Physics 113 - September 11, 2012

- P.S. 2 due Thursday
- 220 to 1 → I'm not evil but don't expect me to deal with detailed exceptions
  That's why syllabus is as it is in part

Turn P.S. in at end of class on Thursday or in locker ASAP After ...
No promises if sthns showed in to my B+L mail box
or under my office door or show up at 11 am Friday

- Workshop section changes

Last time –

Always True $x - x_0 = \int_{t_0}^{t} v\,dt$

$v - v_0 = \int_{t_0}^{t} a\,dt$

is F constant? $F = ma$

Assumes a = constant

this form also assumes $t_0 = 0$

Constant Acceleration Equations

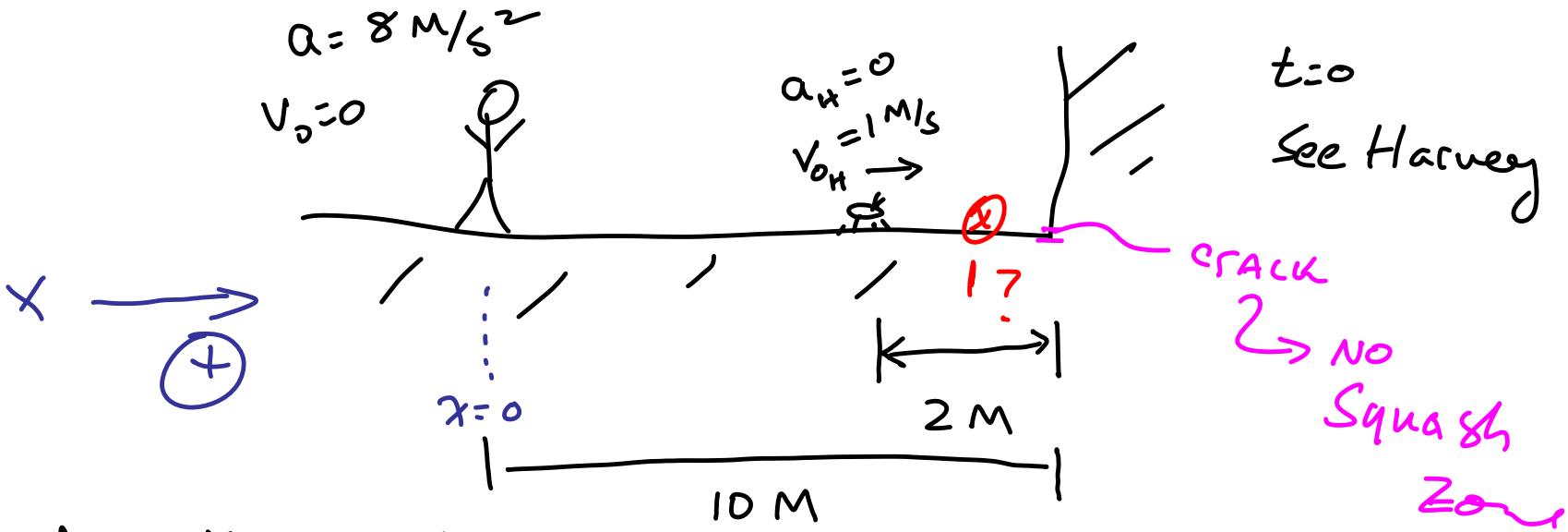
$v = v_0 + at$

$x = x_0 + v_0 t + \frac{1}{2}at^2$

$x = x_0 + \left(\frac{v + v_0}{2}\right)t$

$v^2 = v_0^2 + 2a(x - x_0)$

form may vary slightly ... easily understood if you take the trouble to understand the eqns and their origin



(a) does Harvey live to see another day ?

Time of bug to wall

$$x = x_0 + V_0 t + \frac{1}{2} a t^2$$

$a = 0$

$+10 \quad +8$

$2\,M = (1\,M/s)\,t$

$t = 2\,s$

Time of person to wall

$x = x_0 + v_0 t + \frac{1}{2} a t^2$ ($a = 8\ m/s^2$)

$x_0 = 0$, $v_0 = 0$, $x = 10\ m$

$10 = \frac{1}{2} 8 t^2$

$t = 1.6\ s$

(b) where is the bug spot on rug?

