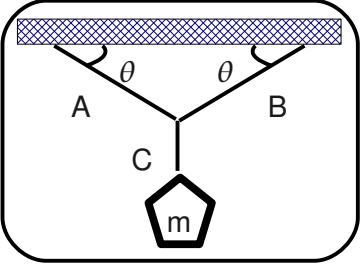
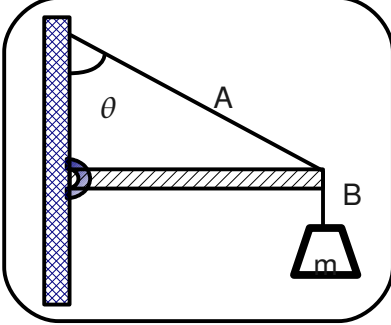
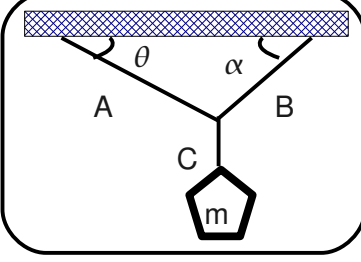
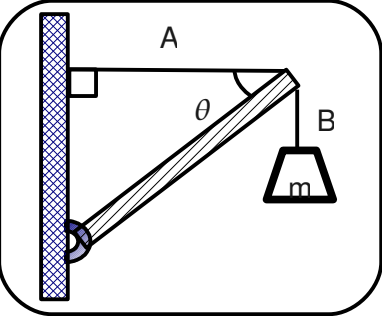
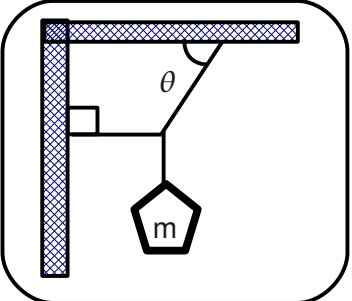
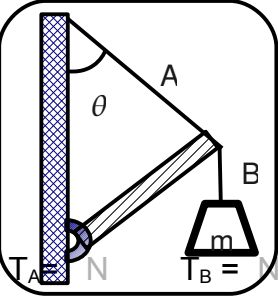
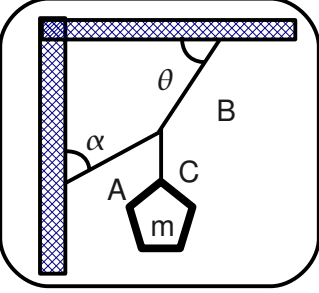
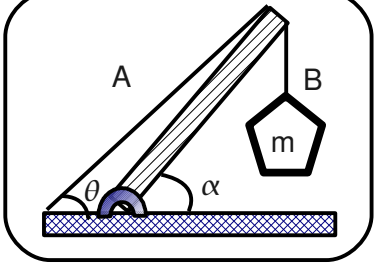


Determine as tensões nas cordas e a força exercida sobre a escora pela articulação, quando for o caso. Desprezar os pesos das barras e das cordas.

Condição de equilíbrio de uma partícula. $\Sigma F_x = 0$ e $\Sigma F_y = 0$

<p>1) Dados: $m = 30,0 \text{ kg}$; $\theta = 45^\circ$</p>  <p>$T_A = T_B = 213 \text{ N}$</p>	<p>5) Dados: $m = 40,0 \text{ kg}$; $\theta = 60^\circ$</p>  <p>$T_A = 800 \text{ N}$ $T_B = 693 \text{ N}$</p>
<p>2) Dados: $m = 30,0 \text{ kg}$; $\theta = 30^\circ$; $\alpha = 45^\circ$</p>  <p>$T_A = 146 \text{ N}$ e $T_B = 179 \text{ N}$</p>	<p>6) Dados: $m = 60,0 \text{ kg}$; $\theta = 30^\circ$</p>  <p>$T_A = 1038 \text{ N}$, $T_B = 1200 \text{ N}$</p>
<p>3) Dados: $m = 20,0 \text{ kg}$; $\theta = 45^\circ$</p>  <p>$T_A = 200 \text{ N}$ e $T_B = 282 \text{ N}$</p>	<p>7) Dados: $m = 80,0 \text{ kg}$; $\theta = 30^\circ$</p>  <p>$T_A = \text{N}$ $T_B = \text{N}$</p>
<p>4) Dados: $m = 20,0 \text{ kg}$; $\theta = 45^\circ$; $\alpha = 60^\circ$</p>  <p>$T_A = \text{N}$ $T_B = \text{N}$</p>	<p>8) Dados: $m = 30,0 \text{ kg}$; $\theta = 30^\circ$; $\alpha = 45^\circ$</p>  <p>$T_A = \text{N}$ $T_B = \text{N}$</p>

