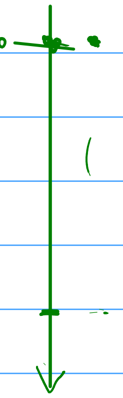
$a \to v(t) \to s(t)$

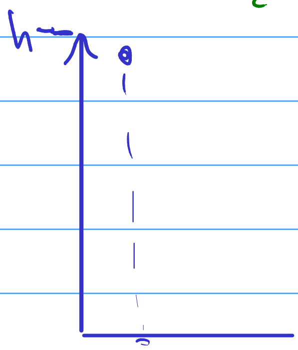
$$\Delta v = \int_0^t a(t')\,dt' \qquad \Delta s = \int_0^t v(t')\,dt'$$

$v(0)$, $s(0)$ condizioni iniziali



$y(0)=0$ $\quad v_0 = 0$

$$y_c = \frac{1}{2} g t^2 \to \text{"}h\text{"} = \frac{1}{2} g t^2$$



h

$$t = \sqrt{\frac{2h}{g}} \to$$

$$\cancel{=} (\text{numero}) \sqrt{\frac{\cancel{m}}{\cancel{m}/s^2}} =$$

$$= (\quad) \sqrt{s^2}$$

$$= (\quad) \cdot s \;!!$$

$g = 9.8\ m/s/s$

$= 35\ km/h/s$

Terra: $y_c^{(1s)} = \frac{1}{2} g (1s)^2 = \underline{4,9\ m}$!

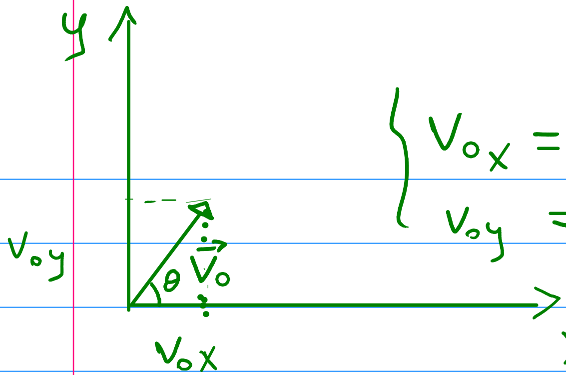
ISS: $y_{c_{ISS}}^{(1s)} = \frac{1}{2} g_{ISS} (1s)^2 = ?$

LUNA: $y_{c_{Luna}}^{(1s)} = \frac{1}{2} g_{LUNA} (1s)^2 = ?$

$\boxed{\text{Mela cascano} \longleftrightarrow \text{Luna gira}}$

$\Rightarrow$ **Cannone di Newton**

$\to$ vedi immagine

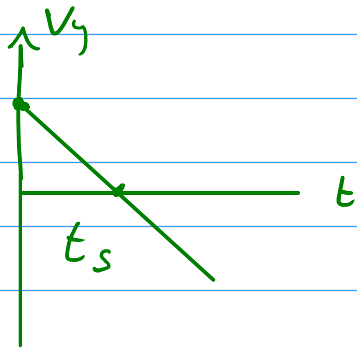


$$\begin{cases} V_{0x} = V_0 \cos\theta \\ V_{0y} = V_0 \sin\theta \end{cases} \qquad \begin{pmatrix} \to V_{x0} \\ \to V_{y0} \end{pmatrix}$$

$$g \to \text{accelerazione} \quad F_G/m_I \to m/s^2$$

$$g \to \text{campo} \quad F_G/m_G \to N/kg$$

<u>Lungo la verticale</u>



$$V_y = V_{y0} + a\,t = V_{y0} - g \cdot t$$

$$0 = V_{y0} - g\,t \Rightarrow \boxed{t_s = \frac{V_{y0}}{g}}$$

$$y_M = y(t=t_s) = \cancel{y_0} + V_{y0} \cdot t_s + \frac{1}{2}(-g)\,t_s^2$$

$$= V_{y0} \cdot \frac{V_{y0}}{g} - \frac{1}{2}\cancel{g}\frac{V_{y0}^2}{g^{\cancel{2}}}$$

$$= \frac{V_{y0}^2}{g} - \frac{1}{2}\frac{V_{y0}^2}{g} = \frac{1}{2}\frac{V_{y0}^2}{g} = \frac{V_{y0}^2}{2g}$$

