FÍSICA B

Aula 09

	0	1	2	3	4	5	6	7	8	9
0		d	a	d	b	b	d	d	c	a
1	a	c	d	e	12	d	d	24	e	

01. d

$v = \frac{\Delta x}{\Delta t}$

$v = \frac{1\,200}{300} = 4$ m/s

$v' = 1{,}25 \times 4 = 5$ m/s

$v' = \frac{\Delta x}{\Delta t}$

$5 = \frac{100}{\Delta t}$

$\Delta t = 20$s

02. a

03. d

$v = \frac{\Delta x}{\Delta t}$

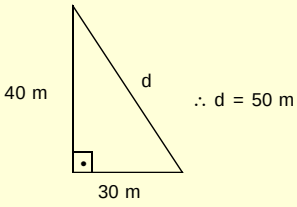
$\frac{60}{3{,}6} = \frac{200 + x}{36}$

$\therefore x = 400$ m

04. b

$S_A = 8 \cdot 5 = 40$ m

$S_B = 10 + 4 \cdot 5 = 30$ m



$\therefore d = 50$ m

05. b

25 m/s = 90 km/h

$v_{rel} = 60 + 90 = 150$ km/h

$v_{rel} = \frac{\Delta x}{\Delta t}$

$150 = \frac{225}{\Delta t}$

$\Delta t = 1{,}5$h

06. d

$t = 5 - 3 = 2$min

07. d

$v = \frac{\Delta x}{\Delta t}$ $\quad \Delta x \,\underline{\mathrm{N}}\, \text{área} = \frac{100 \times 4}{2} = 200$ m

$v = \frac{200}{100}$

$v = 2$ m/s

08. c

09. a

$x = \frac{1}{2}\,at^2$

$500 = \frac{1}{2} \cdot a \cdot 10^2$

$a = 10$ m/s

$v = a \cdot t$

$v = 10 \cdot 10$

$v = 100$ m/s

10. a

$v_0 = 54$ km/h $= 15$ m/s

$v^2 = v_0^2 + 2a\Delta x$

$v^2 = 15^2 + 2 \cdot 2 \cdot 100$

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

11. c

$x \propto t^2$

$x = 2$ cm para $t = 2$s

$x' = 8$ cm para $t' = 4$s

ou

$x = \frac{1}{2}\,at^2$ $\qquad x' = \frac{1}{2} \cdot 1 \cdot 4^2$

$2 = \frac{1}{2} \cdot a \cdot 2^2$ $\qquad x' = 8$ cm

$a = 1$ cm/s^2

12. d

Pontos de inflexão: $v = 0$

13. e

$\Delta v \,\underline{\mathrm{N}}\, \text{área} = 3 \times 2 = 6$ m/s

14. 12

04 + 08 = 12

15. d

O movimento é uniformemente variado.

16. d

17. 24

08 + 16 = 24

18. e

$v^2 = v_0^2 - 2g\Delta h$

$0^2 = v_0^2 - 2 \cdot 10 \cdot 720$

$\therefore v_0 = 120$ m/s

$v = v_0 - gt$

$0 = 120 - 10 \cdot t$

$t = 12$s

Aula 10

	0	1	2	3	4	5	6	7	8	9
0		b	b	c	a	b	c	c	*	b
1	d	20	a	b	01					

01. b

$v_{rel} = v_A - v_B$

$v_{rel} = 120 - 80$

$v_{rel} = 40$ km/h

02. b

$$\begin{cases} v_b + v_c = \dfrac{60\ km}{2h} = 30\ km/h \\ v_b - v_c = \dfrac{40\ km}{2h} = 20\ km/h \end{cases}$$

