

Curso Mentor

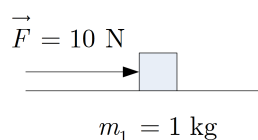
Tema: Dinâmica V

Professor: Leonardo Santos

Data: 1 de novembro de 2013

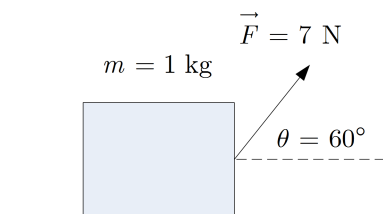
O objetivo em cada questão é calcular todas as forças envolvidas no sistema (normal, peso, tração etc.) e a aceleração do conjunto. Para todos os problemas, considere $g = 10 \text{ m/s}^2$.

Q1. Não há atrito.



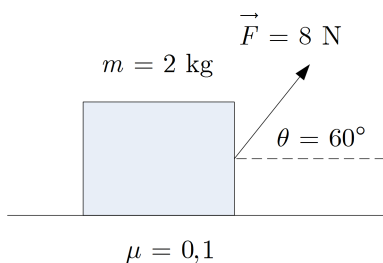
Q2. Não há atrito.

Dados: $\cos 60^\circ = \frac{1}{2}$ e $\sin 60^\circ = \frac{\sqrt{3}}{2}$.

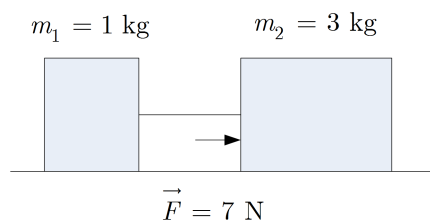


Q3. Há atrito.

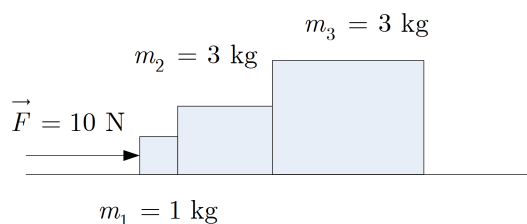
Dados: $\cos 60^\circ = \frac{1}{2}$ e $\sin 60^\circ = \frac{\sqrt{3}}{2}$.



Q4. Não há atrito.

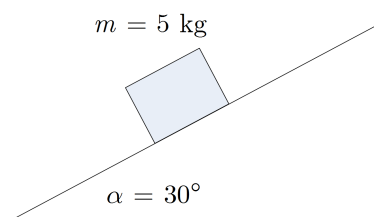


Q5. Não há atrito.



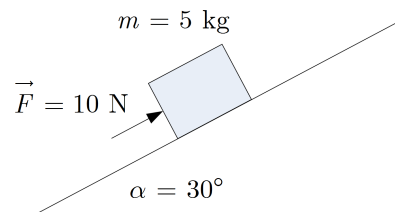
Q6. Não há atrito.

Dados: $\sin 30^\circ = \frac{1}{2}$ e $\cos 30^\circ = \frac{\sqrt{3}}{2}$.

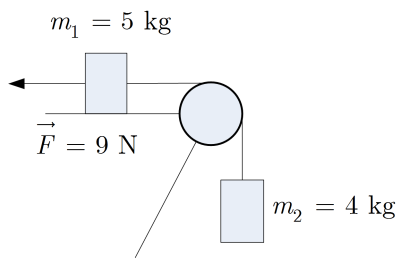


Q7. Não há atrito entre o bloco e a superfície. A força aplicada é paralela ao plano inclinado.

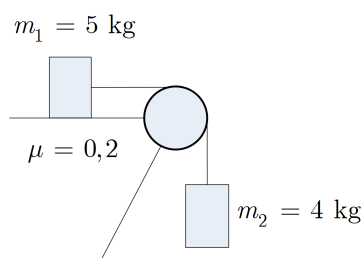
Dados: $\sin 30^\circ = \frac{1}{2}$ e $\cos 30^\circ = \frac{\sqrt{3}}{2}$.



Q8. Não há atrito.

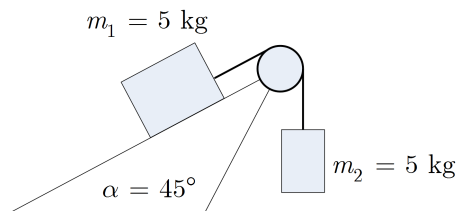


Q9. Há atrito entre o bloco e a superfície.



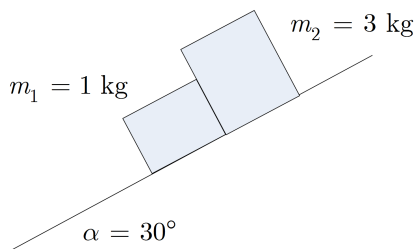
Q10. Não há atrito.

Dados: $\sin 45^\circ = \cos 45^\circ = \frac{\sqrt{2}}{2}$.



