GABARITO

PROFESSOR EDUARDO CAVALCANTI – AULA 1				
1	**2**	**3**	**4**	**5**
C	B	C	B	C
6	**7**	**8**	**9**	**10**
B	*	E	A	*
11	**12**	**13**	**14**	**15**
*	C	–	–	–

***7.**

a) $Ed = V \Rightarrow E = \frac{V}{d} = \frac{300}{5\times10^{-3}} = 60\times10^{3} \Rightarrow$

$\Rightarrow \boxed{E = 6\times10^{4}\ \text{V/m.}}$

b) $V_{AB} = E\,d_{AB} = E(x_B - x_A) =$

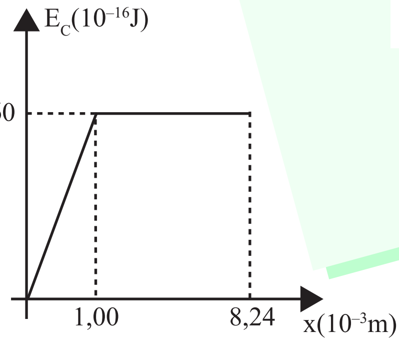
$6\times10^{4}(4-1)\times10^{-3} \Rightarrow \boxed{V_{AB} = 180\ \text{V.}}$

c) $\tau = q\,V_{CA} = -1{,}6\times10^{-19}\times(-180) \Rightarrow$

$\boxed{\tau = 2{,}88\times10^{-17}\ \text{J.}}$

10. 800 N/C

11.



13.

a) $E\ d = U \Rightarrow E = \frac{U}{d} = \frac{12}{2\times10^{-2}} \Rightarrow E = 6\times10^{2}\ \text{V.}$

b) 16 V/m

PROFESSOR EDUARDO CAVALCANTI – AULA 2				
1	**2**	**3**	**4**	**5**
*	A	E	*	C
6	**7**	**8**	**9**	**10**
A	C	D	E	D
11	**12**	**13**	**14**	**15**
*	*	C	B	*

***1.**

a) $\left.\begin{cases} I = \frac{P}{NA_1} \Rightarrow P = I\,NA_1 \\ E = Pt \end{cases}\right\} \Rightarrow E = I\,NA_1\,t = \Rightarrow$

$\Rightarrow 1200\times225\times10^{-4}\times60 \Rightarrow \boxed{E = 3{,}24\times10^{9}\ \text{J.}}$

b) $Q = mc\Delta T \Rightarrow \Delta T = \frac{Q}{mc} = \frac{3500\times10^{3}}{500\times700} \Rightarrow$

$\Rightarrow \boxed{\Delta T = 10\text{K} = 10\,°\text{C.}}$

4.

a) $Q_T = Q_c + Q_{H_2O} = (m\cdot c\cdot\Delta T)_c + (m\cdot c\cdot\Delta T)_{H_2O}$

$Q_T = (100\cdot0{,}2\cdot30) + (200\cdot1\cdot30)$

$Q_T = 600 + 6000$

$Q_T = 6600\ \text{cal}$

b) $Q_v = Q_{120°C\to100°C} + Q_L + Q_{100°C\to50°C}$

$Q_v = m\cdot c_v\cdot(-20) + m\cdot L + m\cdot c\cdot(-50)$

$Q_v = m\cdot0{,}5\cdot(-20) + m(-540) + m\cdot1\cdot(-50)$

$Q_v = -600\ m$

$\sum Q = 0$

$Q_T + Q_v = 0$

$6600 - 600m = 0$

$m = 11\ g$

11.

a) $\frac{D}{D_{Sol}} = \frac{f}{L} \Rightarrow \frac{D}{1{,}5\times10^{9}} = \frac{15}{1{,}5\times10^{11}} \Rightarrow$

$\Rightarrow D = \frac{15}{10^{2}} \Rightarrow \boxed{D = 0{,}15\ \text{m.}}$

b) $S = \frac{P}{A} \Rightarrow P = A\,S\left\{\begin{matrix} P_1 = A_1\,S_1 \\ P_2 = A_2\,S \end{matrix}\right\} \Rightarrow \frac{\pi\,D_E^2}{4}\times S_1$

$\Rightarrow = \frac{\pi\,D^2}{4}S \Rightarrow S = \frac{D_E^2\,S_1}{D^2} = \frac{100\times1.000}{0{,}15^2} \Rightarrow$

