FÍSICA A

Aula 13

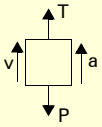
	0	1	2	3	4	5	6	7	8	9
0		a	e	e	d	*	a	c	b	d
1	a	14	a	a	a	a	b	e		

01. a
MRU → equilíbrio
Parado (repouso) → equilíbrio

02. e
Vcte → MRU → equilíbrio
$T = P = m \cdot g = 50 \cdot 10 = 500$ N

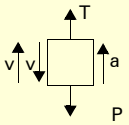
03. e
III: $v \uparrow \uparrow a$ $N > P$
IV: $v \downarrow \uparrow a$ $N > P$

04. d
$N = 600$ N
$\therefore N - P = m \cdot a$
$600 - 500 = 50 \cdot a$
$a = 2$ m/s²

05. 

$P - T = m \cdot a$
$2\,000 - T = 200 \cdot 1$
$T = 1\,800$ N

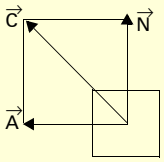
06. a
$T > P$



descendo retardado
ou
subindo acelerado

07. c
$N - P = m \cdot a$
$720 - m \cdot g = m \cdot a$
$720 - m \cdot 9{,}8 = m \cdot 2{,}2$
$12 \cdot m = 720$
$m = 60$ kg

08. b



$\vec{C}$ = força de contato

09. d

10. a
Vcte: $\therefore A = F$
$\mu \cdot N = F$
$\mu \cdot 400 = 200$
$\mu = 0{,}5$

11. 14
02 + 04 + 08

12. a
$F - A_A - A_B = (m_A + m_B) \cdot a$
$F - \mu \cdot N_A - \mu \cdot N_B = (m_A + m_B) \cdot a$
$100 - 0{,}2 \cdot 50 - 0{,}2 \cdot 150 = (5 + 15) \cdot a$
$60 = 20 \cdot a$
$a = 3$ m/s²
$T - A_A = m_A \cdot a$
$T - 10 = 5 \cdot 3$
$T = 25$ N

13. a
$P_B - A_A = (m_A + m_B) \cdot a$
$m_B \cdot g - \mu \cdot N_A = (m_A + m_B) \cdot a$
$60 - 0{,}5 \cdot 30 = (3 + 6) \cdot a$
$a = 5$ m/s²
$P_B - T = m_B \cdot a$
$60 - T = 6 \cdot 5$
$T = 30$ N

14. a
$R = 0$ $\therefore 60 - 40 - A = 0$ $A = 20$ N

15. a
$A = P$
$\mu \cdot N = P$
$0{,}25 \cdot F = 100$
$F = 400$ N

16. b
$F = A$
$m \cdot a = \mu \cdot N$
$m \cdot a = \mu \cdot mg$
$a = \mu \cdot g$

17. e
$R = A$
$m \cdot a = \mu \cdot N$
$a = \mu \cdot g$
$a = 0{,}4 \cdot 10$
$|a| = 4$ m/s² → $a = -4$ m/s²
$v = v_0 + a \cdot t$
$0 = 20 - 4 \cdot t$
$t = 5$s

Aula 14

	0	1	2	3	4	5	6	7	8	9
0		0	c	b	b	b	e	c	d	e
1	e	90	a	65	d	d	25			

01. 0
Em plano inclinado liso, a aceleração do bloco independe de sua massa.
$a = g \cdot \text{sen } \alpha$ (a aceleração é a mesma para os dois blocos).

02. c
$P_t^B = (m_A + m_B) \cdot a$
$P_B \cdot \text{sen } 30° = (m_A + m_B) \cdot a$
$30 \cdot 0,5 = (2 + 3) \cdot a$
$a = 3 \text{ m/s}^2$
$T = m_A \cdot a$
$T = 2 \cdot 3 = 6 \text{ N}$

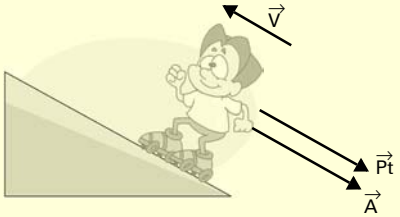
03. b
M. R. U $\therefore$ $T = P_t$
$T = P \cdot \text{sen } \alpha$

04. b
$P_t^C + P_t^B - P_A = (m_A + m_B + m_C) \cdot a$
$P_C \cdot \text{sen } 30° + P_B \cdot \text{sen } 30° - P_A = (m_A + m_B + m_C) \cdot a$
$50 \cdot 0,5 + 30 \cdot 0,5 - 20 = (2 + 3 + 5) \cdot a$
$20 = 10 \cdot a$
$a = 2 \text{ m/s}^2$