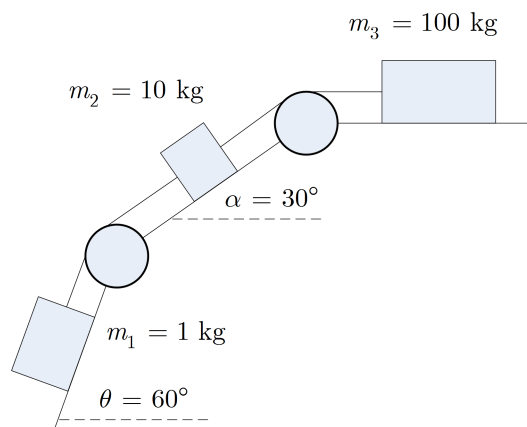
Q11. Não há atrito.

Dados: $\sin 30^\circ = \frac{1}{2}$ e $\cos 30^\circ = \frac{\sqrt{3}}{2}$.



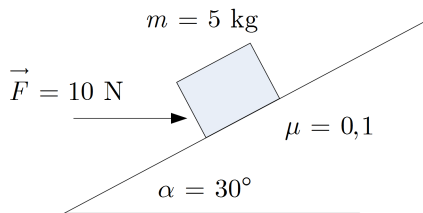
Q12. Não há atrito.

Dados: $\sin 30^\circ = \frac{1}{2}$, $\cos 30^\circ = \frac{\sqrt{3}}{2}$, $\cos 60^\circ = \frac{1}{2}$ e $\sin 60^\circ = \frac{\sqrt{3}}{2}$.



Q13. Há atrito. A força \vec{F} é paralela ao plano horizontal.

Dados: $\sin 30^\circ = \frac{1}{2}$, $\cos 30^\circ = \frac{\sqrt{3}}{2}$, $\cos 60^\circ = \frac{1}{2}$ e $\sin 60^\circ = \frac{\sqrt{3}}{2}$.



GABARITO

Q1. $a = 10 \text{ m/s}^2$; $N = 10 \text{ N}$; $P = 10 \text{ N}$

Q2. $a = \frac{7}{2} \text{ m/s}^2$; $N = 10 - \frac{7\sqrt{3}}{2} \text{ N}$; $P = 10 \text{ N}$

Q3. $a = 1 + \frac{\sqrt{3}}{5} \text{ m/s}^2$; $N = 20 - 4\sqrt{3} \text{ N}$; $f_{at} = 2 - \frac{2\sqrt{3}}{5} \text{ N}$; $P = 20 \text{ N}$

Q4. $N_1 = P_1 = 10 \text{ N}$; $N_2 = P_2 = 30 \text{ N}$; $T_1 = T_2 = \frac{7}{4} \text{ N}$; $a = \frac{7}{4} \text{ m/s}^2$

Q5. $N_1 = P_1 = 10 \text{ N}$; $N_2 = P_2 = 30 \text{ N}$; $N_3 = P_3 = 30 \text{ N}$; $F_{1,2} = \frac{60}{7} \text{ N}$; $F_{2,3} = \frac{30}{7} \text{ N}$; $a = \frac{10}{7} \text{ m/s}^2$

Q6. $N = 25\sqrt{3}$ N; $P = 50$ N; $a = 5$ m/s²

Q7. $N = 25\sqrt{3}$ N; $P = 50$ N; $a = 3$ m/s²
com o bloco descendo o plano inclinado.

Q8. $N_1 = P_1 = 50$ N; $P_2 = 40$ N;
 $T_1 = T_2 = \frac{236}{9}$ N; $a = \frac{31}{9}$ m/s² com o bloco
2 descendo.

Q9. $N_1 = P_1 = 50$ N; $P_2 = 40$ N;
 $T_1 = T_2 = \frac{80}{3}$ N; $f_{at} = 10$ N; $a = \frac{10}{3}$ m/s²
com o bloco 2 descendo.

Q10. $N_1 = 25\sqrt{2}$ N; $P_1 = 50$ N; $P_2 = 50$
N; $T_1 = T_2 = \frac{50+25\sqrt{2}}{2}$ N; $a = \frac{10-5\sqrt{2}}{2}$ m/s²
com o bloco 2 descendo.

Q11. $N_1 = 5\sqrt{3}$ N; $P_1 = 10$ N; $N_2 = 15\sqrt{3}$
N; $P_2 = 30$ N; $F_{1,2} = F_{2,1} = 0$ N; $a = 5$ m/s²

Q12. $N_1 = 5$ N; $P_1 = 10$ N; $P_2 = 100$
N; $N_2 = 50\sqrt{3}$ N; $N_3 = P_3 = 1000$
N; $a = \frac{5(\sqrt{3}+10)}{111}$ m/s² com o bloco 3 des-
cendo; $T_3 = \frac{500(\sqrt{3}+10)}{111}$ N; $T_1 = \frac{10(55\sqrt{3}-1)}{111}$ N;

Q13. $N = 30$ N; $P = 50$ N; $f_{at} = 3$
N; $a = \frac{28-5\sqrt{3}}{5}$ m/s² com o bloco descendo.