BC0208 – Fenômenos Mecânicos

Terceiro quadrimestre letivo de 2015

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Lista de Respostas

Lista 1: **1.** (a) 18,3 m/s, 18,03 m/s, 18,003 m/s; (b) 18 m/s. **2.** (a) 4 m/s^2; (b) sentido positivo de x. **3.** (a) 80 m/s; (b) 110 m/s; (c) 20 m/s^2. **4.** (a) 16,5 km; (b) 570 m/s $\approx$ 2.050 km/h, 133 s. **5.** (a) 0,13 m; (b) 0,5 m. **6.** 3,6 m do edifício. **7.** 0,56 m/s. **8.** (a) 249 m/s; (b) 25,4; (c) 101 m; (d) não. **9.** (a) 15 m; (b) 2 m/s; (c) -2 m/s; (d) 3,5 m/s, 0 m/s^2. **10.** 6 h 38 min 48 s.

Lista 2: **1.** (a) 6,42 m; (b) não; (c) sim; (d) sim; (f) 7,96 m. **2.** (a) $\mathbf{r}$= a $\mathbf{i}$ + a $\mathbf{j}$ + a $\mathbf{k}$; (b) $\mathbf{r}$= $-$ a $\mathbf{i}$ + a $\mathbf{j}$ + a $\mathbf{k}$; (c) $\mathbf{r}$= a $\mathbf{i}$ $-$ a $\mathbf{j}$ + a $\mathbf{k}$; (d) $\mathbf{r}$= $-$ a $\mathbf{i}$ $-$ a $\mathbf{j}$ + a $\mathbf{k}$; (e) 54,7º; (f) a$\sqrt{3}$. **3.** $|\mathbf{F}| = 2\sqrt{10}$ N, $|\mathbf{\Delta r}| = \sqrt{10}$ m, 36,9º. **4.** (a) 3,00 m; (b) 0 m; (c) 3,46 m; (d) 2,00 m; (e) $-5,00$ m; (f) 8,66 m; (g) $-6,66$; (h) 4,33. **5.** (a) 1080 km; (b) 63,4º SL; (c) 480 km/h; (d) 63,4º SL; (e) 644 km/h. **6.** (a) 10,0 s; (b) 893 m. **7.** 240 m a 237º **8.** (a) 17,8 m/s; (b) no rio, a uma distância de 28,4 m da margem mais próxima da rampa. **9.** (a) 55,6º; (b) 6,85 m; (c) 6,78 m/s. **10.** (a) 255 m/s; (b) 45,0 s; (c) aumentaria. **11.** (a) $1,6 \times 10^2$ m/s^2. **12.** 1,67.

Lista 3: **1.** (a) $\mathbf{a} = (0,860 \text{ m/s}^2)\ \mathbf{i} - (0,162 \text{ m/s}^2)\ \mathbf{j}$; (b) 0,875 m/s^2; (c) 10,6º. **2.** $1,5 \times 10^{-3}$ m. **3.** (a) 1,18 m; (b) 0,674 s; (c) 3,50 m/s em módulo. **4.** $1,8 \times 10^4$ N. **5.** (a) 36,8 N; (b) 0,191 m. **6.** (a) 3×10^2 N; (b) 1,3 m/s^2. **7.** 0,54. **8.** 48,2 km/h. **9.** 3,3 kg. **10.** (a) 486 N; (b) 1082 N. **11.** (a) 2,13 s; (b) 1,66 m. **12.** 7,1 cm. **13.** (a) $1,6 \times 10^2$ N; (b) 8,6 m/s^2. **14.** (a) 4,90 m/s^2; (b) 3,13 m/s; (c) 1,35 m; (d) 1,14 s; (e) não. **15.** Em 1: 1470 N, em 2 e 3: 735 N, Força = 245 N.

