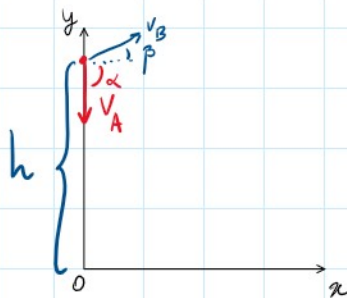


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$$|V_A| = |V_B| = 13 \text{ m/s}$$

$$h = 7,0 \text{ m}$$

$$\vec{V}_{A_F} = ? ; \vec{V}_{B_F} = ?$$



$$V_{A_F} = \sqrt{V_{A_{Fx}}^2 + V_{A_{Fy}}^2} \quad \text{ma} \quad \begin{cases} V_{A_{Fx}} = 0 \\ V_{A_{Fy}} = V_{Ay} - gt = V_A \cdot \sin(\alpha) - gt \end{cases}$$

Quanto vale t ? t è il tempo che A impiega a percorrere

la distanza verticale h : $y_F = y_0 + v_{y0}t + \frac{1}{2}a_y t^2$

NEL NOSTRO CASO: $0 = h + V_A \sin(\alpha)t - \frac{1}{2}gt^2$ (NB) $\sin(-90^\circ) = -1$
 $\rightarrow V_A \sin(\alpha) = -V_A$

$$\Rightarrow t_{1,2} = \frac{-(-V_A) \pm \sqrt{(-V_A)^2 - 4(-\frac{1}{2}g)h}}{2(-\frac{1}{2}g)}$$

$$t_{1,2} = \frac{+13 \frac{\text{m}}{\text{s}} \pm \sqrt{169 \frac{\text{m}^2}{\text{s}^2} + 2 \cdot 9,81 \frac{\text{m}}{\text{s}^2} \cdot 7 \text{m}}}{-9,81 \text{ m/s}^2} = - \frac{13 \frac{\text{m}}{\text{s}} \pm \sqrt{169 \frac{\text{m}^2}{\text{s}^2} + 137 \frac{\text{m}^2}{\text{s}^2}}}{9,81}$$

$$t_{1,2} = - \frac{13 \frac{\text{m}}{\text{s}} \pm \sqrt{306 \frac{\text{m}^2}{\text{s}^2}}}{9,81 \text{ m/s}^2} = - \frac{13 \frac{\text{m}}{\text{s}} \pm 17,5 \frac{\text{m}}{\text{s}}}{9,81 \text{ m/s}^2} = - \frac{13 \pm 17,5}{9,81} \text{ s}$$

$$t_1 = -3,1 \text{ s}; t_2 = 0,46 \text{ s} \rightarrow t_1 < 0 \text{ NON ACCETTABILE}$$

$$V_{A_F} = V_A \sin(\alpha) - gt_2 = -V_A - gt_2 = -13 \frac{\text{m}}{\text{s}} - 9,81 \frac{\text{m}}{\text{s}^2} \cdot 0,46 \text{ s} = 17,51 \frac{\text{m}}{\text{s}} = 18 \frac{\text{m}}{\text{s}}$$

V_{B_F} ? $V_{B_F} = \sqrt{V_{B_{Fx}}^2 + V_{B_{Fy}}^2}$ CON $\begin{cases} V_{B_{Fx}} = V_{B_x} = V_B \cdot \cos(\beta) \\ V_{B_{Fy}} = V_{B_y} - gt = V_B \cdot \sin(\beta) - gt \end{cases}$

Valore di t ? Come per la palla di neve (A)

$$y = y_0 + v_{y0}t + \frac{1}{2}a_y t^2 \rightarrow 0 = h + |V_B| \sin(25^\circ)t - \frac{1}{2}gt^2$$
 (NB) $V_B \sin(\beta) = 5,5 \frac{\text{m}}{\text{s}}$

$$t_{1,2} = \frac{-5,5 \pm \sqrt{(5,5)^2 - 4(-\frac{1}{2} \cdot 9,81)7}}{-9,81} = \frac{-5,5 \pm \sqrt{30,25 + 137,34}}{-9,81}$$

Moltiplico Num. e Denom. per "-1" per togliere i segni negativi.

$$t_{1,2} = \frac{5,5 \pm \sqrt{167,59}}{9,81} = \frac{5,5 \pm 12,95}{9,81} = \begin{cases} t_1 = -0,76 \text{ s} \\ t_2 = 1,9 \text{ s} \end{cases}$$

$$V_{B_{Fy}} = V_{B_y} - gt = V_B \sin(25^\circ) - gt = 5,5 \frac{\text{m}}{\text{s}} - 9,81 \frac{\text{m}}{\text{s}^2} \cdot 1,9 \text{ s} = 5,5 \frac{\text{m}}{\text{s}} - 18,64 \frac{\text{m}}{\text{s}} = -13,14 \text{ m/s}$$

$$V_{B_{Fx}} = V_B \cdot \cos(25^\circ) = 11,78 \text{ m/s} \Rightarrow V_{B_F} = \sqrt{11,78^2 + (-13,14)^2} = 17,64 \text{ m/s} = 18 \text{ m/s}$$

$$V_{A_F} = V_{B_F} = 18 \text{ m/s}$$