CLICKER

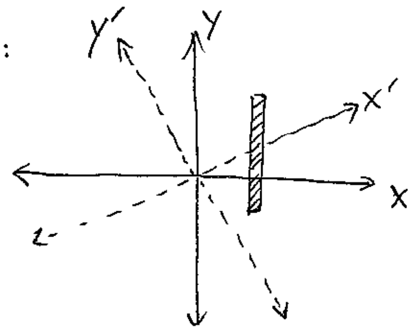
LAST TIME: similarity between

Rotations: AND Lorentz Transformations

$$x' = \cos\theta\, x - \sin\theta\, y$$
$$y' = \cos\theta\, y + \sin\theta\, x$$

$$t' = (\gamma)t - \left(\gamma \frac{v}{c^2}\right)\cdot x$$
$$x' = (\gamma)x - (\gamma v)\cdot t$$

Visualize:



$\Rightarrow$ Spacetime diagram (TODAY)

$L^2 = (\Delta x)^2 + (\Delta y)^2$ same for both coordinate systems

$\Rightarrow$ $I = (\Delta x)^2 + (\Delta y)^2 + (\Delta z)^2 - c^2(\Delta t)^2$

INVARIANT INTERVAL between 2 events.

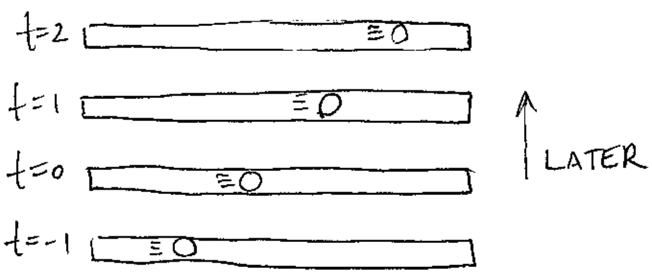
$\otimes\ (\vec{x}_1, t_1)$ $\quad \otimes\ (\vec{x}_2, t_2)$

$\Delta x = x_2 - x_1$, etc...

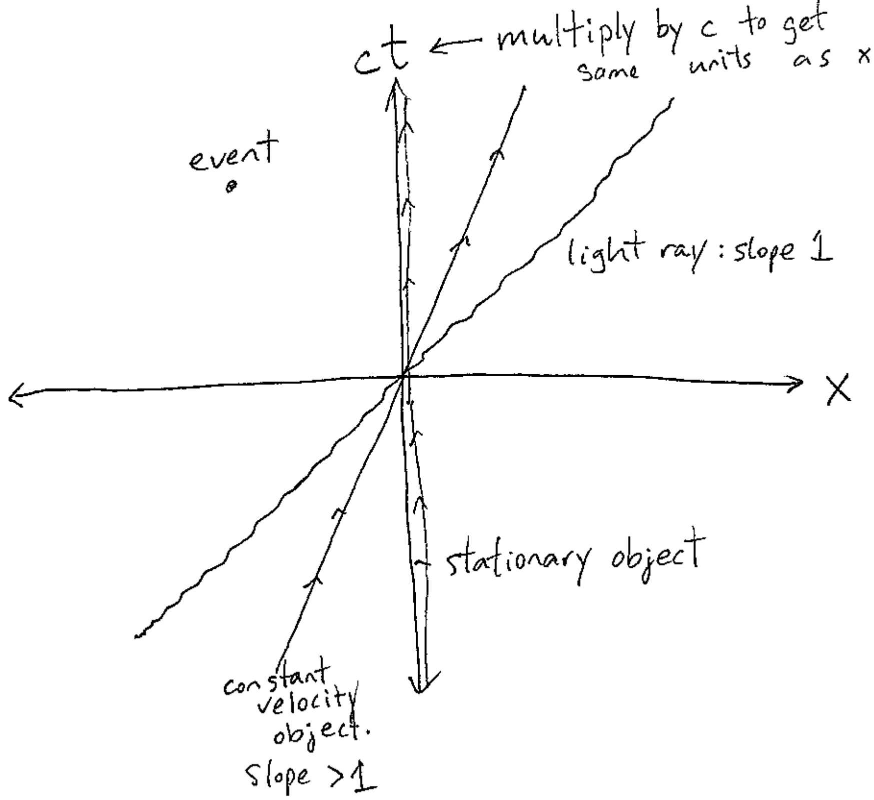
Same for all inertial observers.

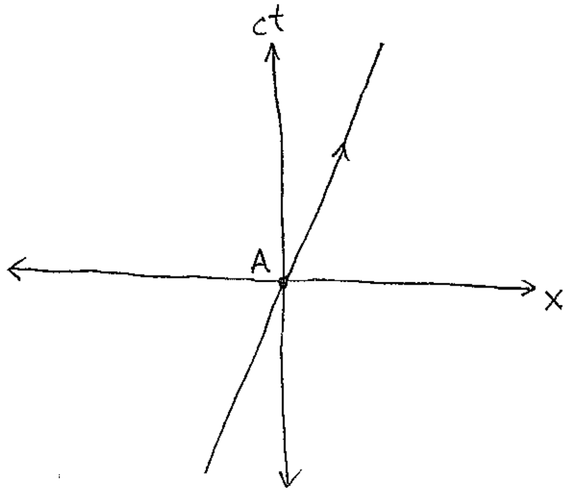
What does it mean?

SPACETIME DIAGRAMS



CLICKER





- events are points
- trajectories are paths.

observer at velocity v:
trajectory $x = vt$

$$\Rightarrow t = \frac{x}{v}$$

$$\Rightarrow ct = \left(\frac{c}{v}\right) \cdot x$$

slope > 1

Which events does this moving observer see as simultaneous with A?

Answer: events with $t' = 0$

$$\Rightarrow \gamma\left(t - \frac{v}{c^2}x\right) = 0$$

$$\Rightarrow ct = \left(\frac{v}{c}\right) \cdot x$$

line w. slope < 1