Appunti Fisica

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Indice

Parte I

fisica 1

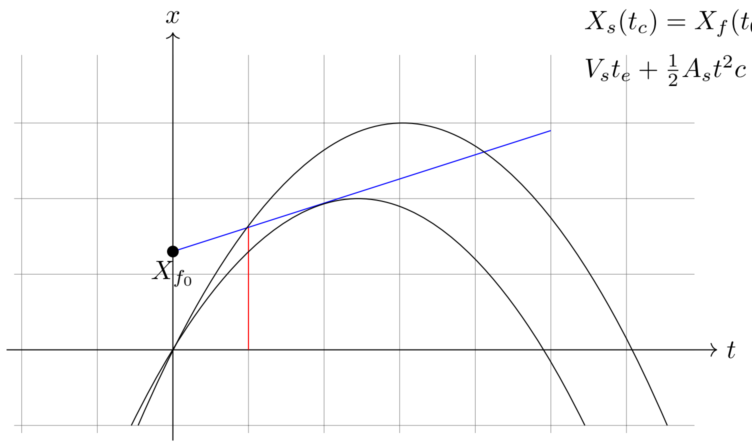
0.1 moto rettilineo uniformemente accelerato

Moto rettilineo uniformemente accelerato. La definizione di moto rettilineo uniformemente accelerato è: il moto di un corpo con accelerazione costante lungo una traiettoria retta sempre nella stessa direzione e identico verso.

$V_{S_0} = 30,0m/s$ $\quad X_{F_0} = I_{SF} = 155,5m$ $\quad X_F(t) = X_{F_0} + V_{F_0}t$

$V_F = 5,00m/s$ $\quad X_s(t) = X_{S_0} + X_{S_0}t + \frac{1}{2}A_s t^2$

$A_s = -2.00m/s$ $\quad X_s(t) = V_{S_0} + \frac{1}{2}A_s t^2$



$X_s(t_c) = X_f(t_0)$

$V_s t_e + \frac{1}{2}A_s t^2 c = X_{F_0} + V_{F_0} + V_{F_0} + V_{F_0}tc$

$(x_f(t) - x_{f_0}) = X_f(t_0)$

$\alpha x^2 + \beta x + \gamma = 0$

$x = \frac{-\beta \pm \sqrt{\beta - \gamma}}{2\alpha}$ $\Delta \geq 0$

$\tilde{x^2} + 2\tilde{\beta}x + \gamma = 0$

$x = \sqrt{\tilde{\beta}}$

$\frac{1}{2}(V_{s_0} - V_{F_0})T_c - X_{F0} = 0$

$t_c^2 + \frac{2}{|A_s|}(V_{s_0} - V_{f_0})t_c - \frac{2}{A_s}X_{f_0} = 0$

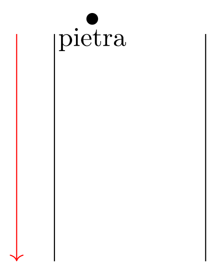
$A_s = -|A_s|$

$t_c = -[-\frac{I}{A_s}(V_{s_0} - V_{f_0})] \pm \sqrt{(v_{s_0} - v_{f_0})/A_s^2 - \frac{2}{|A_s|}X_{f_0}} = 156,25 - 155 = 1,25$

$t_{c_-} = 12,5 - 1,00s = 11.5s$

0.1.1 Un problema d'esempio

Si Lascia cadere un sasso in un pozzo. il tempo nell'acqua viene percepito con un ritardo di 7.40s, a quale distanza dall'imboccatura del pozzo si trova la superficie dell'acqua? La velocità del suono nell'aria è 336 m/s.



$V_s = 336m/s$ $\Delta t_{tot} = 4,40s$

$y(t) = y_0 + V_0 t + \frac{1}{2}at^2$

$y = 0$ $y_0 = 0$ $V_0 = 0$ $a = -g$

$y(t) = h - \frac{1}{2}gt^2$

$\Delta t_{tot} = t_{caduta} + t_{suono}$

$h = V_s * t_{suono}$

$t_{suono} = h/V_s$

$y(t_c) = 0$

$h - \frac{1}{2}gt_c^2 = 0$

$\Delta t_{tot} = \sqrt{\frac{2h}{g}} + \frac{h}{V_s}$

$\Delta t_{tot} = -\frac{h}{V_S} = \sqrt{\frac{2h}{g}}$

$\Delta t_{tot} - \frac{h}{V_s} > 0$

$(\Delta t_{tot} - \frac{h}{V_s})^2 = \frac{2h}{g}$

$\Delta t_{tot}^2 + \frac{h^2}{V_s^2} - \frac{2h}{v+V_x}\Delta t_{tot} = \frac{2h}{g}$

