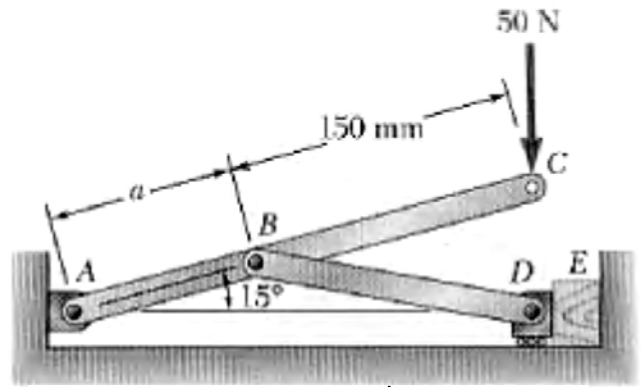


A .

1.

Sila od 50 N djeluje na kraj poluge AC.
Ako je dužina $a=100$ mm odredit veličinu horizontalne sile koja djeluje na gredicu E.
Dužina BD je 150 mm.



2.

Pomoću kočnice prema slici spušta se jednoliko teret Q niz kosinu pod uglom $\alpha=60^\circ$.

Ako je sila F na kraju kočnice jednaka 1000 N, odrediti teret Q koji se može zadržati na kosini ako su zadane veličine:

$r = 20$ cm

$R = 40$ cm

$a = 20$ cm

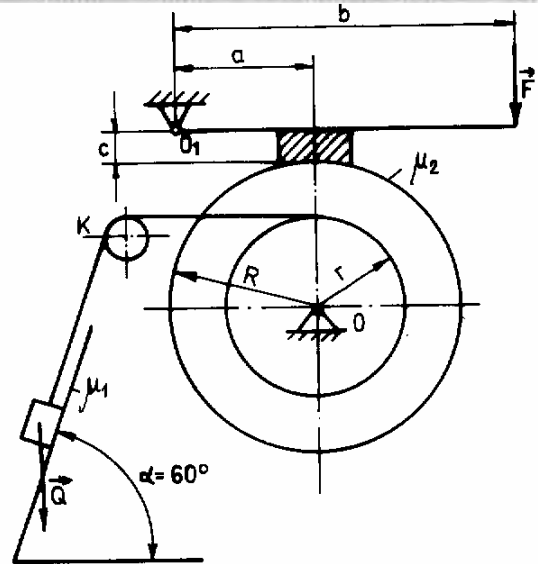
$b = 100$ cm

$c = 8$ cm

$\mu_1 = 0,1$ na kosini

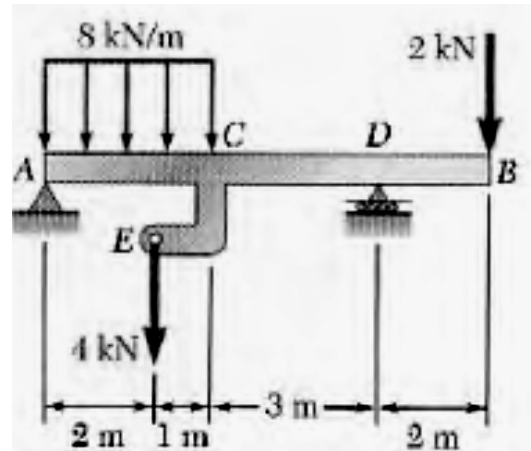
$\mu_2 = 0,3$ na kočnici

Trenje koturače K zanemariti.

