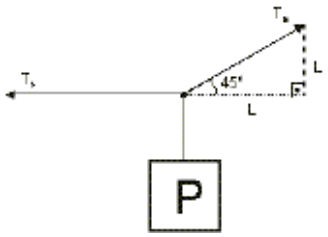
3ª Série do Ensino Médio - Gabarito Comentado

FÍSICA

21. Letra D.



Projeções em Y:

TB sen45^0 = P

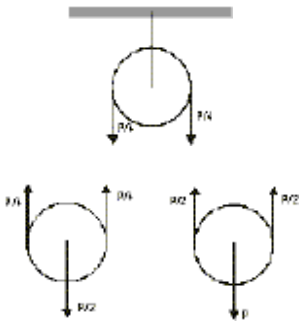
$\frac{\sqrt{2}}{2} T_B = P$

$T_B = \frac{2P}{\sqrt{2}}$

$T_B = \frac{2P}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}}$

$T_B = \sqrt{2}\,P$

22. Letra A.



P = 2000 N

F = P/4 = 500 N

23. Letra C.

Projeção em Y:

T cos a = P

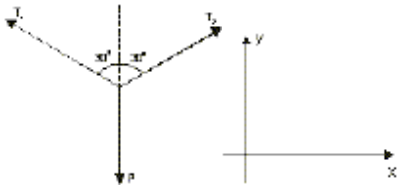
2P cos a = P

cos a = $\frac{P}{2P}$

cos a = $\frac{1}{2}$

a = 60^0

24. Letra A.



Projeções em y:

$T_1 \cos 30^0 + T_2 \cos 30^0 = P$

Como $T_1 = T_2 = 100$ N

$2\ T_1 \cos 30^0 = P$

2 (100) = $\frac{\sqrt{3}}{2}$ = P

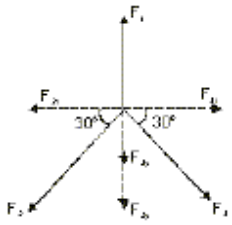
$P = 100\sqrt{3}$

$M = 10\sqrt{3}$

M = 17,32 kg

25. Letra B.

Já que as forças são coplanares e de mesmo módulo, a única opção possível é a B.



Projeções em X: åFx = 0

$F_2x = F_3x$

$F_2 \cos 30^0 = F_3 \cos 30^0$

$F_2 = F_3$

Projeções em y: åFy = 0

$F_1 = F_3y + F_2y$

$F_1 = F_3 \text{ sen}30^0 + F_2 \text{ sen } 30^0$

$F_1 = \frac{F_3}{2} + \frac{F_2}{2}$ Como: $F_3 = F_2$

$F_1 = F_2$ ou $F_1 = F_3$

26. Letra A.

Massa total do sistema: $\frac{5M}{3}$

$\left(\frac{5M}{3}\right) . a_{máx} = M . N$

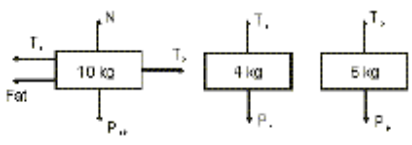
$\left(\frac{5M}{3}\right) . a_{máx} = M\ (M) . y$

$\frac{5M}{3} a_{máx} = M\mu^2 y$

$a_{máx} = \frac{3M\gamma}{5}$

27. Letra A.

Isolando os corpos:



$P_6 = T_2$ $P_4 = T_1$

$T_1 + Fat = T_2$

$P_4 + Fat = P_6$

$Fat = P_6 \_ P_4$

$Fat = 60 \_ 40$

$Fat = 20$ N

28. Letra B.

$V_2 = V_0^2 + 2a$ D S

$\_ 100 = 2$ a (20)

