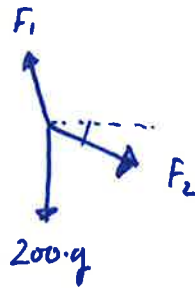
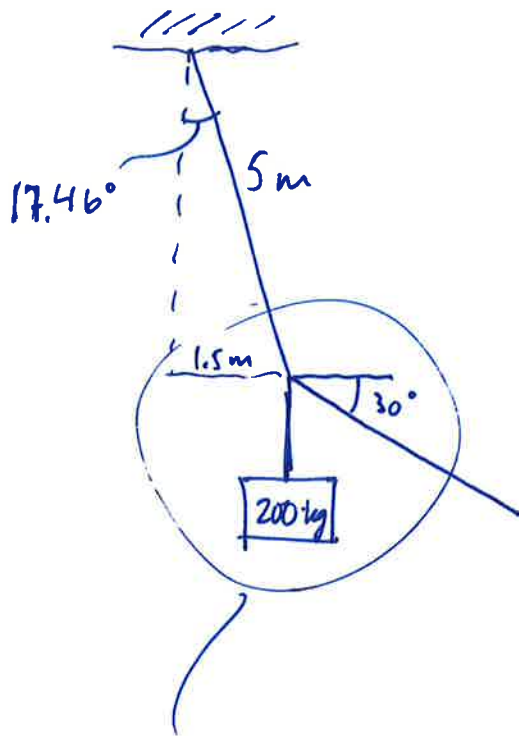
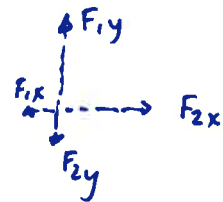


1)



komponen ter:



$$\rightarrow : F_{2x} - F_{1x} = 0$$

$$F_{2x} = F_{1x} \quad (1)$$

$$\uparrow : F_{1y} - F_{2y} - 200g = 0 \quad (2)$$

$$F_{2x} = F_2 \cdot \cos 30^\circ$$

$$F_{1x} = F_1 \cdot \sin 17.46^\circ = F_1 \cdot \frac{1.5}{5} = \underline{\underline{0.3 F_1}}$$

$$(1) \Rightarrow F_2 \cdot \cos 30^\circ = 0.3 \cdot F_1 \Rightarrow F_1 = \frac{F_2 \cdot \cos 30^\circ}{0.3} \quad (3)$$

$$F_{1y} = F_1 \cdot \cos 17.46^\circ = F_1 \cdot 0.953939$$

$$F_{2y} = F_2 \cdot \sin 30^\circ = F_2 \cdot 0.5$$

$$(3) : (4) \Rightarrow$$

$$(2) \Rightarrow F_1 \cdot 0.953939 - F_2 \cdot 0.5 - 200g = 0 \quad (4)$$

$$F_2 \cdot \frac{\cos 30^\circ}{0.3} \cdot 0.953939 - F_2 \cdot 0.5 - 200g = 0$$

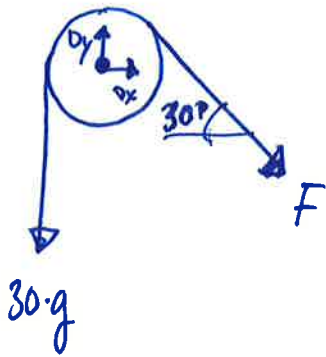
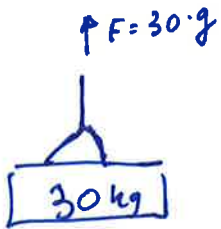
$$\left( F_1 = \frac{870.5 \cdot \cos 30^\circ}{0.3} = \underline{\underline{2513 N}} \right)$$

$$\| F_2 = \underline{\underline{870.5 N}} \|$$

2)

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Trissa med radie R



$$F \cdot R - 30 \cdot g \cdot R = 0$$

$$R \cdot (F - 30g) = 0 \quad \text{eftersom } R \neq 0 \Rightarrow$$

$$F - 30 \cdot g = 0 \quad F = 30 \cdot g = \underline{\underline{294.3 \text{ N}}}$$

$$\uparrow: -30 \cdot g - F \cdot \sin 30^\circ + O_y = 0$$

$$-30 \cdot g - 30 \cdot g \cdot \sin 30^\circ + O_y = 0$$

$$O_y = 30g + 30 \cdot g \cdot \sin 30^\circ = 45 \cdot g = \underline{\underline{441.45 \text{ N}}}$$

$$\rightarrow O_x + F \cdot \cos 30^\circ = 0 \quad \begin{aligned} O_x &= -F \cdot \cos 30^\circ = \\ &= -30 \cdot g \cdot \cos 30^\circ = \\ &= \underline{\underline{-254.9 \text{ N}}} \end{aligned}$$