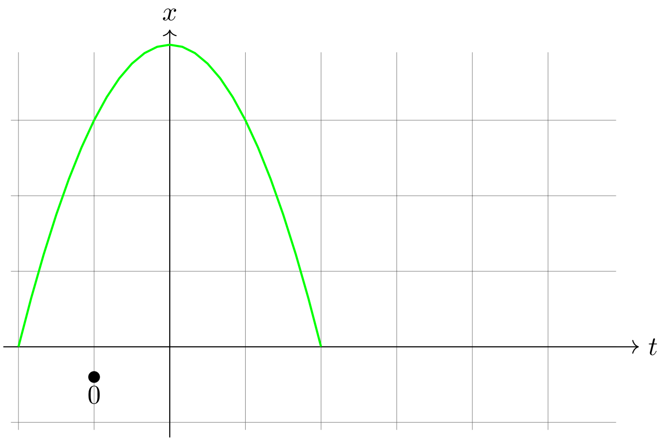
$\frac{h^2}{V_s^2} - 2(\frac{\Delta t_{tot}}{V_s} + \frac{I}{g})h + \Delta t_{tot}^2 = 0$

$h^2 - 2V_s^2(\frac{\Delta t_{tot}}{V_s} + \frac{I}{g})h + \Delta t_{tot}^2 = 0$

$h = V_s^2(\frac{\Delta t_{tot}}{V_s} + \frac{I}{g})h + V_s^2 \Delta t_{tot}^2 = 0$

$h = V_s^2(\frac{\Delta t_{tot}}{V_s} + \frac{I}{g}) \pm \sqrt{[\frac{\Delta t_{tot}}{V_s} + \frac{I}{g}]^2 - \frac{2h}{v+V_x}\Delta t_{tot}}$

$\Delta t_{tot} - \frac{h}{V_s} > 0$



$x(t) = x_0 + V_{x_0} t$

$y(t) = y_0 + V_{y_0} t$

$x - x_0 = V_{x_0}$

$y - y_0 = V_{y_0}$

$\frac{y-y_0}{x-x_0} = \frac{V_{x_0}}{V_{y_0}}$

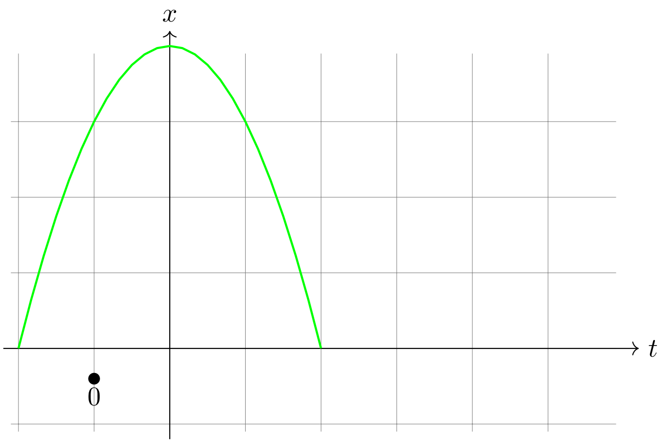
$x(t) = x_0 + V_{x_0} t + \frac{1}{2}a_x t^2$

$y(t) = y_0 + V_{y_0} t + \frac{1}{2}a_y t^2$

$\frac{y-y_0}{x-x_0} = \frac{V_{y_0}}{V_{x_0}} = \frac{ay}{ax}$

$\frac{1}{2}\frac{V_{y_0}}{g} = -\frac{1}{2}\frac{g}{V_{x_0^2}}\frac{V_{x_0^r} * V_{y_0}^2}{g^2}$