$a = \_ 2{,}5$ m/s^2

Fat = ma

McN = ma

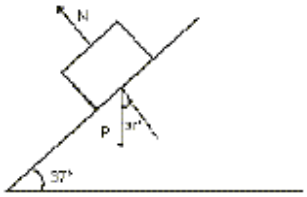
Mcmy = ma

Mcg = a

$Mc = \frac{2}{Y}$

$Mc = \frac{2{,}5}{10} = 0{,}25$

29. Letra C.



P sen 37^0 = m . a

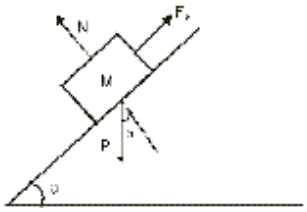
m y sen 37^0 = m . a

y sen 37^0 = a

a = 10 (0,60)

a = 6,0 m/s^2

30. Letra B.

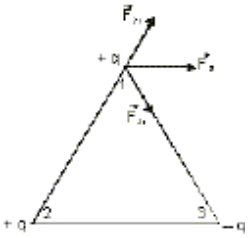


Para o equilíbrio:

F_P = Psen q

F_P = My sen q

31. Letra C.



32. Letra B.

Q_1 = 5,0 x 10^{-6} C

Q_2 = _ 1,0 x 10^{-6} C

$F_A = \frac{K_0 |Q_1| Q_2}{O^2}$

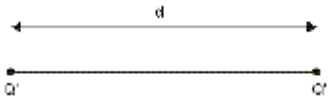
$F_A = \frac{K_0}{O^2}(5 \times 10^{-12})$

$F_A O^2 = K_0(5 \times 10^{-12})$

Após o contato:

$$Q' = \frac{Q_1 + Q_2}{2} = \frac{5{,}0 \times 10^{-6} - 1{,}0 \times 10^{-6}}{2}$$

$Q' = 2{,}0 \times 10^{-6}$



$$F_R = \frac{K_0 Q' \, Q'}{d^2}$$

$$F_R = \frac{K_0}{d^2} (4{,}0 \times 10^{-12})$$

Como: |FR| = |FA|

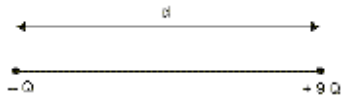
$$\frac{F_A d^2}{F_R d^2} = \frac{K_0 (5{,}0 \times 10^{-12})}{K_0 (4{,}0 \times 10^{-12})}$$

$$\frac{Q^2}{d^2} = \frac{5{,}0 \times 10^{-12}}{4{,}0 \times 10^{-12}}$$

$$\frac{Q}{d} = \frac{\sqrt{5{,}0 \times 10^{-12}}}{\sqrt{4{,}0 \times 10^{-12}}}$$

$$\frac{Q}{d} = \frac{\sqrt{5}}{\sqrt{4}}$$

33. Letra B.

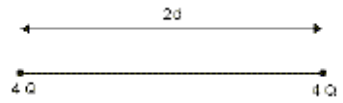


$$F_A = \frac{K_0 |Q| |9Q|}{d^2}$$

$$F_A = \frac{9 K_0 Q^2}{d^2}$$

Após contato

$$\frac{-Q + 9Q}{2} = 4\,Q \text{ (cada uma)}$$



$$F_R = \frac{K_0 |4Q| |4Q|}{(2d)^2}$$

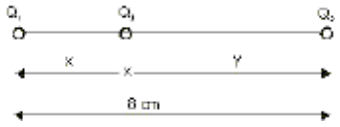
$$F_R = \frac{16 K_0 Q^2}{4d^2}$$

$$F_B = \frac{4 K_0 Q^2}{d^2}$$

$$\frac{F_B}{F_A} = \frac{\frac{4 K_0 Q^2}{d^2}}{\frac{9 K_0 Q^2}{d^2}}$$

$$\frac{F_B}{F_A} = \frac{4}{9}$$

34. Letra C.



Em Q_3, temos:

$$F_{13} = \frac{K_0 |Q_1||Q_3|}{x^2} \quad F_{13} = \frac{K_0 (18 \times 10^{-18})}{x^2}$$

$$F_{23} = \frac{K_0 |Q_2||Q_3|}{y^2} \quad F_{23} = \frac{K_0 (50 \times 10^{-18})}{y^2}$$