Lista 4: **1.** (a) $-4,5 \times 10^{14}$ J; (b) 0,1 MtonTNT; (c) 8 bombas. **2.** 5×10^3 J. **3.** (a) $W_\text{T} = 1,50$ J; (b) aumenta. **4.** 25 J. **5.** (a) 16 J; (b) 16 J; (c) 0 J; (d) -14 J. **6.** (a) 900 J; (b) $1,1 \times 10^2$ W; (c) $2,2 \times 10^2$ W. **7.** (a) 166,6 J; (b) $-166,6$ J; (c) 196 J; (d) 29,4 J; (e) 166,6 J; (f) $-166,6$ J; (g) 296 J; (h) 129,4 J. **8.** (a) 0,35 m; (b) 1,7 m/s. **9.** (a) 0,15 J; (b) 0,11 J; (c) 0,19 J; (d) 0,038 J; (e) 0,075 J; (f) 2,5 N; (g) 0,31 N; (h) 0,3 m. **10.** (a) 30,1 J; (b) $-30,1$ J; (c) 0,225. **11.** $2R/3$. **12.** 20 cm. **13.** (b) 0,823 m/s. **14.** 0,3 m.

Lista 5: **1.** 3×10^{-3} m/s. **2.** (a) $\theta_1 = \theta_2$; (b) $\mathbf{\Delta q} = -0,572$ kg m/s $\mathbf{j}$. **3.** (a) 14 m/s; (b) $\theta = 45$º. **4.** (a) 2 m/s; (b) $-1,25$ J; (c) 40 J; (d) ganhou energía cinética, possível se teve alguma explosão na colisão. **5.** 60 km/h. **6.** (a) 64/9 m/s; (b) maior; (c) menor; (d) menor. **7.** 0,22%. **8.** (a) 6,93 m/s; (b) 30º; (c) 6,93 m/s; (d) -30º; (e) 2; (f) 180º. **9.** $x = 11$ cm, $y = 4,4$ cm. **10.** $x = 0$, $y = 3,13 \times 10^{-11}$ m. **11.** $x = -6,5$ cm, $y = 8,3$ cm, $z = 1,4$ cm. **12.** 6,20 m. **13.** (a) 22 m; (b) 9,3 m/s. **14.** (a) $y = 5,74$ m; (b) $\mathbf{v}$=10 m/s $\mathbf{i}$; (c) $\mathbf{a}$=$-3,68$ m/s^2 $\mathbf{j}$. **15.** 53 m.

Lista 6: **1.** (a) $\mathbf{v} = R(w_0+\alpha t)[-\sin\theta\ \mathbf{i}+\cos\theta\ \mathbf{j}]$, $\mathbf{a} = [-R\alpha\sin\theta - R(w_0+\alpha t)^2\cos\theta]\ \mathbf{i}+[R\alpha\cos\theta - R(w_0+\alpha t)^2\sin\theta]\ \mathbf{j}$; (b) $\mathbf{v}\cdot\mathbf{r} = 0 \Rightarrow \mathbf{v} \perp \mathbf{r}$; (c) $mR^2(w_0+\alpha t)\ \mathbf{k}$. **2.** (a) 59,3 rad/s; (b) -9,33 rad/s^2; (c) 70,7 m. **3.** (a) $-2,34\times10^{-9}$ rad/s^2; (b) $2,7 \times 10^3$ anos; (c) 0,024 s. **5.** -3,85 m·N $\mathbf{k}$. **6.** (a) $4mvd\ \mathbf{k}$; (b) 0; (c) $-2mvd\ \mathbf{k}$. **7.** (a) -174 (kg·m^2/s) $\mathbf{k}$; (b) 56 m·N $\mathbf{k}$; (c) 56 m·N $\mathbf{k}$. **8.** 3,4 rad/s. **9.** 2,2 s. **10.** (a) 0,6 m; (b) 1,4.

Lista 7: **1.** (a) $mv_0/[d(M+m/2)]$; (b) $\sqrt{(2M+m)gd/m}$. **2.** (a) 0,20 kg·m^2; (b) 6,3 rad/s. **3.** (a) $a = m'g/(m+m'+M/2)$; (b) $T = ma$, $T' = m'(g-a)$. **4.** $v^2 = 2gh(m' - m\sin\theta)/(m+m'+M/2)$. **5.** (a) $7Md^2/48$; (b) $\omega^2 = 24g\sin\theta/(7d), \alpha = 12g\cos\theta/(7d)$. **6.** $R + 3v^2/(4g)$. **7.** (a) $(2g\sin\theta)/3$; (b) $(g\sin\theta)/2$; (c) $\mu_{disco} = (\tan\theta)/3$, $\mu_{aro} = (\tan\theta)/2$. **8.** $F = Mg\sqrt{d(2R-d)}/(R-d)$. **9.** $(25/24)l$.