$y - y_m = -\frac{1}{2}\frac{g}{}$



$A_y = -g$

$y(t) = y_0 + V_{y_0} t + \frac{1}{2}A_y t^2$

$y_0 = 0$ $x_0 = 0$

$V(t) = V_{y_0} t - \frac{1}{2}gt^2$

$x(t) = x_0 + V_{y_0} t$

$x(t) = V_{x_0} t$

$\begin{cases} x(t) = V_{x_0} t \\ y() = V_{y_0} t - \frac{1}{2}gt^2 \end{cases}$

$y - y_m = \alpha(x - x_m)^2$

$V_y(t) = V_{y_0} - gt$ $-V_m = \alpha x_m^2$

$t = \frac{x}{V_{y_0}}$

$y = V_{y_0} - \frac{1}{2}g\frac{x^2}{V_{x_0}^2}$

$y - y_m = \alpha x^2 + \alpha x_m^2 - 2\alpha x x_m$

$\alpha = -\frac{1}{2}$

$X_m = \frac{V_{x_0} * V_{y_0}}{g}$

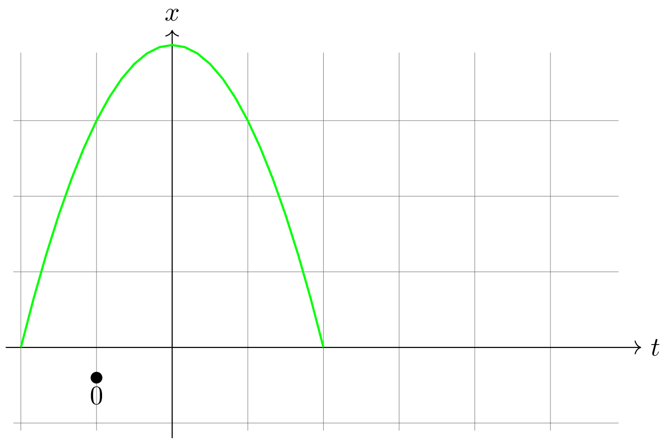
$t_m = \frac{V_{y_0}}{g}$

$V_{y_0} - gt_m = 0$

$y_m = V_{y_0}\frac{V_{y_0}}{g} - \frac{1}{2}g\frac{V_{y_0}^2}{g^2}$

$\frac{1}{2}\frac{V_{y_0^2}}{g} = -\frac{1}{2}\frac{g}{V_{x_0^2}}\frac{V_{x_0^r}}{g^2}$

$y - y_m = -\frac{1}{2}\frac{g}{V_{x_0^2}}(x - x_m)^2$



$X_p = r * \cos\sigma$

$\cos\sigma = \frac{x_p}{r}$

$y_p = r \sin\sigma$

$X_p^2 + y_p^2 = r^2$

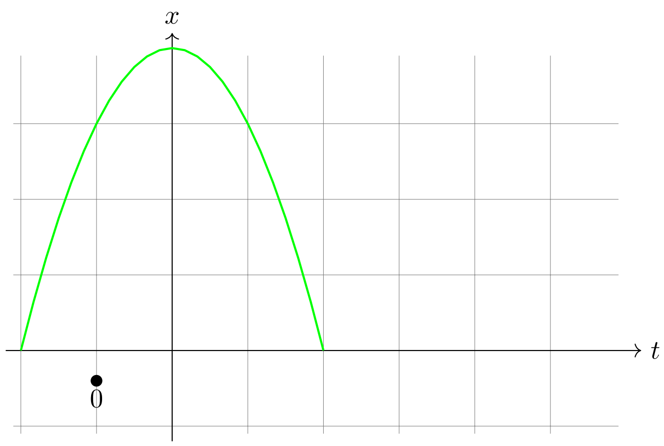
$\frac{y_p}{x_p} = \frac{\sin\sigma}{\cos\sigma} = \tan\sigma$

$\cos\sigma = \cos -\sigma$

$\sin\sigma = -\sin -\sigma$

0.2 I vettori

0.2.1 Proiezione dei vettori prodotto scalare



$L * L = 1$

$J * J = 1$

$\overrightarrow{a} * \overrightarrow{i} = a_x$

$\overrightarrow{a} *$

$\overrightarrow{a} = \overrightarrow{a}_x \overrightarrow{I} + a_y \overrightarrow{J}$

$ax = \overrightarrow{a} * \overrightarrow{J} = ||a|| * ||\overrightarrow{J}|| \cos\phi = ||\overrightarrow{a}|| * \cos\phi$