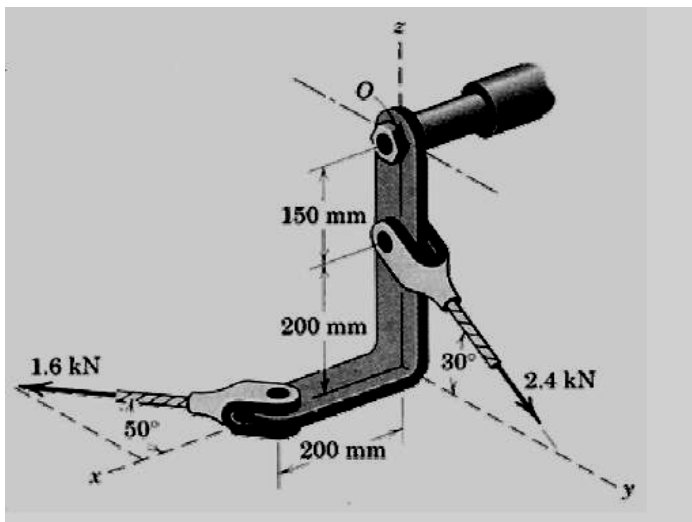


3.

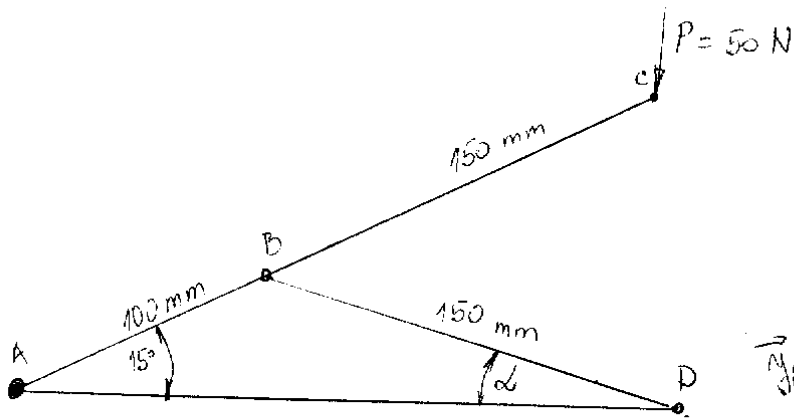
Nacrtati dijagrame momenta savijanja i transferzalne sile u gredi.



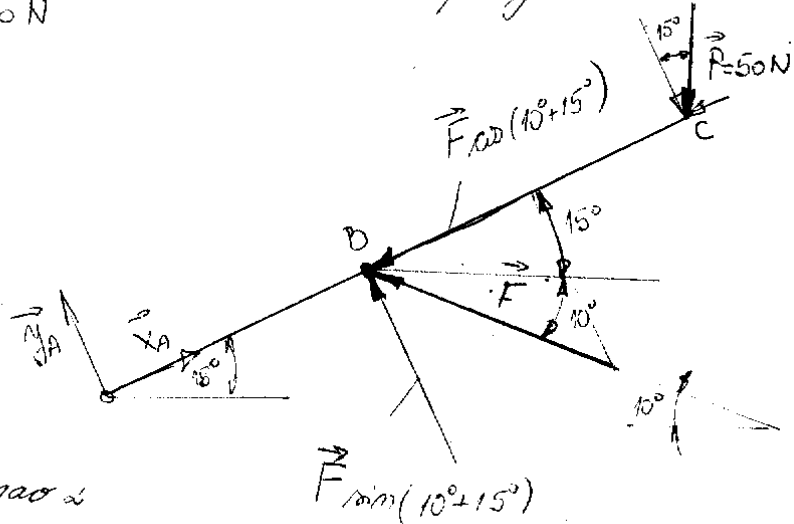
4. Naći komponente glavnog vektora za zglob O i komponente momenta za zglob O.



4. zad. grupa A



Ramoteža poluge ABC



Primjenom sinusne teoreme odredi ne ugao α

$$\frac{\sin \alpha}{100} = \frac{\sin 15^\circ}{150} \quad | \cdot 100$$

$$\sin \alpha = \frac{\sin 15^\circ}{1,5}$$

$$\sin \alpha = 0,17$$

$$\alpha = 9,9^\circ \approx 10^\circ$$

Na polugu \overline{BD} ne djeluje ni raspršena sila, ni moment, pa je poluga \overline{BD} opterećena samo aksijalnom silom \vec{F}

Na osnovu uslova ramoteže:

