

Def 2

equilibrium

$$\sum \vec{F}_x = 0 \Leftrightarrow F_{1,x} = F_{2,x} \Leftrightarrow F_1 \cdot \cos 35^\circ = F_2 \cdot \cos 70^\circ \Leftrightarrow F_1 = \frac{F_2 \cdot \cos 70^\circ}{\cos 35^\circ}$$

$$\sum \vec{F}_y = 0 \Leftrightarrow 5000 = F_{1,y} + F_{2,y} \Leftrightarrow 5000 = F_1 \cdot \cos 35^\circ + F_2 \cdot \cos 70^\circ$$

$$\Leftrightarrow 5000 = F_2 \cdot \frac{\cos 70^\circ \cdot \cos 35^\circ}{\cos 35^\circ} + F_2 \cdot \cos 70^\circ$$

$$\Leftrightarrow 5000 = F_2 \cdot \cos 70^\circ \cdot \frac{\cos 35^\circ}{\cos 35^\circ} + F_2 \cdot \cos 70^\circ$$

$$\Leftrightarrow 5000 = F_2 \cdot (\cos 70^\circ \cdot \frac{\cos 35^\circ}{\cos 35^\circ} + \cos 70^\circ)$$

$$\Leftrightarrow F_2 = \frac{5000}{3000} = 2969$$

$$\Rightarrow F_1 = 4864$$

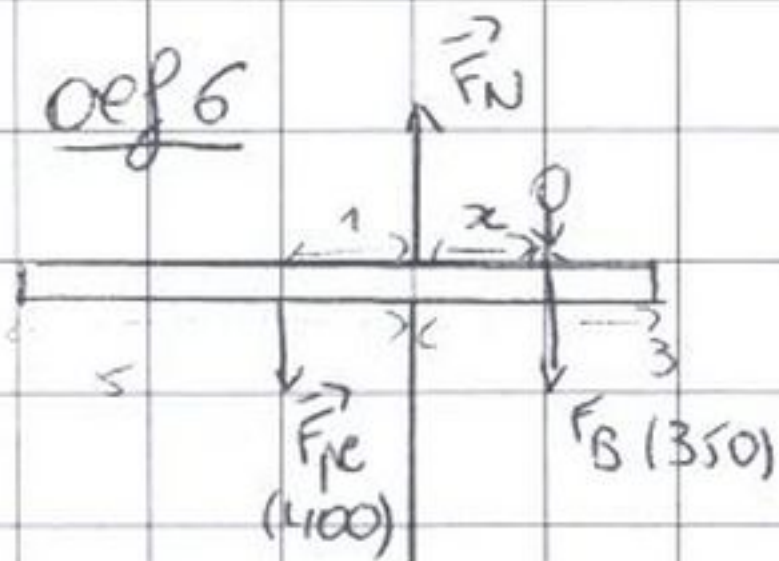
Def 4b)

$$2 \cdot F_{\max} \cdot \cos \alpha = F_2$$

$$2 \cdot 9,0 \cdot 10^4 \cdot \cos \alpha = 7,5 \cdot 10^4$$

$$\cos \alpha = \frac{7,5 \cdot 10^4}{18 \cdot 10^4} \rightarrow \alpha = 24^\circ 37' 28'' \times 2 = 48^\circ \quad 180 - 48 = 132$$

Def 6

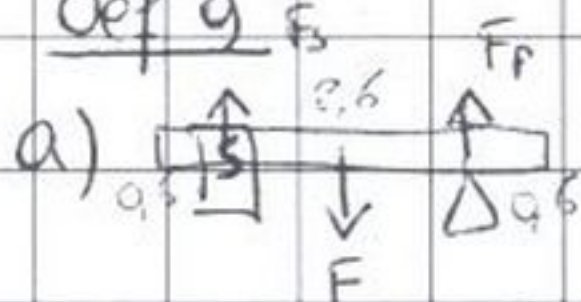


$$\sum \tau = 0$$

$$400 \cdot 1 = 350 \cdot x$$

$$\Leftrightarrow x = 1,14$$

Def 9



$$\sum \tau = 0$$

$$F \cdot 1,3 = F_P \cdot 2,6$$

$$\frac{94 \cdot 1,3}{2,6} = F_P = 47 \text{ N}$$

b)