05. b

06. e
Repouso $\therefore$ $A = P_t$
$A = P_t$
$A = P \cdot \text{sen } 30°$
$A = 300 \cdot 0,5$
$A = 150 \text{ N}$

07. c



08. d
$\downarrow N = P \cdot \cos \alpha \uparrow$

09. e
$Pt - A = m \cdot a$
$P \cdot \text{sen } 37° - A = m \cdot a$
$20 \cdot 0,6 - 4 = 2 \cdot a$
$a = 4 \text{ m/s}^2$

10. e
iminência de movimento: $\mu_e = \text{tg } \alpha$
$\mu_e = \text{tg } 30°$
$\mu_e = \frac{\sqrt{3}}{3}$

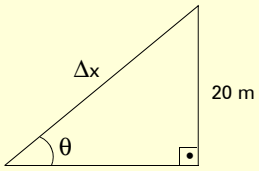
11. velocidade constante: $A = P_t$
$A = P \cdot \text{sen } 30°$
$A = 180 \cdot 0,5$
$A = 90 \text{ N}$

12. a
$R = 0$
$P_A - P_t^B - A = 0$
$P_A - P_B \cdot \text{sen } 30° - A = 0$
$50 - 80 \cdot 0,5 - A = 0$
$A = 10 \text{ N}$

13. 65
01 + 64

14. d
$a = g \cdot \text{sen } \alpha$
$a = 10 \cdot \frac{5}{10}$
$a = 5 \text{ m/s}^2$
$x = \frac{1}{2} \text{ at}^2$
$10 = \frac{1}{2} \cdot 5 \cdot t^2$
$t = 2 \text{ s}$

15. d



$\text{sen } \theta = \frac{20}{\Delta x}$
$0,8 = \frac{20}{\Delta x}$
$\Delta x = 25 \text{ m}$

$v^2 = v_0^2 + 2a \Delta x$
$20^2 = 0^2 + 2 \cdot a \cdot 25$
$a = 8 \text{ m/s}^2$
$F - Pt - A = m \cdot a$
$F - P \cdot \text{sen } \theta - \mu \cdot N = m \cdot a$
$F - P \cdot \text{sen } \theta - \mu \cdot P \cdot \cos \theta = m \cdot a$
$F - 30 \cdot 0,8 - 0,5 \cdot 30 \cdot 0,6 = 3 \cdot 8$
$F = 57 \text{ N}$

16. $x = \frac{1}{2} \text{ at}^2$
$5 = \frac{1}{2} \cdot a \cdot 10^2$
$a = 0,1 \text{ m/s}^2$
$F - Pt = m \cdot a$
$F - P \cdot \text{sen } 30° = m \cdot a$
$F - 5 \cdot 9,8 \cdot 0,5 = 5 \cdot 0,1$
$F = 25 \text{ N}$