Svar: Kraften i linan är  $30 \cdot g = 294.3 \text{ N}$  (drag)  
 Kraften från stödet är  $O_y = 441.45 \text{ N}$  (upp)  
 $O_x = 254.9 \text{ N}$  (vänster)

3/

3/6

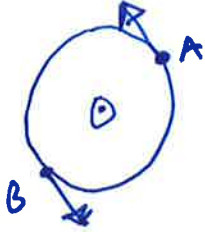
a)



$$-6 \cdot 0.2 - 6 \cdot 0.2 = -2.4 \text{ Nm}$$

Momentet kring O är 2.4 Nm moturs.

b)



$$\widehat{B}: -6 \cdot 0.4 = -2.4 \text{ Nm}$$

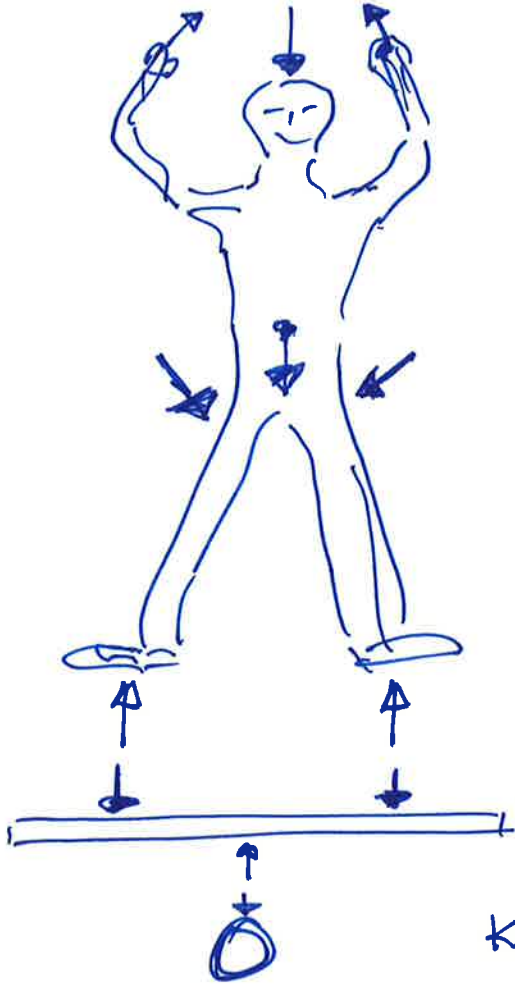
Momentet kring B är 2.4 Nm moturs.

c)

Samma resultat oavsett moment punkt.

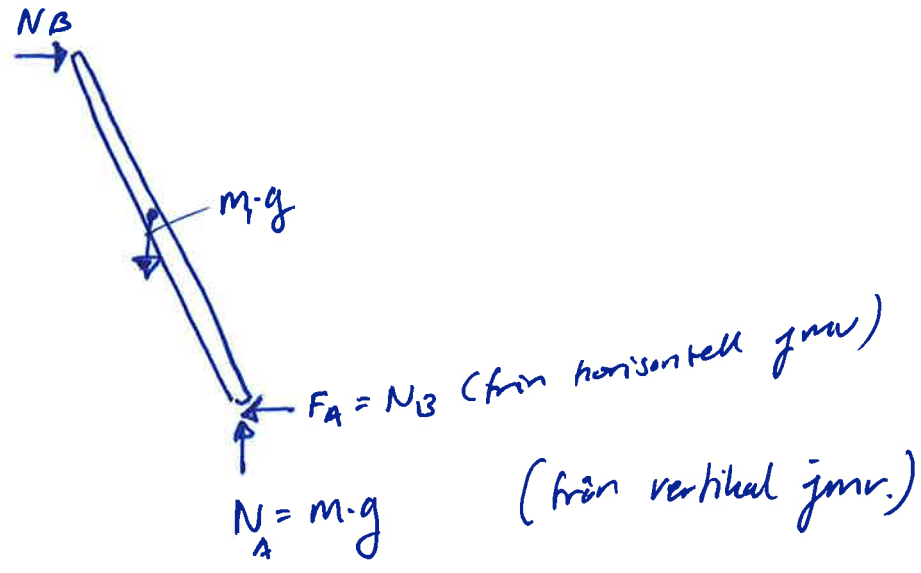
4.