ESTÁTICA DA PARTÍCULA

1

$\sum F_x = T_{B_x} - T_{A_x} = 0 \Rightarrow T_B \cdot \cos 45^\circ - T_A \cos 45^\circ = 0 \Rightarrow T_B \frac{\sqrt{2}}{2} = T_A \frac{\sqrt{2}}{2} \Rightarrow T_A = T_B$

$\sum F_y = T_{B_y} + T_{A_y} - T_C = 0 \Rightarrow T_B \sin 45^\circ + T_A \sin 45^\circ - 300 = 0 \Rightarrow$
 $T_A \frac{\sqrt{2}}{2} + T_A \frac{\sqrt{2}}{2} - 300 = 0 \Rightarrow 2\sqrt{2} T_A = 600 \Rightarrow T_A = \frac{300 \text{ N}}{\sqrt{2}} = T_B = 213 \text{ N}$

2

$\sum F_x = T_B \cos 45^\circ - T_A \cos 30^\circ = 0 \Rightarrow T_B \cdot \frac{\sqrt{2}}{2} - T_A \frac{\sqrt{3}}{2} = 0 \Rightarrow T_A = \frac{\sqrt{2}}{\sqrt{3}} T_B$ ①

$\sum F_y = T_A \sin 30^\circ + T_B \sin 45^\circ - 200 = 0 \Rightarrow \left(T_A \frac{1}{2} + T_B \frac{\sqrt{2}}{2} - 200 = 0 \right) \times 2$
 $T_A + \sqrt{2} T_B = 400 \Rightarrow$ substituindo T_A por $\frac{\sqrt{2}}{\sqrt{3}} T_B$ temos:
 $\left(\frac{\sqrt{2}}{\sqrt{3}} T_B + \sqrt{2} T_B = 400 \right) \times \sqrt{3} \Rightarrow \sqrt{2} T_B + \sqrt{6} T_B = \sqrt{3} \cdot 400 \Rightarrow T_B = \frac{1,73 \cdot 400}{3,86}$
 $T_B \approx 179,3 \text{ N}$ $T_A = 0,82 \cdot 179,3 \approx 146,4 \text{ N} \Rightarrow T_A = 146,4 \text{ N}$

3

$\sum F_x = T_B \cos 45^\circ - T_A = 0 \Rightarrow T_B \cdot \frac{\sqrt{2}}{2} = T_A$ ①

$\sum F_y = T_B \sin 45^\circ - 200 = 0 \Rightarrow T_B \frac{\sqrt{2}}{2} = 200 \Rightarrow T_B = \frac{400}{\sqrt{2}} = \frac{\sqrt{2} \cdot 400}{\sqrt{2} \cdot \sqrt{2}} = \frac{\sqrt{2} \cdot 200 \text{ N}}{2}$ ou 282 N

$T_A = \sqrt{2} \cdot 200 \cdot \frac{\sqrt{2}}{2} = \frac{\sqrt{2} \cdot \sqrt{2} \cdot 200}{2} = \frac{2 \cdot 200}{2} = 200 \text{ N}$

4

$\sum F_x = T_A \cos 45^\circ - T_B \cos 30^\circ = 0$ $\begin{cases} 0,71 T_A - 0,87 T_B = 0 \\ 0,71 T_A - 0,5 T_B = 200 \end{cases}$