$\overrightarrow{a} = a_x \overrightarrow{L} + a_y \overrightarrow{J}$

$\overrightarrow{b} = b_x \overrightarrow{L} + b_y \overrightarrow{J}$

$\overrightarrow{a} * \overrightarrow{b} = (a_x \overrightarrow{J} + a_y \overrightarrow{J}) * (b_x \overrightarrow{J} + b_y \overrightarrow{J})$

$\overrightarrow{a} * \overrightarrow{b} = a_x * b_x + a_y b_y$

$||\overrightarrow{a}|| = a_{x^*2} + a_{y^2} = \overrightarrow{a} * \overrightarrow{a}$

$\overrightarrow{r(t)} = \overrightarrow{r_0} + V_0 t + \frac{1}{2} \overrightarrow{y} t^2$

$\overrightarrow{r} * \overrightarrow{J} = y = \overrightarrow{r} * \overrightarrow{J} + \overrightarrow{V_0} * \overrightarrow{J}$

$\cos\frac{\pi}{2} * \phi = \sin\phi$

$x = x_0 + V_x t$

$y = y_0 + V_0 t - \frac{1}{2} g t^2$

Moto balistico

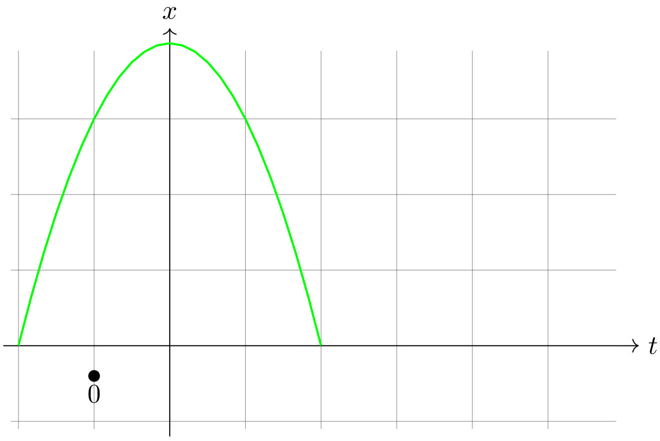
$x = x_0 + V_{0x} t$

$y = y_0 + V_{0y} t - \frac{1}{2} g t^2$

$x = 0$

$y = h$
$V_{0y} = \overrightarrow{V_0} * \overrightarrow{J} = ||\overrightarrow{V}|| * ||\overrightarrow{J}||$
$h = \frac{1}{2}gt^2$

0.2.2 Primitive di una funsione



$\frac{d}{ax}\mathcal{A}_x = f(x)$

$\mathcal{A}(x) \quad = \quad \int_?^? i\mathcal{A}(x) \quad =$ traria
$\int_?^? f(x)dx$ =integrale indefinita $\quad P(x_2) - P(x_1) = \mathcal{A}(x_2) + c -$
$P(x) = \mathcal{A}(x) + c \rightarrow$costante arbi- $\quad \mathcal{A}(x_1) - c = \mathcal{A}(x_2) - \mathcal{A}(x_1)$

Integrali definito

$\mathcal{A}(x_2) - \mathcal{A}(x_1) = \int_{\mathcal{A}(x_1)}^{\mathcal{A}(x_2)} d\mathcal{A}(x) = \int_{\mathcal{A}(x_1)}^{\mathcal{A}(x_2)} f(x)dx$
Teorema dell'energia cinetica $\overrightarrow{F}_R$ risultante delle forze.
$dL = \overrightarrow{F}_R * d\overrightarrow{r}$ lavoro elementare fonte della risultante.

$L_{1,2} = \int_{\overrightarrow{r}_1}^{\overrightarrow{r}_2} F_R * d\overrightarrow{r}$
$\overrightarrow{F}_R = m\overrightarrow{a} = m\frac{d\overrightarrow{v}}{dt}$

$L_{1,2} = m\int_{\overrightarrow{r}_1}^{\overrightarrow{r}_2} \frac{d\overrightarrow{v}}{dt} * d\overrightarrow{r} = m\int_{\overrightarrow{r}_1}^{\overrightarrow{r}_2} d\overrightarrow{v} * \frac{d\overrightarrow{r}}{dt} = m\int_{\overrightarrow{r}_1}^{\overrightarrow{r}_2} d\overrightarrow{v} * \overrightarrow{v}$