Aula 15

	0	1	2	3	4	5	6	7	8	9
0		b	e	*	e	*	d	d	b	d
1	c	*	d	90	*	d	03			

01. b

02. e

03. $R_c = m \cdot a_c$ $\qquad 20 = 2 \cdot \frac{v^2}{0,1}$

$T = m \cdot \frac{v^2}{r}$ $\qquad v = 1$ m/s

04. e

05. 6 m/s

$v = \sqrt{r \cdot g}$

$v = \sqrt{3,6 \cdot 10} = \sqrt{36} = 6$ m/s

06. d

$P - N = m \cdot \frac{v^2}{r}$

$9\,800 - N = 1\,000 \cdot \frac{20^2}{80}$

$N = 4\,800$ N

07. d

I. $N = 0$

$P = m \cdot \frac{v^2}{r}$

$8\,000 = 800 \cdot \frac{v^2}{90}$

$v = 30$ m/s $= 108$ km/h

II. A força centrípeta não é atuante, é resultante.

III. $P - N = m \cdot \frac{v^2}{r}$

$8\,000 - N = 800 \cdot \frac{18^2}{90}$

$N = 5\,120$ N $\rightarrow 512$ kgf

08. b

$N - P = m \cdot \frac{v^2}{r}$

$N - 8\,000 = 800 \cdot \frac{20^2}{20}$

$N = 24\,000$ N $= 2,4 \cdot 10^4$ N

09. d

$T - P = m \cdot \frac{v^2}{r}$

$T - 10 = 1 \cdot \frac{4^2}{1}$

$T = 26$ N

10. c

$T + P = m \cdot \frac{v^2}{r}$

$T + mg = m \cdot \frac{v^2}{L}$

$T = m \frac{v^2}{L} - mg$

11. $A = m \frac{v^2}{r}$

$\mu \cdot N = m \frac{v^2}{r}$

$\mu \cdot m \cdot g = m \frac{v^2}{r}$

$0,8 \cdot 9,8 = \frac{v^2}{25}$ $\qquad v = 14$ m/s

12. d

$A = m \frac{v^2}{r}$

$\mu \cdot N = m \frac{v^2}{r}$

$\mu \cdot mg = m \frac{v^2}{r}$

$v = \sqrt{\mu r g} = \sqrt{0,4 \cdot 100 \cdot 10} = 20$ m/s $= 72$ km/h

13. $v = \sqrt{\mu r g} = \sqrt{0,5 \cdot 125 \cdot 10} = 25$ m/s $= 90$ km/h

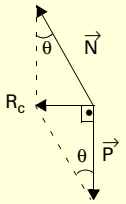
14. $N = 0$

$P = m \cdot \frac{v^2}{r}$

$m \cdot g = m \frac{v^2}{r}$

$v = \sqrt{rg} = \sqrt{360 \cdot 10} = 60$ m/s

15. d



$tg\ \theta = \frac{R_c}{P}$

$tg\ \theta = \frac{m \cdot \frac{v^2}{r}}{mg}$

$0,2 = \frac{v^2}{200 \cdot 10}$

$v = 20$ m/s $= 72$ km/h

16. 03

01 + 02

$01 \rightarrow \downarrow \omega = \sqrt{\frac{g}{\mu \cdot r}} \uparrow$

Aula 16

	0	1	2	3	4	5	6	7	8	9
0		09	e	e	a	e	d	c	b	b
1	07	e	01	b	b	c	a	*		

01. 09
01 + 08

02. e

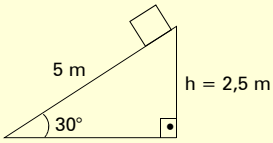
03. e

04. a

05. e

$\mathcal{T} \triangleq$ área $= \left(\frac{150 + 50}{2}\right) \cdot 15 = 1\,500$ J

06. d



$\mathcal{T} = mgh = P \cdot h$
$\mathcal{T} = 80 \cdot 2,5$
$\mathcal{T} = 200$ J

07. c
$|\mathcal{T}| = m \cdot g \cdot h$
$\mathcal{T} = (80 + 30) \cdot 10 \cdot (20 \cdot 0,25)$
$\mathcal{T} = 5\,500$ J

08. b
$|\mathcal{T}| = m \cdot g \cdot h$
$|\mathcal{T}| = 100 \cdot 10 \cdot 0,9$
$|\mathcal{T}| = 900$ J

09. b

10. 07
01 + 02 + 04

02. $\vec{F}$ / $\vec{P}$
$F - P = m \cdot a$
$F - 800 = 80 \cdot 2$
$F = 960$ N
$\therefore \mathcal{T} = F \cdot \Delta x$
$\mathcal{T} = 960 \cdot 5 = 4,8 \cdot 10^3$ J

04. $F - P = m \cdot a$
$F - 800 = 80 \cdot 1$
$F = 880$ N
$F = k \cdot x$
$880 = 1\,100 \cdot x$
$x = 0,8$ m

08. $F = P = k \cdot x$
$800 = 1\,100 \cdot x$
$x \cong 0,72$ m

11. e
$|\mathcal{T}| = mgh = 10 \cdot 10 \cdot 1 = 100$ J

12. $P = \frac{|\mathcal{T}|}{\Delta t} = \frac{mgh}{\Delta t} = \frac{200 \cdot 10 \cdot 15}{30} = 1\,000$ W
$= 1$ kW

13. b

$P = \frac{|\mathcal{T}|}{\Delta t} = \frac{mgh}{\Delta t} = \frac{18\,000 \cdot 10 \cdot 20}{7\,200} = 500$ W
$= 5 \cdot 10^2$ W

14. b

$P = \frac{|\mathcal{T}|}{\Delta t} = \frac{mgh}{\Delta t} = \frac{120 \cdot 10 \cdot 6}{20} = 360$ W

15. c

$P = \frac{|\mathcal{T}|}{\Delta t} = \frac{F \cdot \Delta x}{\Delta t} = \frac{100 \cdot 10}{10} = 100$ W

16. a
$P = F \cdot v = (8 \cdot 10^3 - 2 \cdot 10^3) \cdot 2 = 12 \cdot 10^3$ W
$= 12$ kW