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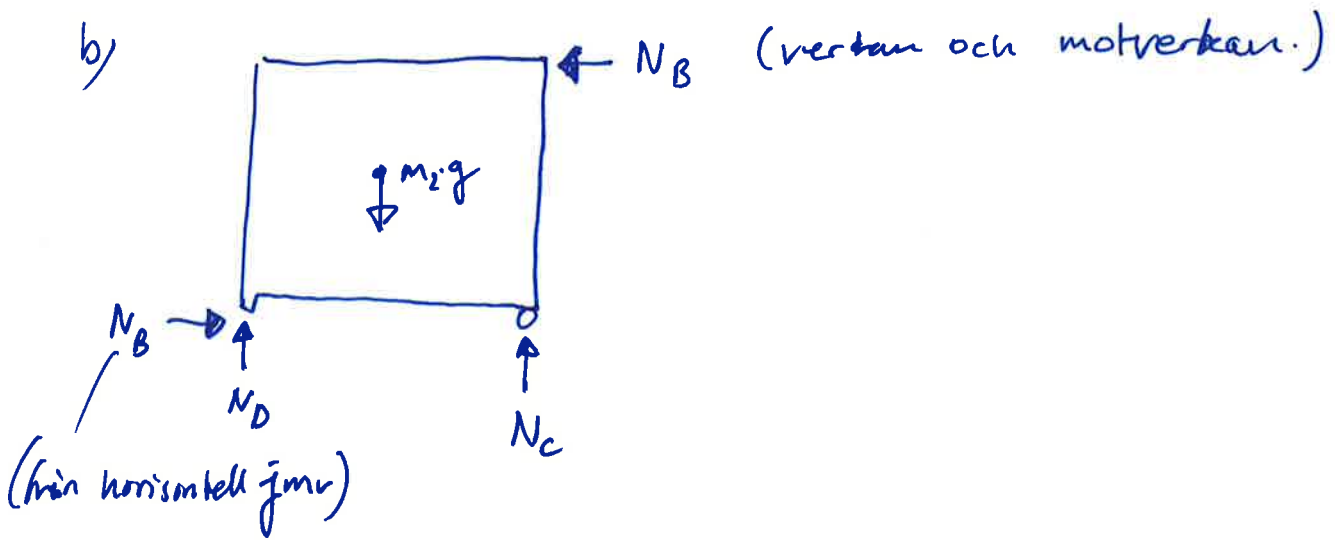


Kraften på röret = tyngden av utrustningen + 4 akrobater

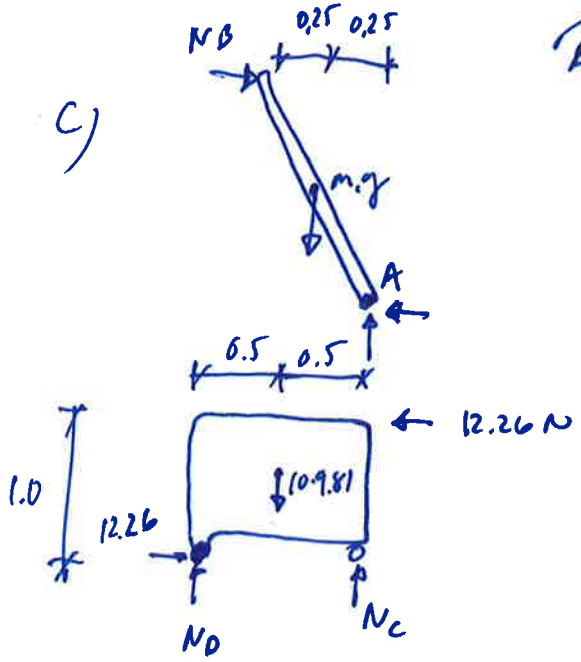
5) a)



b)



c)



$$\overset{A}{\curvearrowright} N_B \cdot 1 - 5 \cdot 0.25 \cdot 9.81 = 0$$

$$N_B = 12.26 \text{ N}$$

$$\overset{A}{\curvearrowright} 10 \cdot 9.81 \cdot 0.5 - 12.26 \cdot 1 - N_C \cdot 1 = 0$$

$$N_C = 36.79 \text{ N}$$

$$\uparrow: N_D + N_C - 10 \cdot 9.81 = 0$$

$$N_D = 10 \cdot 9.81 - N_C = \underline{\underline{61.31 \text{ N}}}$$

6) Spänningen är  $\sigma = \frac{F}{A} = \frac{1000}{10 \cdot 10} = 10 \text{ N/mm}^2 = 10 \text{ MPa}$

Hållfastheten = 50 MPa OK?

a) Drag OK?

b) Tryck: kontrollera om lasten är större än knäckningslasten,  $P_{cr}$ .

$$P_{cr} = \frac{\pi^2 EI}{L^2} \quad \text{med } I = \frac{bh^3}{12}$$

$$P_{cr} = \frac{\pi^2 \cdot \overbrace{10 \cdot 1000 \cdot 10^6}^{\text{"E"}} \cdot \left( \overbrace{0.010 \cdot 0.010^3}^{\text{"I"}} \right)}{0.5^2} =$$

$$= \underline{\underline{329 \text{ N}}}$$

Men lasten är 1000 N.

Alltså knäckning vid tryck!