$\sum M_A = 0$ dobiva se aksijalna sila u poluzi \overline{BD}

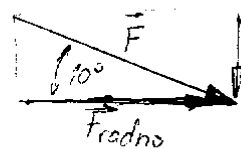
$$F \sin 25^\circ \cdot 100 - P \cos 15^\circ \cdot 250 = 0 \quad | : 100$$

$$F \sin 25^\circ = P \cos 15^\circ \cdot 2,5$$

$$F = \frac{P \cos 15^\circ \cdot 2,5}{\sin 25^\circ}$$

$$F = 234 \text{ N}$$

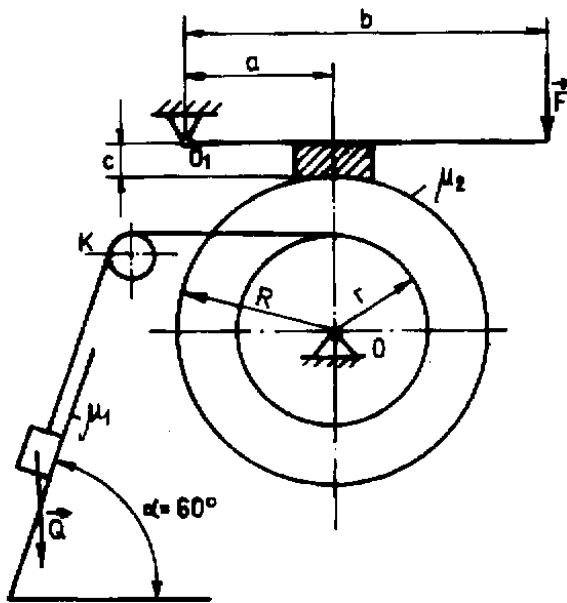
Horizontalna komponenta sile F , koja je jednaka:



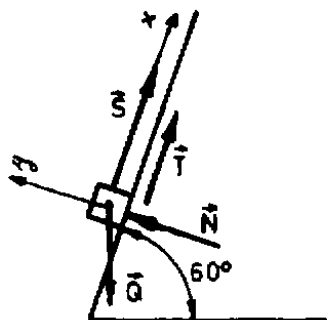
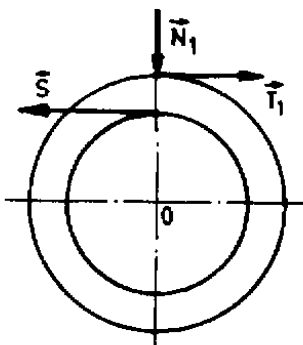
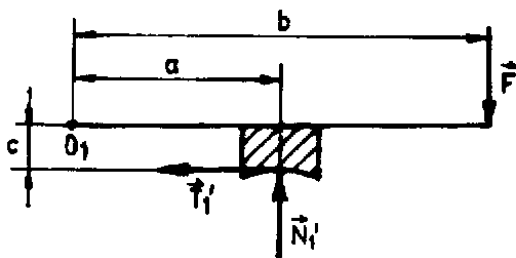
$$F_{\text{radno}} = F \cos 10^\circ$$

$$= 279,7 \text{ N}$$

2.A.



Slika 2.12.1 Kočnica sa dobošem



Pomoću kočnice prema slici spušta se jednoliko teret Q niz kosinu pod uglom $\alpha=60^\circ$.

Ako je sila F na kraju kočnice jednaka 1000 N, odrediti teret Q koji se može zadržati na kosini ako su zadane veličine:

$$r = 20 \text{ cm}$$

$$R = 40 \text{ cm}$$

$$a = 20 \text{ cm}$$

$$b = 100 \text{ cm}$$

$$c = 8 \text{ cm}$$

$$\mu_1 = 0,1 \text{ na kosini}$$

$$\mu_2 = 0,3 \text{ na kočnici}$$

Trenje koturače K zanemariti.