<u>moto frenato</u> (eco) $\Rightarrow$ <u>spazio di frenata</u>!

$$t_D = \sqrt{\frac{2y_M}{g}} = \sqrt{\frac{\cancel{2}V_{y0}^2}{\cancel{2}g} \cdot \frac{1}{g}} = \frac{V_{y0}}{g} = t_s \quad OK!$$

$$t_v = t_s + t_D = 2\frac{V_{y0}}{g}$$

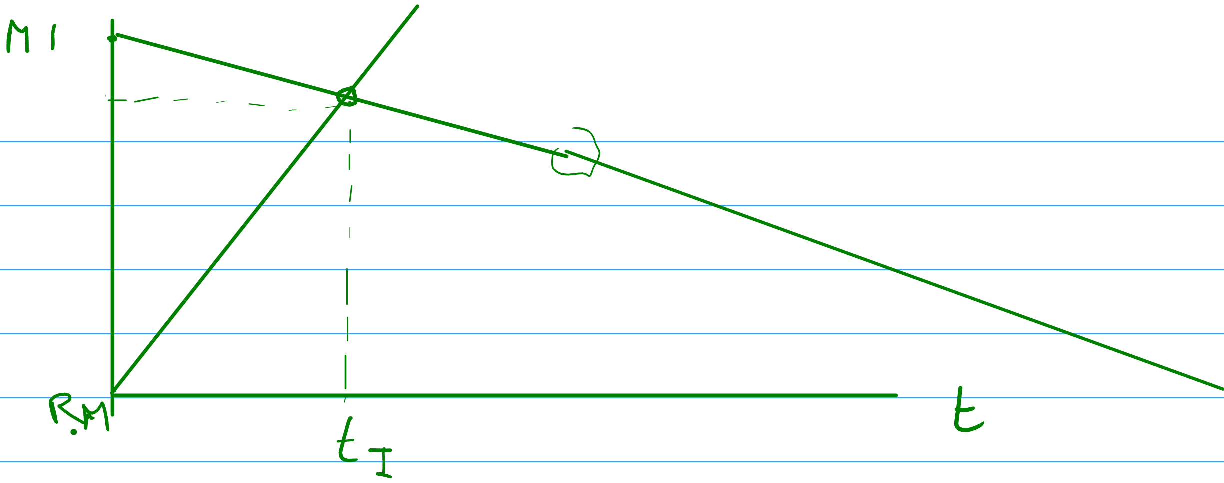
<u>tempo di volo</u>

$$\text{"المدى"} = V_{x_0} \cdot t_v = V_{x_0} \cdot \frac{2V_{y_0}}{g} = 2\,\frac{V_{x_0} \cdot V_{y_0}}{g}$$

$$= \frac{2V_0^2}{g} \sin\theta \cdot \cos\theta$$

$$\boxed{\overset{\sin}{\cancel{\cos}}(2\theta) = 2\sin\theta \cdot \cos\theta}$$

$$= \frac{V_0^2}{g}\,\overset{\sin}{\cancel{\cos}}(2\theta) \xrightarrow[\text{max}]{} \theta = 45^\circ$$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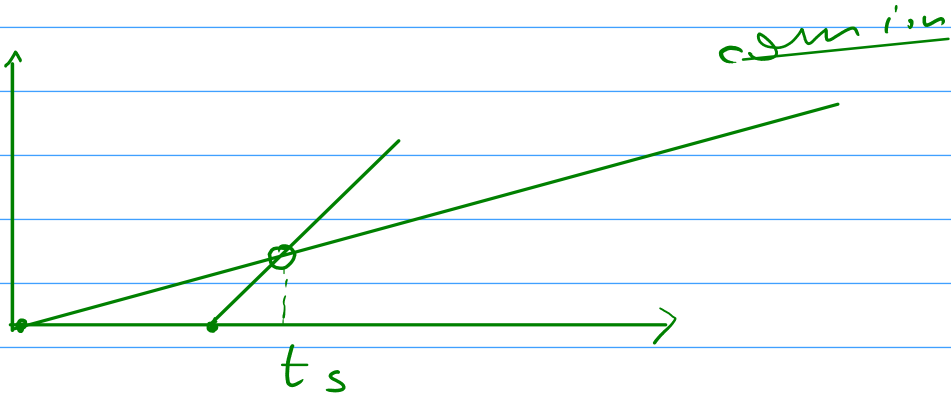
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