C12 - 3.10 - y'/Int Ball

$t\ ;s$ $\quad s(t)\ ;m$ $\quad v(t)\ ;\frac{m}{s}$ $\quad a^*(t)\ ;\approx 10\frac{m}{s^2}$ $\quad s'(t)=v(t)$ $\quad v'(t)=a(t)$ $\quad \int v(t)\,dt=s(t)$ $\quad \int a(t)\,dt=v(t)$

5 m Ball Drop.

$v_i=0$

1D

$d=5$

$v_f=-10$

? s, t = 0.5

$s=-5t^2+5$ Given

$s=-5(0.5)^2+5$

$s=3.75\ m$

Find v @ 0.5s.

$v=-10t^2$

$v=-10(0.5)^2$

$v=-2.25$

? t in air.

$s=-5t^2+5$

$0=-5t^2+5$

$5=5t^2$

$t=1$

? v final, s ≈ 0.

$v=-10t^2$

$v=-10(1)$

$v=-10$

? s, v=-3.

$v=-10t^2$

$-3=-10t^2$

$t^2=0.3$

$t=0.55$

$s=-5t^2+5$

$s=-5(0.55)^2+5$

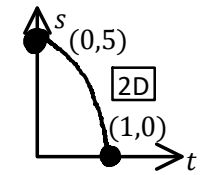
$s=3.5$

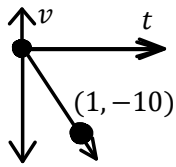
Find $v(t)$.

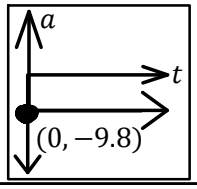
$s=-5t^2+5$

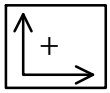
$v=s'=-10t^2$

$v=-10t^2$









Physics 11*

$d_f-d_i=\vec{v}_it+\frac{1}{2}\vec{a}t^2$

$d_f=\frac{1}{2}\vec{a}t^2+\vec{v}_it+d_i$

$d_f=\frac{1}{2}(-10)t^2+5$

$d_f=-5t^2+5$

$\Delta\vec{d}=\vec{v}_it+\frac{1}{2}\vec{a}t^2$

$v=\vec{d}'=\vec{v}_i+\vec{a}t$

$\vec{v}_f=0-10t$

$\vec{v}_f=-10t$

$\vec{v}_f=-10t$

$a=v'=-10$

$a=-10$

$y=position\ (s)$

$y'=velocity\ (v)$

$y''=acceleration\ (a)$

Ball Straight Up @ 10.

$v_{max}=0$

$d=5$

$v_i=10$

? s, t = 0.5

$s=-5t^2+10t$ Given

$s=-5(0.5)^2+10(0.5)$

$s=3.75\ m$

Find $v(t)$.

$s=-5t^2+10t$

$v=s'=-10t+10$

$v=-10t+10$

? t, s = 3.75.

$s=-5t^2+10t$

$3.75=-5t^2+10t$

$0=-5t^2+10t-3.75$

$t=0.5,1.5$

? v at t = 0.5.

$v=-10t+10$

$v=-10(0.5)+10$

$v=5$

? t , v = 5.

$v=-10t+10$

$5=-10t+10$

$t=0.5$

$d_f=+\frac{1}{2}(-10)t^2+10t$

$d_f=-5t^2+10t$

$\vec{v}_f=10-10t$

$v_f^2=v_i^2+2ad$

$0^2=10^2+2(-10)d$

$0=100-20d$

$d=5$

Time to Max Height.

$v=-10t+10$

$0=-10t+10$

$t=1$

Max Height.

$d=-5t^2+10t$

$d=-5(1)^2+10(1)$

$d=5$

Total Time*

$t=1\times 2$

$t=2$ OR

? t, s = 0.

$s=-5t^2+10t$

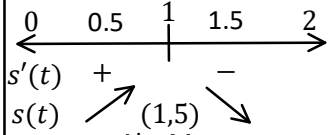
$0=-5t^2+10t$

$0=-5t(t-2)$

$t=0,2$ Factor

Total Time $t=2-0$

$t=2$



? Final v.

$v=-10t+10$

$v=-10(2)+10$

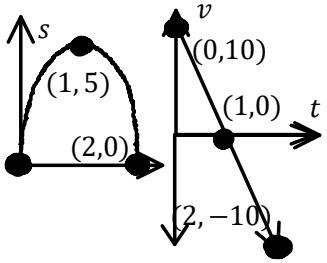
$v=-10$

$s'(0.5)=-10(0.5)+10$

$s'(0.5)=+5=+ve$

$s'(1.5)=-10(1.5)+10$

$s'(1.5)=-5=-ve$



Up from 5 m Building @ 10.

$d=5$

$v_i=10$

5

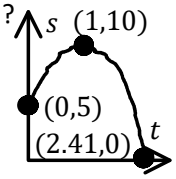
When does it Hit the Ground?

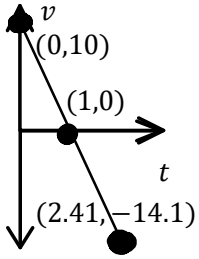
$s=-5t^2+10t+5$

$0=-5t^2+10t+5$

$0=t^2-2t-1$

$t=-0.41$ $\quad t=2.41s$





These Graphs are all the Different Sections of the Same Shape.

$d_f=\frac{1}{2}(-10)t^2+10t+5$

$d_f=-5t^2+10t+5$

$\vec{v}_f=10-10t$

5 m Ball Drop. Find $v(t)$. Find $s(t)$.

$a(t)=-10$

$v(t)=\int -10\,dt$

$v(t)=10t+C$

$0=-9.8(0)+C$

$C=0$ $\quad v(0)=0$

$v(t)=-10t$

$s(t)=\int -10t\,dt$

$s(t)=\frac{-10t^2}{2}+C$

$s(t)=-5t^2+C$

$5=-5(0)^2+C$

$C=5$ $\quad s(0)=5$

$s(t)=-5t^2+5$

Ball Straight Up @ 10.

$10=-9.8(0)+C$

$C=10$ $\quad v(0)=10$

$v(t)=-10t+10$

$s(t)=\int -10t+10\,dt$

$s(t)=-5t^2+10t+C$ $\quad s(0)=0$

$s(t)=-5t^2+10t$

Up from 5 m Building @ 10.

$v(t)=-10t+10$

$5=-5(0)^2+10(0)+C$

$C=5$ $\quad s(0)=5$

$s(t)=-5t^2+10t+5$