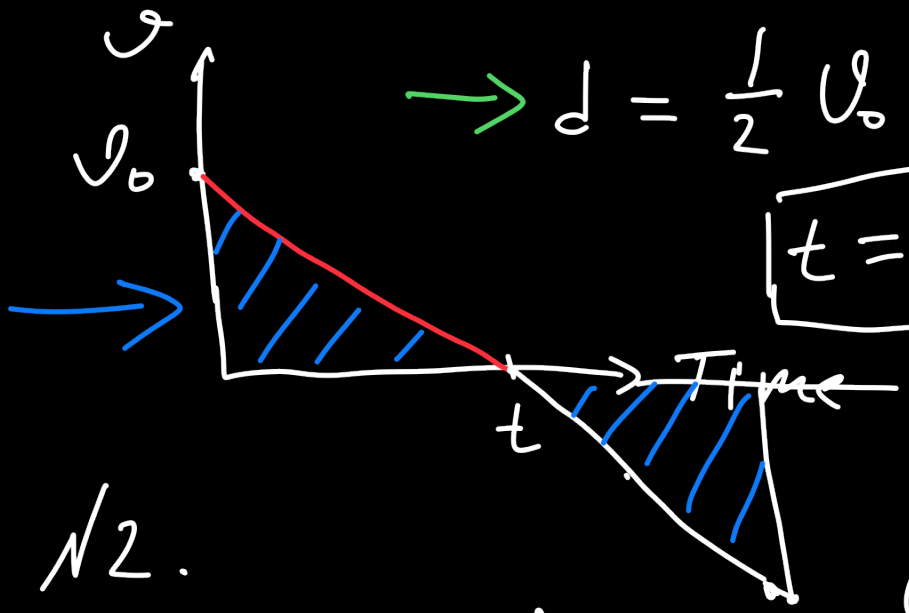
Homework 5

№1

a) $v_0 = 0 \Rightarrow d = \frac{1}{2} a t^2 \simeq 30.7\,m$

б) $v_0 = 60\,mph = 26.7\,\frac{m}{s}$

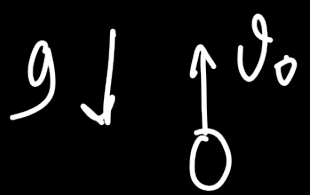
$\rightarrow d = v_0 \cdot t - \frac{1}{2} a t^2 = 89..\,m$



$\rightarrow d = \frac{1}{2} v_0 \cdot t = 90\,m$

$t = \frac{v_0}{g}$

№2.



a) $t_h = \frac{v_0}{g} \simeq 1.5s.$

$v_h = v_0 - g \cdot t_h$, $v_h = 0$

б) $d = \frac{1}{2} v_0 \cdot t_h = \frac{1}{2} \cdot 15\frac{m}{s} \cdot 1.5s = 11.25\,m.$

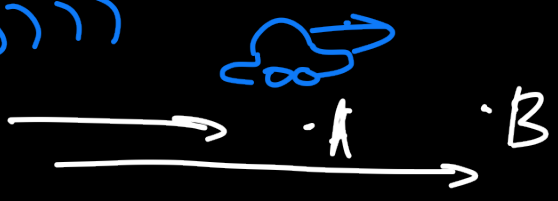
c) $t = 3\,seconds.$; $d = 0 + g \cdot t_2^2 \cdot \frac{1}{2}$

Classwork.

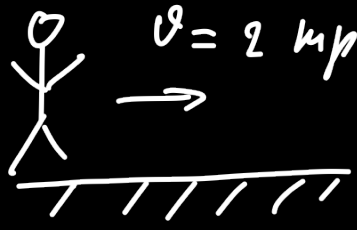
How do we measure velocity?

→ In the car, measure how far you traveled:

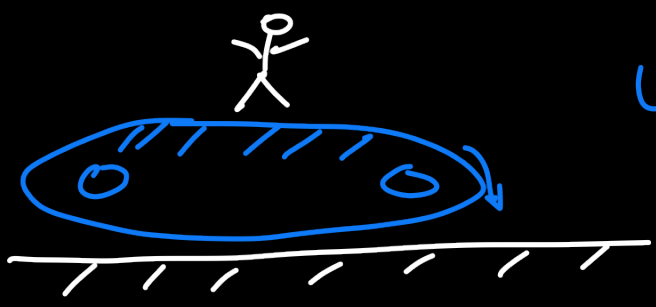
→ Radar.



Relativity of motion

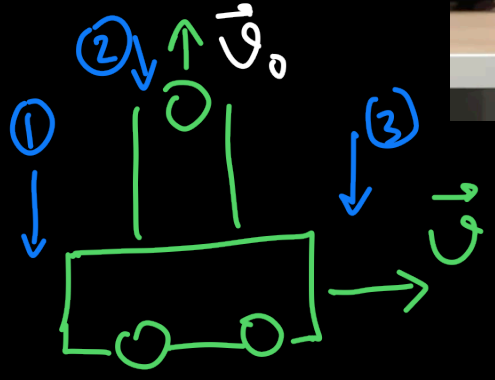


Reference frame: ground, true.



$v_1 = 2$ mph

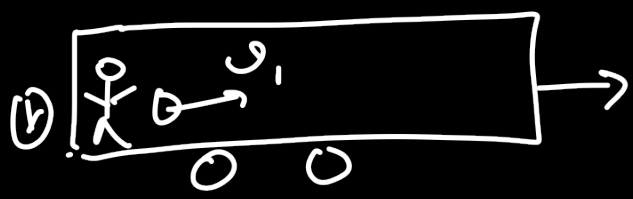
$v_2 = 0$ mph.



√√√ 1. Behind

→ √√√ 2. On the cart

3. In front



v_1 – wrt train

v_2 – wrt ground

② $v_2 = ?$

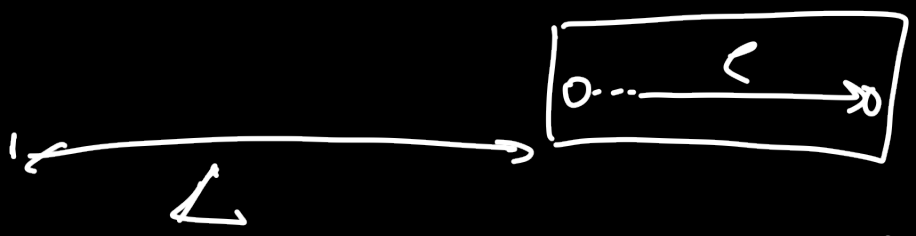
$$\vec{v}_2 = \vec{v}_1 + \vec{v}$$

a) Both have synch. clocks ($t_1 = t_2 = t$).

$$\ell = v_1 \cdot t$$

$$d_{in} = \ell = v_1 \cdot t$$

b) outside.



$$d_{out} = \ell + L = v_1 \cdot t + v \cdot t$$

$$v_{out} = \frac{\ell + L}{t} = v_1 + v$$

$$\vec{v}_{out} = \vec{v}_1 + \vec{v}$$