Ravnoteža poluge

$$\sum M_{O_1} = 0 \quad F \cdot b - N_1 a + T_1 c = 0$$

$$T_1 = \mu_2 \cdot N_1 \Rightarrow N_1 = \frac{T_1}{\mu_2}$$

$$F \cdot b - \frac{T_1 a}{\mu_2} + T_1 \cdot c = 0 \quad / \mu_2$$

$$F \cdot b \cdot \mu_2 - T_1 a + T_1 \cdot c \cdot \mu_2 = 0$$

$$T_1 = \frac{F \cdot b \cdot \mu_2}{a - c \cdot \mu_2} = \frac{1 \text{ kN} \cdot 100 \cdot 0,3}{20 - 8 \cdot 0,3}$$

Ravnoteža kočionog doboša

$$\sum M_O = 0 \quad S \cdot r - T_1 \cdot R = 0$$

$$T_1 = 1,7 \text{ kN}$$

$$S = \frac{T_1 \cdot R}{r} = \frac{1,7 \cdot 40}{20} = 3,4 \text{ kN}$$

Ravnoteža tereta Q

$$\sum X = 0 \quad S + T - Q \sin 60^\circ = 0 \dots\dots\dots(1)$$

$$\sum Y = 0 \quad N - Q \cos 60^\circ = 0 \dots\dots\dots(2)$$

$$T = \mu_1 N = \mu_1 Q \cos 60^\circ \dots\dots\dots(3)$$

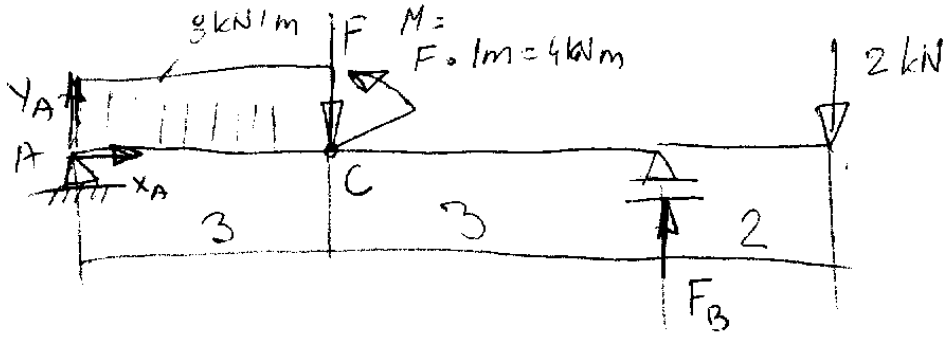
Iz (1) i (3)

$$S + \mu_1 Q \cos 60^\circ - Q \sin 60^\circ = 0$$

$$S = Q (\sin 60^\circ - \mu_1 \cos 60^\circ)$$

$$Q = \frac{S}{0,866 - 0,05} = 9,3 \text{ kN}$$

3. zad. grupa A



1. $\sum X = 0 \quad X_A = 0$

$\sum Y = 0 \quad Y_A - 24 - 4 + F_B - 2 = 0$

2. $\sum M_A = 0 \quad -24 \cdot 1,5 - 4 \cdot 3 + 4 + F_B \cdot 6 - 2 \cdot 8 = 0$
 $-36 - 12 + 4 - 16 + 6F_B = 0$