$x_H = x_{0H} + v_{0_H} t_H + \frac{1}{2} a_H t_H^2$

$x_{0H} = +8$, $v_{0_H} = 1\ m/s$, $a = 0$

$x_H = 8 + t_H$

$$x_p = x_{0p} + v_{0p} t_p + \frac{1}{2} a_p t_p^2$$

$x_{0p} = 0$, $v_{0p} = 0$

$$x_p = \frac{1}{2} g t_p^2$$

at squash time

$x_p = x_{sq}$

$t_p = t_{sq}$

$$x = g + t$$

$$x = \frac{1}{2} g t^2$$

$$g + t = \frac{1}{2} g t^2$$

$$\frac{1}{2} g t^2 - t - g = 0$$

$$t^2 - \frac{1}{4}t - 2 = 0$$

$$Ax^2 + Bx + C = 0 \rightsquigarrow x = \frac{-B \pm \sqrt{B^2 - 4AC}}{2A}$$

$t = 1.54\ s$ or $t = -1.3\ s$

Obviously correct one

2ND root makes No physical Sense

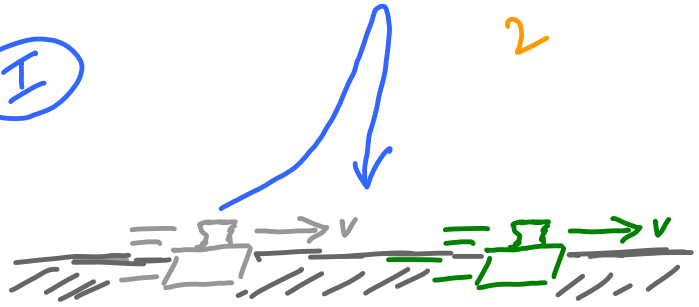
$$x = 8 + t = 8 + 1.54$$

$$x = 9.54\ m$$

Harvey is Squared

What path will ball take as cart moves from "launch" point to "end" point (when ball returns to cart level) ?

I



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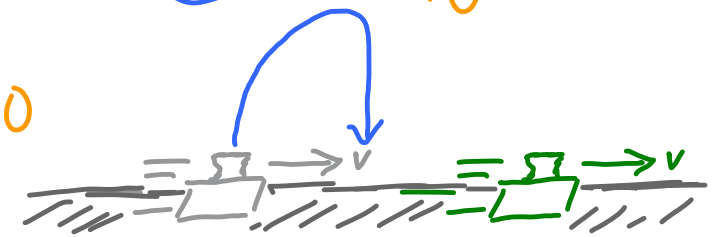
II



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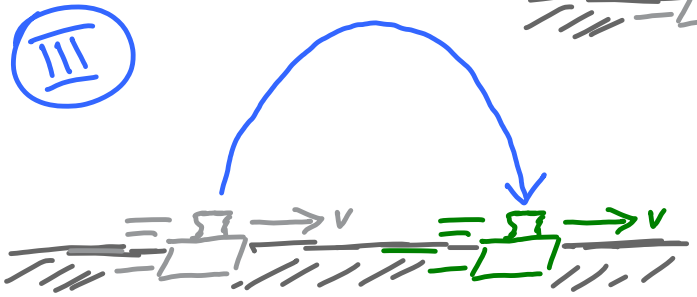
III



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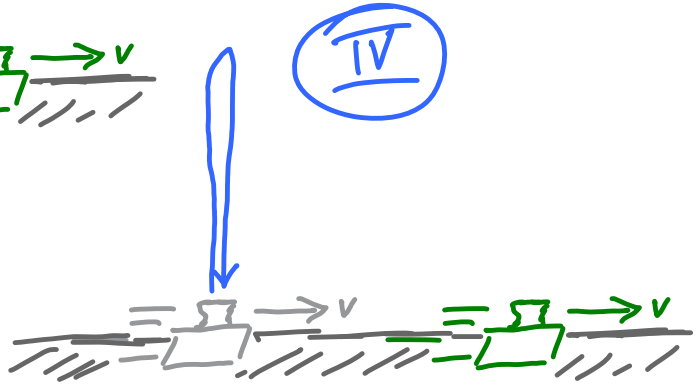
IV



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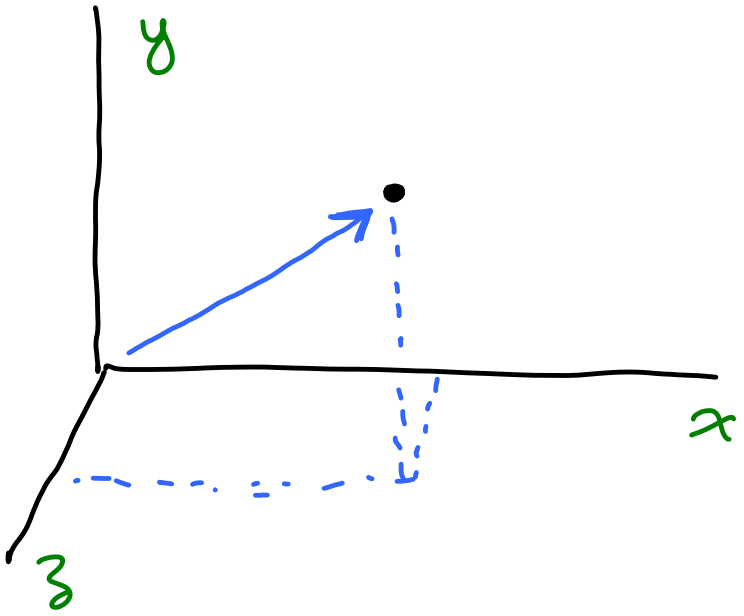
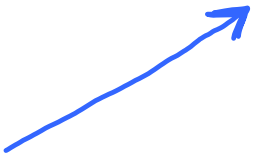
Scalars ⇝ #'s ... has magnitude

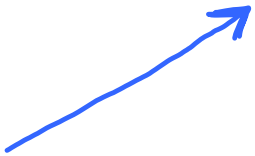
Vectors ⇝ magnitude and direction

3 #'s

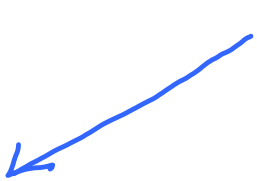




$\vec{A}$ = vector = (x, y, z)



$\vec{A}$



$-\vec{A}$

vector addition