Ex 30.2 (Relativistic time dilation)

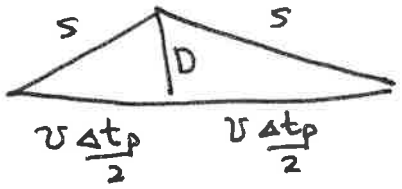
a) According to Castor the light travels 2D at speed c

$$\Delta t_c = \frac{2D}{c}$$

b) Accordg to Pollux, the light travels distance

$$2s = 2\sqrt{D^2 + \frac{v^2 \Delta t_p^2}{4}}$$

Since



c) $\Delta t_p = \frac{2s}{c}$

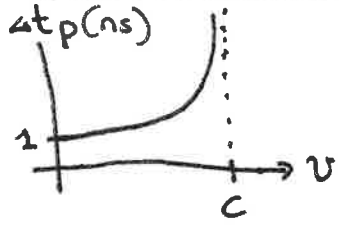
$$\Delta t_p^2 = \frac{4}{c^2} D^2 + \frac{v^2 \Delta t_p^2}{c^2}$$

$$\Delta t_p^2 \left(1 - \frac{v^2}{c^2}\right) = \frac{4D^2}{c^2}$$

$$\Delta t_p = \frac{2D}{c} \frac{1}{\sqrt{1-(v/c)^2}}$$

$$\boxed{\Delta t_p = \gamma \Delta t_c}$$

d)



$\Delta t_p = \Delta t_c$ when $v = 0$

e) Each thinks the other's ticks slowly.