$\sum F_y = T_A \sin 45^\circ - T_B \sin 30^\circ - 200 = 0$

$T_A = 642 \text{ N}$
 $T_B = 541 \text{ N}$

Extra

Nó ① $\begin{cases} \sum F_x = T_C \cos 53^\circ - T_C \cos 53^\circ = 0 \\ \sum F_y = T_C \sin 53^\circ + T_C \sin 53^\circ - 200 = 0 \end{cases}$

Nó ② $\begin{cases} \sum F_x = T_B - T_A \cos 37^\circ + T_C \cos 53^\circ = 0 \\ \sum F_y = T_A \sin 37^\circ - T_C \sin 53^\circ = 0 \end{cases}$

5

$\sum F_x = F_C - T_A \cos 30^\circ = 0 \Rightarrow F_C = T_A \frac{\sqrt{3}}{2}$ ①

$\sum F_y = T_A \sin 30^\circ - 400 = 0 \Rightarrow T_A \cdot \frac{1}{2} = 400 \Rightarrow T_A = 800 \text{ N}$

$F_C = \sqrt{3} \cdot 400 \text{ N}$ ou 709 N

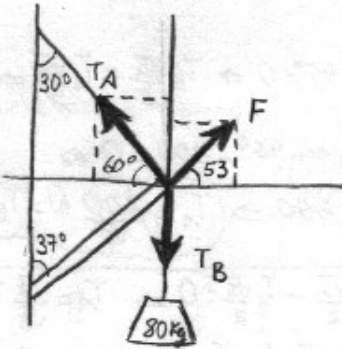
6

$\sum F_x = F_C \cos 30^\circ - T_A = 0 \Rightarrow F_C \frac{\sqrt{3}}{2} = T_A$

$\sum F_y = F_C \sin 30^\circ - 600 = 0 \Rightarrow \frac{F_C}{2} = 600 \Rightarrow F_C = 1200 \text{ N}$

$T_A = \sqrt{3} \cdot 600 \text{ N}$ ou 1038 N

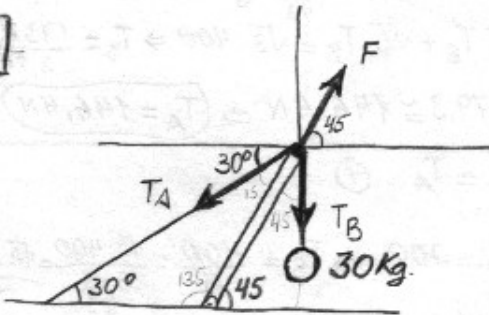
7



$$\begin{aligned} \sum F_x = F_x + T_{Ax} = 0 &\Rightarrow F \cdot \cos 53^\circ - T_A \cdot \cos 60^\circ = 0 \\ \sum F_y = F_y + T_{Ay} - 800 = 0 &\Rightarrow F \sin 53^\circ + T_A \sin 60^\circ = 800 \end{aligned}$$

$$\begin{cases} 0,60F - 0,5T_A = 0 \\ 0,80F + 0,87T_A = 800 \end{cases} \quad \begin{aligned} F &= 434 \text{ N} \\ T_A &= 521 \text{ N} \end{aligned}$$

8



$$\begin{aligned} \sum F_x = F_x - T_{Ax} = 0 &\Rightarrow F \cos 45^\circ - T_A \cos 30^\circ = 0 \\ \sum F_y = F_y - T_{Ay} - P = 0 &\Rightarrow F \sin 45^\circ - T_A \sin 30^\circ = 300 \end{aligned}$$

$$\begin{cases} 0,71F - 0,87T_A = 0 \quad (-1) \\ 0,71F - 0,50T_A = 300 \end{cases}$$

$$0,37T_A = 300 \Rightarrow T_A = 811 \text{ N}$$

$$F = \frac{0,87 \times 811}{0,71} \Rightarrow F = 994 \text{ N}$$