Assim: $v_b = 25$ km/h e
$v_c = 5$ km/h

03. c

$$\begin{cases} v_b + v_c = 12 \\ v_b - v_c = 8 \end{cases}$$

Assim: $v_b = 10$ m/s e

$v_c = 2\ m/s$

04. a

Mesmo sentido: $v_{rel} = v + v = 2v$
Sentidos opostos: $v_{rel} = v - v = 0$

05. b

v = velocidade em relação às margens
v = 1,5 m/s

$v = \dfrac{\Delta x}{\Delta t}$

$1{,}5 = \dfrac{\Delta x}{60}$

$\Delta x = 90$ m

06. c

$v = \dfrac{\Delta x}{\Delta t}$ | $2 = \dfrac{\Delta x}{10}$

$5 = \dfrac{50}{\Delta t}$ | $\Delta x = 20$ m

$\Delta t = 10s$

07. c

$v = \dfrac{\Delta x}{\Delta t}$ | $v_c = \dfrac{25}{25}$

$4 = \dfrac{100}{\Delta t}$ | $v_c = 1$ m/s

$\Delta t = 25s$

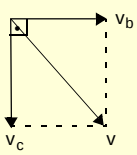
08. a. $v = \dfrac{\Delta x}{\Delta t}$ | b. $v = \dfrac{\Delta x}{\Delta t}$

$2 = \dfrac{4}{\Delta t}$ | $0{,}5 = \dfrac{\Delta x}{2}$

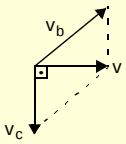
$\Delta t = 2h$ | $\Delta x = 1$ km

09. b

$v^2 = v_b^2 + v_c^2$
$v^2 = 7^2 + 4^2$
$v \cong 8$ m/s

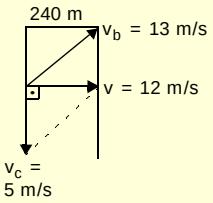


10. d



$v^2 = v_b^2 - v_c^2$
$4^2 = v_b^2 - 3^2$
$v_b = 5$ m/s

11.



$v^2 = v^2 - v_c^2$
$v^2 = 13^2 - 5^2$
v = 12 m/s

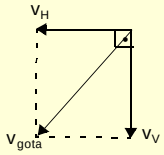
$v = \dfrac{\Delta x}{\Delta t}$

$12 = \dfrac{240}{\Delta t}$

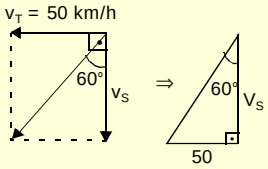
$\Delta t = 20s$

12. a

Tomando o trem como referencial:



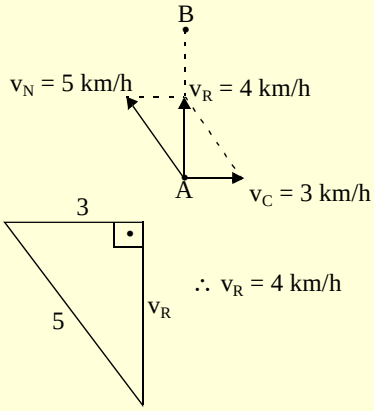
13. b



$\text{tg } 60° = \dfrac{50}{v_S}$

$\therefore\ v_s \cong 28{,}9$ km/h

14. De A para B e de B para A:



$\therefore\ v_R = 4$ km/h

Assim: $\Delta t = \dfrac{8}{4} = 2h$

Logo: ida e volta = 4h

De A para C:

$v_R = 5 + 3 = 8$ km/h

$\therefore\ \Delta t_1 = \dfrac{8}{8} = 1h$

De C para A:

$v_R = 5 - 3 = 2$ km/h

$\therefore\ \Delta t_2 = \dfrac{8}{2} = 4h$

Logo: $\mathbf{\Delta t = \Delta t_1 + \Delta t_2 = 5h}$

Dessa forma, a diferença de tempo será:

5h – 4h = 1h

Aula 11

	0	1	2	3	4	5	6	7	8	9
0		e	e	08	c	d	e	b	b	*
1	b	c	b	b	16					

01. e

02. e

03. 08
Somente a força gravitacional (peso).

04. c
O tempo de queda independe da velocidade horizontal.
Como $A_B = 2d$ e $A_A = d$ então $v_B = 2v_A$.