17. $P_u = F \cdot v = (40\,000 - 30\,000) \cdot 2 = 20\,000$ W
$n = \frac{P_u}{P_t}$
$0,8 = \frac{20\,000}{P_t}$
$P_t = 25\,000$ W $= 25$ kW
ou
$P_t = \frac{25\,000}{746} \cong 33,5$ HP

Testes complementares

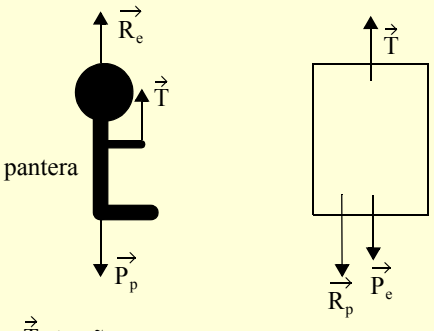
	0	1	2	3	4	5	6	7	8	9
0		e	*	a	a	d	a	e	b	d
1	19									

01. e

$x = x_o + v_o t + \frac{1}{2}at^2$
$x = 2 + 2 \cdot t + 4 \cdot t^2$
$\Rightarrow \frac{1}{2}a = 4$
$a = 8$ m/s²
$R = m \cdot a$
$R = 4 \cdot 8$
$R = 32$N

02. a. A pantera continua a cair (com grande velocidade vertical) ao dar o pequeno salto.

b.



$\vec{T}$: tração

$\vec{R}_e$: reação do elevador

$\vec{R}_p$: reação da pantera

$\vec{P}_e$: peso do elevador

$\vec{P}_p$: peso da pantera

c. $R_e + T = P_p$ $\qquad$ $T = R_p + P_e$

$R_e = P_p - T$ $\qquad$ $R_p = T - P_e$

$R_e = R_p$

$P_p - T = T - P_e$

$$T = \frac{(M + m) \cdot g}{2}$$

03. a

Como a aceleração resultante e a massa do bloco B não se alteram, então a força resultante que atua no bloco B não se altera.

04. a

$v_o = 54km/h = 15m/s$

$v = 90km/h = 25m/s$

$$a = \frac{\Delta v}{\Delta t} = \frac{25 - 15}{10} = 1m/s^2$$

$R = m \cdot a$

$A = 1\,000 \cdot 1$

$A = 1\,000\ N = 100\ kgf$

05. d

I. falsa

II. correta

$R = A$

$m \cdot a = \mu \cdot n$

$m \cdot a = \mu \cdot P$

$\cancel{m} \cdot a = \mu \cdot \cancel{m} \cdot g$

$a = \mu \cdot g$

III. correta.

IV. falsa, o atrito independe da área.

06. a.

$A = \mu \cdot N = \mu \cdot P = \mu \cdot m \cdot g$

Homem: $A_h = 0,5 \cdot 80 \cdot 10 = 400N$

Cofre: $A_c = 0,1 \cdot 200 \cdot 10 = 200N$

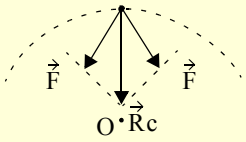
Como: $A_h > A_c$, o homem consegue empurrar o cofre.

07. e

I. falsa

II. correta

III. correta



08. b

I. falsa, no trecho BC há aceleração centrípeta.

II. falsa, só há a força centrípeta.

III. correta.

09. d

120 batidas —— 60s

1 batida ———— x

$x = 0,5s = \Delta t$

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

$$2,25 = \frac{\varepsilon}{0,5}$$

$\varepsilon = 1,125J$

10. 19

01 + 02 + 16

01. $v^2 = v_o^2 + 2a\Delta x$

$o^2 = 20^2 + 2 \cdot a \cdot 50$

$a = -4\ m/s$

$A = \mu \cdot n = \mu \cdot P = \mu \cdot m \cdot g = 0,4 \cdot 4\,000 \cdot 10$

$A = 16\,000N$

$R = m \cdot |a| = 4000 \cdot |-4| = 16\,000\ N$

Assim, se $\Delta x < 50m \rightarrow R > A \rightarrow$ o bloco escorrerá.

02. $N = P = m \cdot g = 4\,000 \cdot 10 = 40\,000\ N = 40\ kN$

16. $R_c = A$

$$m \cdot \frac{v^2}{r} = \mu \cdot N$$

$$\cancel{m} \cdot \frac{v^2}{r} = \mu \cdot \cancel{m} \cdot g$$

$$\frac{v^2}{225} = 0,4 \cdot 10$$

$v = 30\ m/s$

Anotações