$$\sum \tau = 0$$

$$94 \cdot \cos 20^\circ \cdot 1,3 = F \cdot 2,2$$

$$F_{2,y} = F \cdot \cos 20^\circ = 88,33 \text{ N}$$

$$F_{2,y} \cdot 1,3 = F \cdot 2,2$$

$$F = 52,2$$

c)

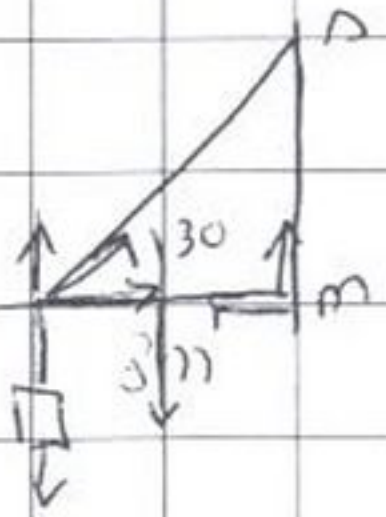


$$F_{S,y} + F_y = F$$

$$F_{S,x} = F \cdot \cos 20^\circ$$

$\alpha =$

oef 15

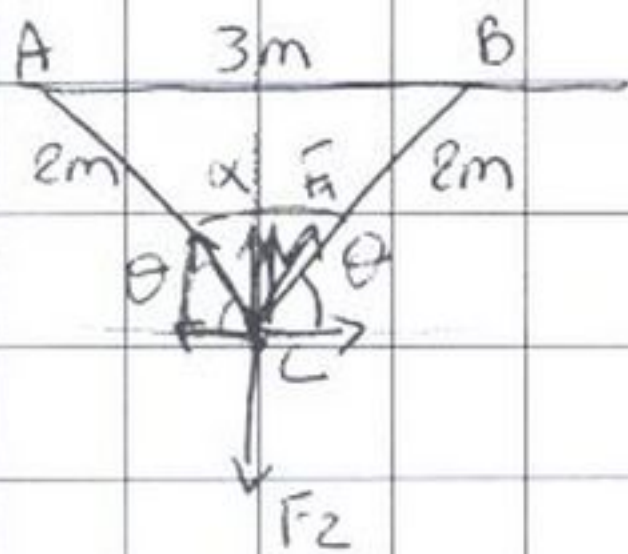


$$\Sigma \Pi = F_{1,y} \cdot 8 = 500 \cdot 8 = 600 \text{ N}$$

$$F_{1,y} = 500 \text{ N}$$

$$F_{1,x} = F_{1,y} \cdot \tan 30 = 306 \text{ N}$$

oef 18



~~18~~

$$F_1 = F_2$$

$$AB^2 = AC^2 + BC^2 - 2AC \cdot BC \cdot \cos \alpha$$

$$\alpha = 98^\circ$$

$$180 - \alpha = 2\theta = 180 - 98 = 82$$

$$\theta = 41^\circ$$

$$\Sigma \vec{F}_y = 0 \quad 2F_y = F_z = 2F_y = 200 \Leftrightarrow F_y = 100$$

$$F = F_y \cdot \cos 41 = 75 \text{ N}$$

oef 19

$$\vec{F}_1 = 15 \vec{e}_x$$

$$\vec{F}_2 = 6,9 \vec{e}_x + 4 \vec{e}_y$$

$$\vec{F}_3 = -3 \vec{e}_x + 5,2 \vec{e}_y$$

$$F_2 = 5,1 \vec{e}_x - 1,2 \vec{e}_y$$

$$\tan \alpha = \frac{1,2}{5,1} \Rightarrow \alpha = 13^\circ 14' 26''$$