05. d

06. e

07. b

$h = \frac{1}{2} gt^2$

$5 = \frac{1}{2} \cdot 10 \cdot t^2$

$t = 1s$
$A = v_0 \cdot t$
$4 = v_0 \cdot 1$
$v_0 = 4$ m/s

08. b
$A = v_0 \cdot t$
$100 = 10 \cdot t$
$t = 10s$

$h = \frac{1}{2} gt^2$

$h = \frac{1}{2} \cdot 10 \cdot 10^2$

$h = 500$ m

09. $h = \frac{1}{2} gt^2$

$1{,}225 = \frac{1}{2} \cdot 9{,}8 \cdot t^2$

$t = 0{,}5s$
$\therefore A = v_0 \cdot t$
$2{,}5 = v_0 \cdot 0{,}5$
$v_0 = 5$ m/s

10. b

$h = \frac{1}{2} gt^2$

$0{,}2 = \frac{1}{2} \cdot 10 \cdot t^2$

$t = 0{,}2s$
$A = v_0 \cdot t \qquad 0{,}3 = v_0 \cdot 0{,}2 \qquad \therefore v_0 = 1{,}5$ m/s

11. c

$h = \frac{1}{2} gt^2$

$245 = \frac{1}{2} \cdot 10 \cdot t^2$

$t = 7s$

12. b

$h = \frac{1}{2} gt^2$

$125 = \frac{1}{2} \cdot 10 \cdot t^2$

$t = 5s$
$A = v_0 \cdot t$
$A = 10 \cdot 5$
$A = 50$ m

13. b

$h = \frac{1}{2} gt^2$

$h = \frac{1}{2} \cdot 10 \cdot 1^2$

$h = 5$ m

14. 16

$v = \frac{740}{1} = 740$ m/s $= 2\,664$ km/h

$v = \frac{11\,000}{30} \cong 366{,}67$ m/s $= 1\,320$ km/h

Aula 12

	0	1	2	3	4	5	6	7	8	9
0		d	22	d	b	c	13	c	60	*
1	*	c	c	45	a	a				

01. d
Força peso

02. 22
02 + 04 + 16
$v_{0x} = v_0 \cdot \cos 60°$
$v_{0x} = 8 \cdot 0{,}5$
$v_{0x} = 4$ m/s

03. d

$t = \frac{v_{0x}}{g} = \frac{v_0 \cdot \text{sen}30°}{g}$

$t = \frac{100 \cdot 0{,}5}{10} = 5s$

04. b

$h_{máx} = \frac{v_{0y}^2}{2g} = \frac{(v_0 \cdot \text{sen}30°)^2}{2g}$

$h_{máx} = \frac{(100 \cdot 0{,}5)^2}{2 \cdot 10} = 125$ m

05. c

$A = v_{0x} \cdot t_t$

$A = v_0 \cdot \cos 30° \cdot 2t$

$A = 100 \cdot \frac{\sqrt{3}}{2} \cdot 2 \cdot 5 = 500\sqrt{3}$ m

06. 13

01 + 04 + 08

07. c

Ângulos complementares.

08. $t_t = 6s \therefore t = 3s$

$t = \frac{v_{0y}}{g} \rightarrow t = \frac{v_0 \cdot \text{sen}30°}{g}$

$3 = \frac{v_0 \cdot 0{,}5}{10} \rightarrow v_0 =$ **60 m/s**

09. $h_{máx} = \frac{v_{0y}^2}{2g} = \frac{(v_0 \cdot \text{sen}30°)^2}{2g}$

$h_{máx} = \frac{(500 \cdot 0{,}5)^2}{2 \cdot 10} = 3\,125$ m = **3,125 km**

10. $A = v_{0x} \cdot t_t$

$A = \frac{v_{0y}^2 \cdot \text{sen}2\alpha}{g} = \frac{200^2 \cdot \text{sen}(2 \cdot 30°)}{10} =$

$=$ **2 000** $\sqrt{3}$ **m**

11. c

$t = \frac{v_{0y}}{g} = \frac{v_0 \cdot \text{sen}30°}{g} = \frac{20 \cdot 0{,}5}{9{,}8} \cong$ **1,02s**

12. c

$v_{0x} = 20$

$v_0 \cdot \cos 60° = 20$

$v_0 \cdot 0{,}5 = 20$

$\therefore v_0 = 40$ m/s

13. 45 m/s

$v_{0x} = 45$ m/s

$v_{0y} = 20$ m/s

$t = \frac{v_{0y}}{g} = \frac{20}{10} = 2s$

Logo, em 2s a bola está no ponto de altura máxima, assim, sua velocidade será igual a $v_{0x} = 45$ m/s.