$\boxed{S = 4{,}44\times10^{6}\ \text{W/m}^2.}$

c) $Q = P\,\Delta t \Rightarrow m\,c\,\Delta T = A_1\,S_1\,\Delta t \Rightarrow$

$$\Rightarrow \Delta T = \frac{A_1\,S_1\,\Delta t}{m\;c} \Rightarrow \Delta T = \frac{3\times\frac{10^2}{4}\times 1.000\times 4}{600\times 1} \Rightarrow$$

$$\Rightarrow \boxed{\Delta T = 500\ \text{K.}}$$

12.

a) $E = P \Rightarrow d_{suco} V_i \cancel{g} = m \cancel{g} \Rightarrow$

$$\Rightarrow V_i = \frac{m}{d_{suco}} = \frac{20}{1} \Rightarrow \boxed{V_i = 20\ \text{cm}^3.}$$

b) $Q_{copo} + Q_{suco} + Q_{gelo} + Q_{água} = 0 \Rightarrow$

$$\Rightarrow (C\Delta\theta)_{copo} + (m\,c\,\Delta\theta)_{suco} + \Rightarrow$$

$$\Rightarrow (m\ L_f)_{gelo} + (m\,c\,\Delta\theta)_{água} = 0 \Rightarrow$$

$$\Rightarrow 60(\theta - 20) + 300(1)(\theta - 20) + 40$$

$$\Rightarrow (80) + 40(1)(\theta - 0) = 0 \quad [\div 20] \Rightarrow$$

$$\Rightarrow 3\theta - 60 + 15\theta - 300 + 160 + 2\theta \Rightarrow$$

$$\Rightarrow 20\theta = 200 \Rightarrow \boxed{\theta = 10\ °\text{C.}}$$

15. Se:

$$P = \frac{Q}{\Delta t}$$

$$1273 = \frac{Q}{165}$$

$$\boxed{Q = 210045\ \text{J}}$$

1 cal ______ 4,2 J
Q ________ 210045 J
Q = 50010 cal
$Q = m \cdot c \cdot \Delta\theta$
$50010 = 1000 \cdot 1 \cdot \Delta\theta$

$$\boxed{\Delta\theta \simeq 50\ °\text{C}}$$

PROFESSOR EDUARDO CAVALCANTI – AULA 3				
1	**2**	**3**	**4**	**5**
D	C	A	*	B
6	**7**	**8**	**9**	**10**
*	B	E	*	E
11	**12**	**13**	**14**	**15**
*	E	B	*	E

***4.**

$$E_{M_i} = E_{M_f}$$

$$E_{p_i} + E_{c_i} = E_{c_f}$$

$$E_{c_f} = m \cdot g \cdot h + \frac{m \cdot v_o^{\,2}}{2}$$

$$E_{c_f} = 50 \cdot 10 \cdot 250 + \frac{50 \cdot \left(\frac{200}{3,6}\right)^2}{2}$$

$$E_{c_f} \simeq 202,3\ \text{kJ}$$

b) $\Delta S_x = 55,6 \cdot 7,07$
$\Delta S_x \simeq 393,1\ \text{m}$

6.

a)

$$v_0 = \sqrt{\frac{3\text{m} \cdot 10\frac{\text{m}}{\text{s}^2}}{2 \cdot \cos 30° \cdot \text{sen}\,30°}} = \Rightarrow$$

$$\Rightarrow \sqrt{\frac{30}{2 \cdot 0,87 \cdot 0,5}} \approx 5,87\frac{\text{m}}{\text{s}}$$

b)

$$\Delta p = p_1 - p_0 = \frac{\rho \cdot v^2}{2} = \frac{1000\frac{\text{kg}}{\text{m}^3} \cdot \left(5,87\frac{\text{m}}{\text{s}}\right)^2}{2}$$

$$\Delta p \approx 17241\text{Pa}$$

9.