$|F_{13}| = |F_{23}|$

$$\frac{K_0 (18 \times 10^{-18})}{x^2} = \frac{K_0 (50 \times 10^{-18})}{y^2}$$

$$\frac{y^2}{x^2} = \frac{50 \times 10^{-18}}{18 \times 10^{-18}} \quad \frac{y^2}{x^2} = 2{,}8$$

$$\frac{y}{x} \cong 1{,}7 \quad y \cong 1{,}7\,x$$

$x + y = 8 \times 10^{-2}$

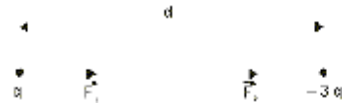
$x + 1{,}7x = 8 \times 10^{-2}$

$2{,}7x = 8 \times 10^{-2}$

$$x = \frac{8 \times 10^{-2}}{2{,}7}$$

$x \cong 3$ cm

35. Letra C.



$F_1 = \frac{K_0 |q| |3q|}{d^2}$ $F_2 = \frac{K_0 |3q| |q|}{d^2}$

$|F_1| = |F_2|$ são atrativas

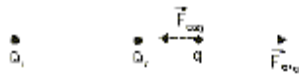
36. Letra B.

Podemos fazer:

Q_1 _ positiva

Q_2 _ negativa

q _ positiva



$F_{Q_1 q} = \frac{K_0 |Q_1| |q|}{36}$

$F_{Q_2 q} = \frac{K_0 |Q_2| |q|}{4}$

No equilíbrio:

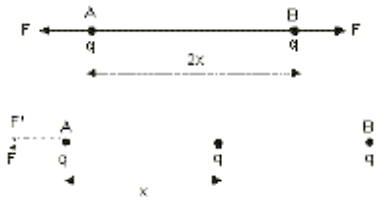
$F_{eq} = F_{eq}$

$\frac{K_0 |Q_1| |q|}{36} = \frac{K_0 |Q_2| |q|}{4}$

$\frac{Q_1}{36} = \frac{Q_2}{4}$ $\frac{Q_1}{Q_2} = \frac{36}{4}$

$\frac{Q_1}{Q_2} = 9$

37. Letra A.



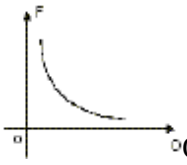
$F = \frac{K_0 |q| |q|}{(2x)^2} = \frac{K_0 q^2}{4x^2}$

$F' = \frac{K_0|q||q|}{x^2} = \frac{K_0q^2}{x^2} = 4F$

$F_R = F + F'$

$F_R = F + 4F = 5F$

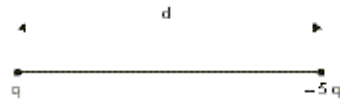
38. Letra A.



Como $F = \frac{K_0|q||q|}{d^2}$ $K_0qq = C$ $F = \frac{C}{d^2}$

F é proporcional ao inverso do quadrado da distância, log 0.

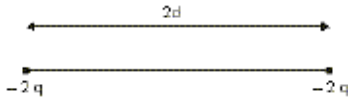
39. Letra D.



$F = \frac{K_0|q||5q|}{d^2} = \frac{5K_0q^2}{d^2}$

Após o contato:

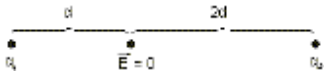
$\frac{q-5q}{2} = \frac{-4q}{2} = -2q$



$F' = \frac{K_0|2q||2q|}{(2d)^2}$ $F' = \frac{4K_0q^2}{4d^2} \Rightarrow F' = \frac{K_0q^2}{d^2}$

F = 5 F' => F'= F/5

40. Letra A.



$E_1 = \frac{K_0|q_1|}{d^2}$ $E_2 = \frac{K_0|q_2|}{(2d)^2}$ $E_2 = \frac{K_0q_2}{4d^2}$

$|E_1| = |E_2|$

$\frac{K_0q_1}{d^2} = \frac{K_0q_2}{4d^2}$ $\frac{q_1}{q_2} = \frac{1}{4}$