14. a

$v_{0y} = 18$ m/s

$t = \frac{v_{0y}}{g} = \frac{18}{10} = 1{,}8s \qquad \therefore t_t = 3{,}6s$

$h_{máx} = \frac{v_{0y}^2}{2g} = \frac{18^2}{2 \cdot 10} = 16{,}2$ m

$x = v_0 \cdot t_t = 5 \cdot 3{,}6 = 18{,}0$ m

15. a

I. $\uparrow h_{máx} = \frac{v_{0y}^2}{2g\downarrow}$

II. $v_{0x} = v_0 \cdot \cos 60° =$ cte

III. $\uparrow A = \frac{v_y^2 \cdot \text{sen}2\alpha}{g\downarrow}$

IV. velocidade de lançamento e chegada são iguais, em módulo.

Testes complementares

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

01. a

$v = v_0 + at$

$v_1 = 0 + 5 \cdot 6 = 30$ m/s

$v_2 = 0 + 5 \cdot 10 = 50$ m/s

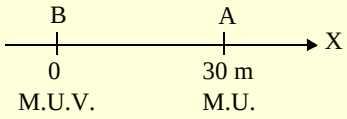
Propriedade fundamental do M.U.V.:

$v_m = \frac{v_1 + v_2}{2} = \frac{30 + 50}{2} =$ 40 m/s

02. d

$a = 5$ m/s²

$v_0 = 25$ m/s $\qquad v_0 = 35$ m/s



Móvel A: $x = x_0 + v \cdot t$

$x_A = 30 + 35 \cdot t$

Móvel B: $x = x_0 + v_0 \cdot t + \frac{1}{2} at^2$

$x_B = 0 + 25 \cdot t + \frac{1}{2} \cdot 5 \cdot t^2$

Logo: $x_B = x_A$

$2{,}5t^2 + 25 \cdot t = 30 + 35 \cdot t$

$2{,}5t^2 - 10 \cdot t - 30 = 0$ (: 2,5)

$t^2 - 4 \cdot t - 12 = 0$

$t_1 = 6s =$ 0,1 min

~~$t_2 = -2s$~~

03. b

04. a. $v = v_0 + g \cdot t$

$300 = 0 + 10 \cdot t$

$t =$ 30s

b. $h = \frac{1}{2} gt^2$

$h = \frac{1}{2} \cdot 10 \cdot 30^2$

$h = 4\,500 =$ 4, 5 km

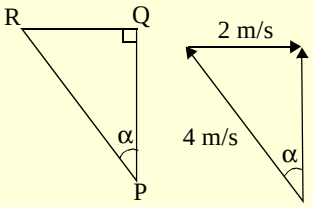
05. c

Como $\Delta x \cong$ área, percebe-se que a área abaixo da curva pontilhada é maior, no invervalo de 0 a 10 s, portanto Robson Caetano venceu a prova.

E de 3 a 20 segundos ambas as curvas coincidem, portanto, as inclinações (velocidades) são iguais.

06. c

7,2 km/h = 2 m/s



$\text{sen } \alpha = \frac{2}{4}$

$\text{sen } \alpha = \frac{1}{2}$

07. c

08. c

09. c

$h = \frac{1}{2} \cdot g \cdot t^2$

$h = \frac{1}{2} \cdot 10 \cdot 2^2$

$h = 20 \text{ m}$

$n = \frac{20}{2,5} = 8$

10. d

$v_{0y} = v_0 \cdot \text{sen } 30^\circ$

$v_{0y} = 50 \cdot \frac{1}{2}$

$v_{0y} = 25 \text{ m/s}$

$v_{0y} = g \cdot t$

$25 = 10 \cdot t$

$t = 2,5\text{s}$

11. b

Alcance:

$A = v_{0x} \cdot t_t$

$240 = 40 \cdot t_t$

$t_t = 6\text{s}$

Novo alcance:

$A' = (40 - 5) \cdot 6$

$A' = 210 \text{ m}$

Logo, a distância ao ponto B será: 240 – 210 = 30 m

Anotações