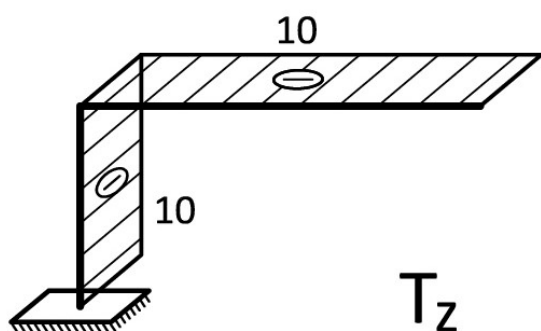
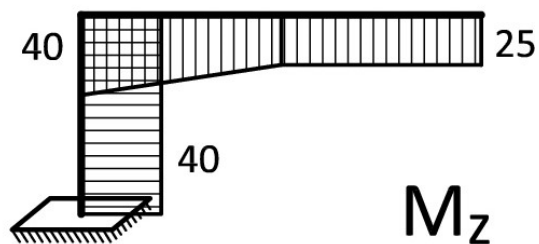
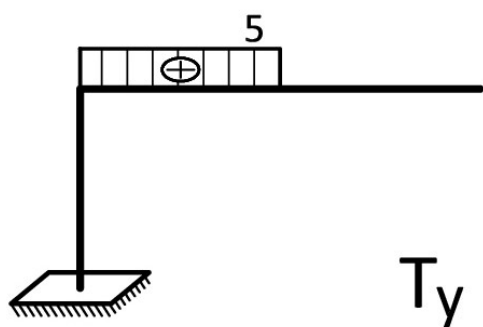
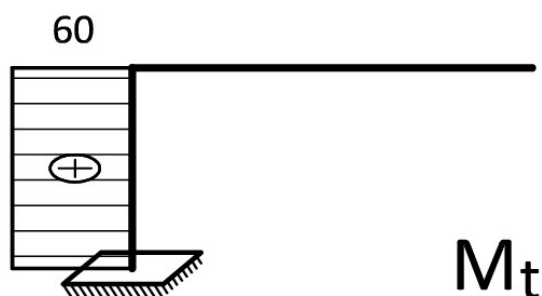
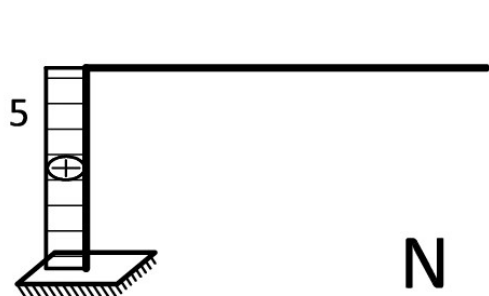
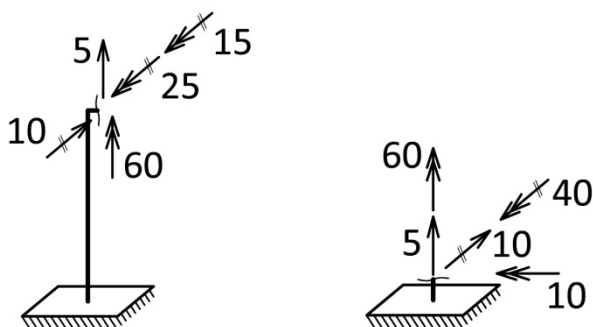
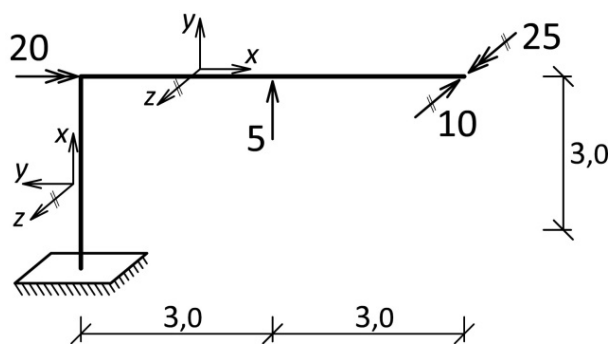
$$\sum F_Y = 0 : Y_A + Y_C = 0 \rightarrow \underline{Y_A = -5}$$

$$\sum M_{B, \text{dec}} = 0 : X_C \cdot 2 - Y_C \cdot 4 = 0 \rightarrow \underline{X_C = 10}$$

$$\sum F_X = 0 : X_A - X_C = 0 \rightarrow \underline{X_A = 10}$$



r)

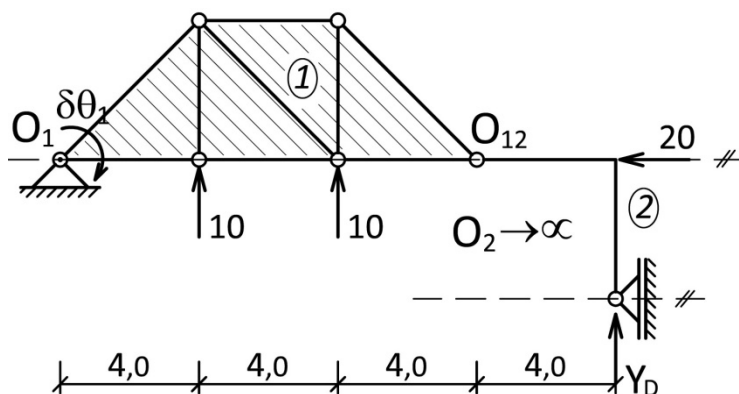


2. ЗАДАТАК (32 %)

