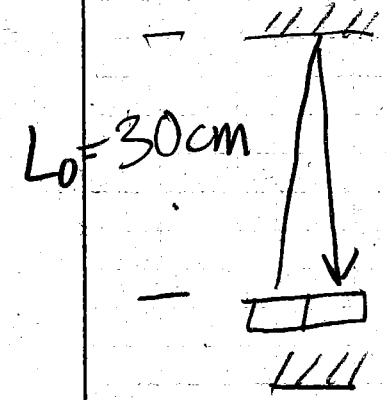
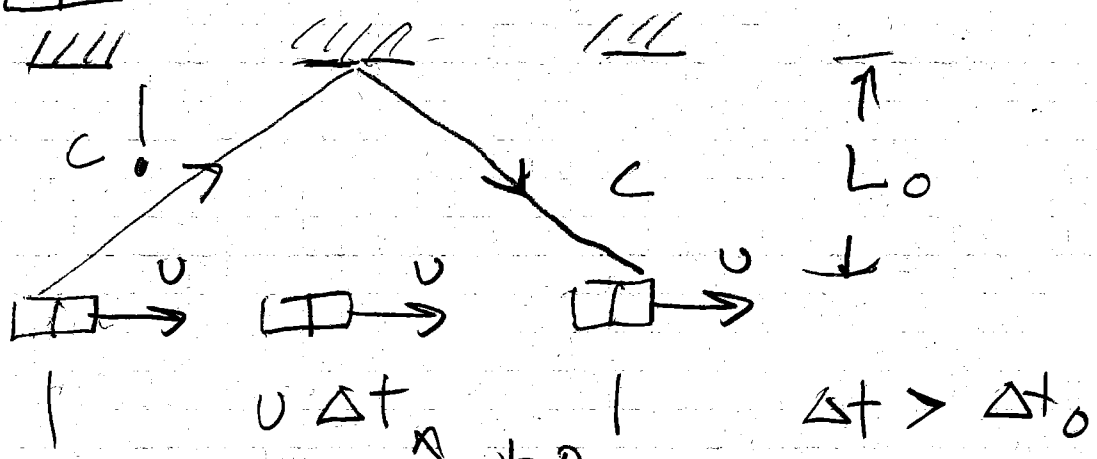
Speed of light always c in all frames (+ x change)

In Rest Frame of clock --



$$\Delta t_0 = \frac{2L_0}{c} = 2\ ns$$
$$= 2 \cdot 10^{-9}\ s$$



Time Dilitation $\boxed{\Delta t = \gamma \Delta t_0}$

$$\gamma = \frac{1}{\sqrt{1-\beta^2}}$$

$$\beta = v/c$$

γ always > 1

as $v \to c$ (limiting)

$\gamma \to \infty$

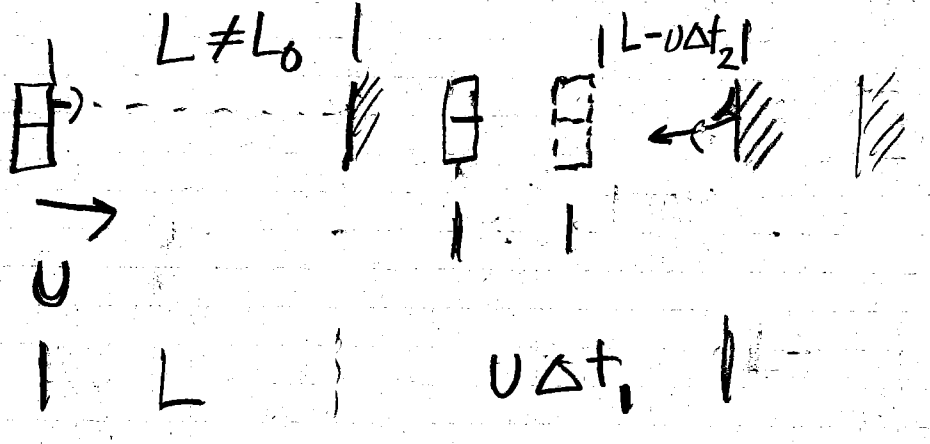
go at $v = .999\,c$, $\gamma = 22.4$

1 second passes in moving frame.

22 seconds pass in "rest" frame.

9-10:30pm

Length Contraction



$$c\Delta t_1 = L + v\Delta t_1 \Rightarrow \Delta t_1 = \frac{L}{c-v}$$

$$c\Delta t_2 = L - v\Delta t_2 \Rightarrow \Delta t_2 = \frac{L}{c+v}$$

$$\Delta t = \frac{L}{c-v} + \frac{L}{c+v}$$

$$= \frac{L(c+v) + L(c-v)}{c^2 - v^2} = \frac{2cL}{c^2 - v^2}$$

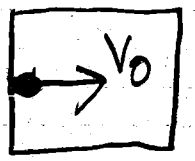
$$\Delta t = \frac{2L}{c} \frac{1}{1-(v/c)^2} \leftarrow \text{BIGGER!}$$

$$\Delta t = \gamma^2 \frac{2L}{c} \leftarrow \text{Not } L_0 !$$

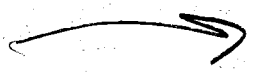
$$= \gamma \Delta t_0 = \gamma \frac{2L_0}{c}$$

$$\boxed{L = \frac{L_0}{\gamma}}$$

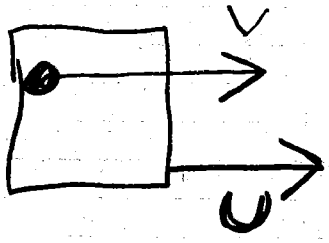
Length Contraction.



Box
v_0 w/r to BOX



hurl box velocity u



$$v \neq v_0 + u$$

→ what if $v_0 = 0.99c$
$u = 0.99c$?

similar

$$v = \frac{v_0 + u}{1 + \frac{v_0 u}{c^2}}$$

"Relativistic"

evaluate

$v_0 = c/2$ $\quad u = \frac{c}{2}$

(A) $v = c$

(B) $v = c/2$

(C) $v = \frac{4}{5}c$

(D) $v = \frac{9}{10}c$

The Lorentz Boost Factor γ can be either < 1 or > 1

(A) TRUE

(B) FALSE