a)

$$h = \frac{1}{2} g\ t_q^2 \Rightarrow t_q = \sqrt{\frac{2\,h}{g}} =$$

$$\sqrt{\frac{2 \cdot 3,2}{10}} = \sqrt{0,64} = 0,8\ \text{s.}$$

$$A = v_0\ t_q \Rightarrow v_0 = \frac{A}{t_q} = \frac{32}{0,8} \Rightarrow v_0 = 40\ \text{m/s.}$$

b)

$$a_C = \frac{v_0^2}{r} = \frac{40^2}{2} \Rightarrow a_C = 800\ \text{m/s}^2.$$

c)

$$\begin{cases} Q = m\,v_0 = 4 \cdot 40 \Rightarrow Q = 160\ \text{kg} \cdot \text{m/s.} \\ E_C = \dfrac{m\,v_0^2}{2} = \dfrac{4 \cdot 40^2}{2} \Rightarrow E_C = 3.200\ \text{J.} \end{cases}$$

11. 02 + 16 = 18.

14.

a)

$$\text{tg}\ \theta_r = \frac{x}{h} \Rightarrow \text{tg}\ 30° = \frac{x}{h}$$

$$\Rightarrow \frac{\sqrt{3}}{3} = \frac{x}{h} \Rightarrow \boxed{x = h\frac{\sqrt{3}}{3}.}$$

b) $y = y_0 + v_{0y}\ t + \frac{a}{2}\ t^2 \Rightarrow$

$\Rightarrow d = \frac{v_0\ \sqrt{3}}{2}\left(\frac{2\ d}{v_0}\right) - \frac{g}{2}\left(\frac{2\ d}{v_0}\right)^2 \Rightarrow$

$\Rightarrow d = \sqrt{3}\ d - \frac{g\ 4\ d^2}{2\ v_0^2} \Rightarrow$

$\Rightarrow \frac{2\ g\ d^2}{v_0^2} = \sqrt{3}\ d - d \Rightarrow$

$\Rightarrow v_0^2 = \frac{2\ g\ d^{\cancel{2}}}{\left(\sqrt{3}-1\right)\cancel{d}} \Rightarrow$

$\Rightarrow v_0^2 = \frac{2\ g\ d\left(\sqrt{3}+1\right)}{2} \Rightarrow$

$\boxed{v_0 = \sqrt{g\ d\ \sqrt{3}+1}\ .}$

PROFESSOR EDUARDO CAVALCANTI – AULA 4				
1	**2**	**3**	**4**	**5**
C	D	*	B	A
6	**7**	**8**	**9**	**10**
*	B	D	*	*
11	**12**	**13**	**14**	**15**
*	A	A	A	A

***3. Observação**: Notar que por o espelho ser convexo, a distância focal é menor que zero (negativa).

a) $d = |p'|$

$d = 0,5\ m$

b) $A = \frac{i}{o} = \frac{d}{o} = \frac{-p'}{p} = \frac{-(-0,5)}{3}$

$\frac{d}{o} = \frac{1}{6}$

6.

a) $\frac{1}{f} = \frac{1}{240} + \frac{1}{60} \Rightarrow \frac{1}{f} = \frac{5}{240} \Rightarrow f = 48\ cm$

Confirmando assim o espelho côncavo, pois f > 0.

b) $\frac{1}{48} = \frac{1}{d_i} + \frac{1}{10} \Rightarrow \frac{1}{48} - \frac{1}{10} = \frac{1}{d_i} \Rightarrow$

$\Rightarrow d_i = -\frac{480}{38} = -12,6\ cm$

Sendo assim, a imagem está a 12,6 cm do vértice do espelho para “dentro do espelho”, sendo uma imagem virtual.

9. 01 + 02 + 16 + = 19

10. V – V – F – V – F

11.

a) Ponto Objeto (PO) é vértice de feixe Incidente no sistema óptico. Pode ser classificado em:
PO Real $\Rightarrow$ vértice de feixe incidente, divergente;
PO Virtual $\Rightarrow$ vértice de feixe incidente, convergente;
PO Impróprio $\Rightarrow$ vértice de feixe incidente, cilíndrico.
O ponto F é vértice de feixe convergente e incidente no pequeno espelho, comportando-se, então, para esse espelho como um **Ponto Objeto Virtual**.

b) $r = 2|f| = 2\frac{2}{3} = \frac{4}{3}\ m \Rightarrow r \cong 1,3\ m.$

c) Ora, no item anterior, obtivemos para o pequeno espelho $f = -\frac{2}{3}\ m$. Logo, ele é convexo.

ANDERSON – Rev.: Amélia