б) $Y_D = ?$

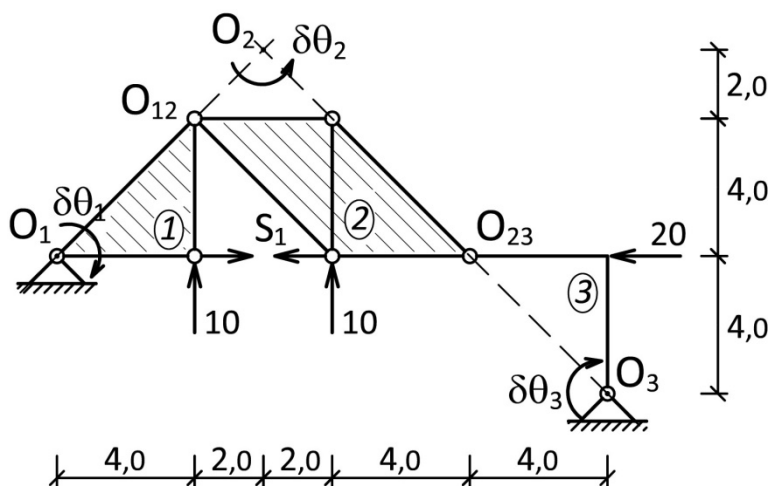
$$O_2 \rightarrow \infty$$

$$\rightarrow \delta\theta_2 = 0$$



$$\delta A = -10 \cdot (4 \cdot \delta\theta_1) - 10 \cdot (8 \cdot \delta\theta_2) - Y_D \cdot (12 \cdot \delta\theta_2) = 0 \rightarrow \underline{Y_D = -10}$$

$S_1 = ?$



$$\delta r_{O_{12},Y} = \delta\theta_1 \cdot 4$$

$$\delta r_{O_{12},Y} = \delta\theta_2 \cdot 2$$

$$\rightarrow \delta\theta_1 = 0.5 \cdot \delta\theta_2$$

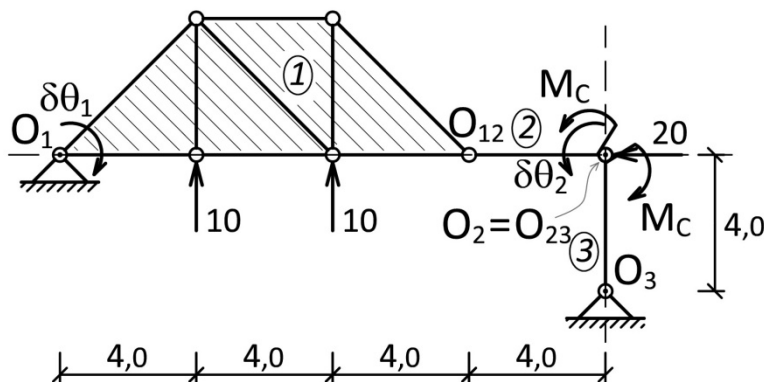
$$\delta r_{O_{23},Y} = \delta\theta_2 \cdot 6$$

$$\delta r_{O_{23},Y} = \delta\theta_3 \cdot 4$$

$$\rightarrow \delta\theta_3 = 1.5 \cdot \delta\theta_2$$

$$\delta A = -10 \cdot (4 \cdot \delta\theta_1) + 10 \cdot (2 \cdot \delta\theta_2) - S_1 \cdot (6 \cdot \delta\theta_2) - 20 \cdot (4 \cdot \delta\theta_3) = 0 \rightarrow \underline{S_1 = -20}$$

$M_C = ?$



$$\delta r_{O_{12},Y} = \delta\theta_1 \cdot 12$$

$$\delta r_{O_{12},Y} = \delta\theta_2 \cdot 4$$

$$\rightarrow \delta\theta_2 = 3 \cdot \delta\theta_1$$

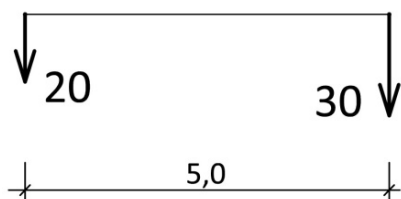
$$O_2 = O_{23}$$

$$\rightarrow \textcircled{3} \text{ неподвижно тело}$$

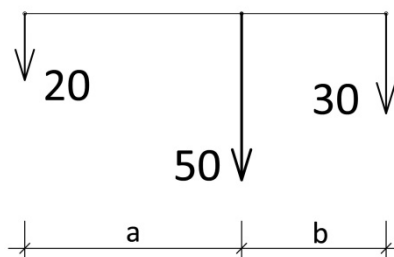
$$\delta A = -10 \cdot (4 \cdot \delta\theta_1) - 10 \cdot (8 \cdot \delta\theta_2) + M_C \cdot \delta\theta_2 = 0 \rightarrow \underline{M_C = 40}$$

3. ЗАДАТАК (18 %)

6)



$$F_R = 20 + 30 = 50$$



$$\frac{30}{20} = \frac{a}{b} \Rightarrow a = 1.5 \cdot b$$

$$1.5 \cdot b + b = 5.0 \quad \rightarrow \quad b = 2.0$$

$$\rightarrow a = 3.0$$