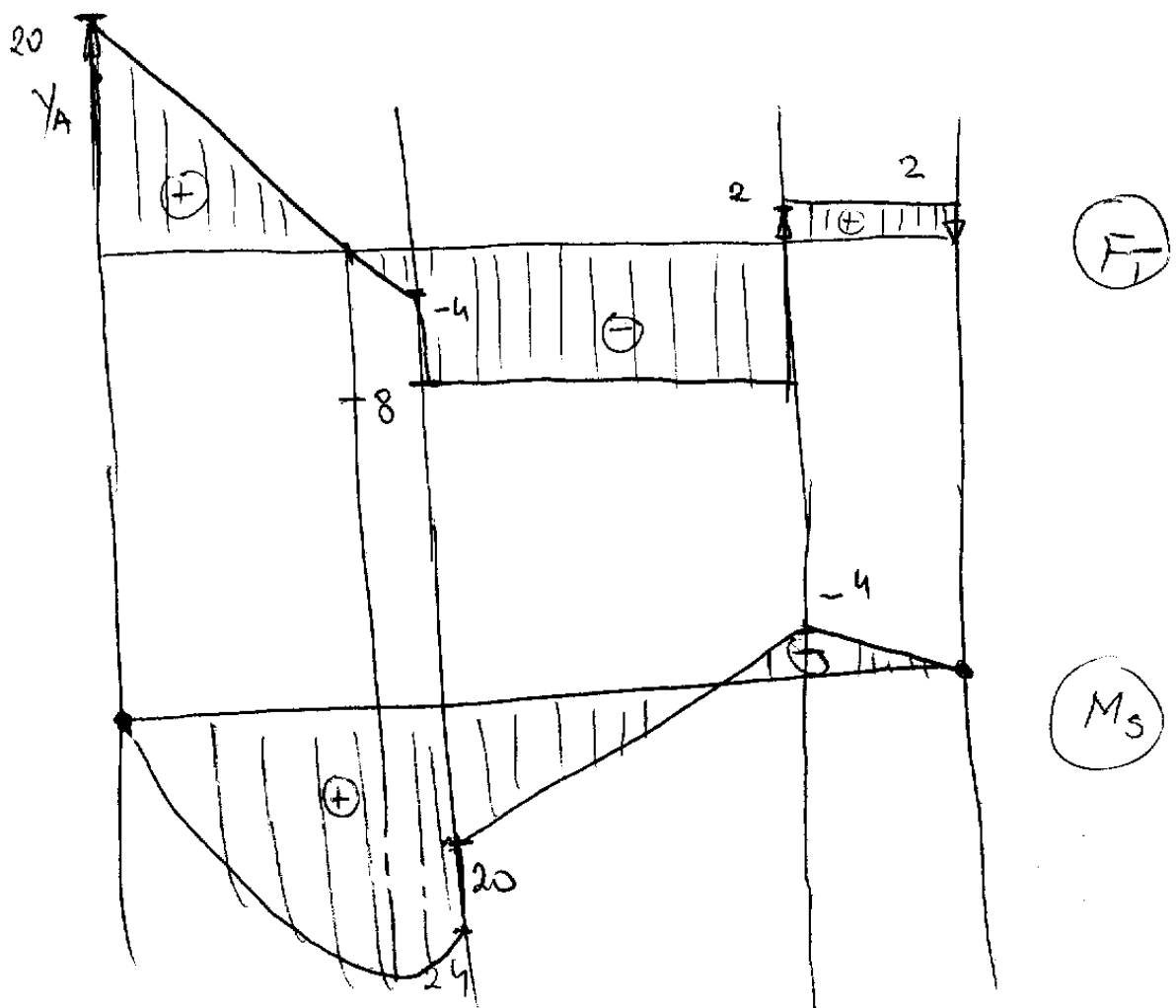
$6F_B = +60$

$F_B = 10$

$F_B + Y_A = 24 + 4 + 2$

$Y_A = 30 - F_B = 20$

$M_{C-} = Y_A \cdot 3 - 24 \cdot 1,5$
 $= 60 - 36$
 $= 24$



4. grupa A

$$F_x = 1,6 \text{ kN} \cdot \cos 50^\circ$$

$$F_y = 2,4 \text{ kN} \cdot \cos 30^\circ - 1,6 \text{ kN} \cdot \sin 50^\circ$$

$$F_z = -2,4 \text{ kN} \cdot \sin 30^\circ$$

$$M_x = 2,4 \text{ kN} \cdot \cos 30^\circ \cdot 200 \text{ mm}$$

$$M_y = 0$$

$$M_z = 2,4 \text{ kN} \cdot \cos 30^\circ \cdot 150 \text{ mm} - 1,6 \text{ kN} \cdot \sin 50^\circ \cdot 350 \text{ mm}$$