Act WHAT IS THIS?

This just means that we multiply the time of any event by c and use that as a coordinate.

-> clicker question

So if light is emmitted at x=0 and t=0, and detected 3m away, it will take $3m / c = (3m)/(3 \ 10^8 \ m/s) = 10^{-8} \ s$ to get there. On a ct axis, this corresponds to ct = 3m and the spacetime diagram looks like this:



Notice the 45 degree angle - that's how light travels on these diagrams. It's convenient.

How do other things travel?

-> clicker question

physical objects (other than light) travel on lines which are more vertical than 45 deg, since they are slower





On the left are events in a stationary frame, on the right are the same 4 events in a moving frame, v=0.5c Let's try one LT to see this: (x,ct)=(0,L) $\xi = 1, 15$

$$\hat{\mathbf{x}} = \mathbf{y} \left(\mathbf{x} - \mathbf{v}t \right) = \mathbf{y} \left(\mathbf{0} - \frac{\mathbf{v}}{\mathbf{c}} \mathbf{L} \right) = -0.5 \ \mathbf{y}\mathbf{L}$$
$$\hat{\mathbf{z}} = \mathbf{y} \left(t - \frac{\mathbf{v}}{\mathbf{c}^2} \mathbf{x} \right) = \mathbf{y} \frac{\mathbf{z}}{\mathbf{c}} \quad c\hat{\mathbf{z}} = \mathbf{y}\mathbf{L}$$

Would like to see it all on one axis. Recall that the \dot{t} axis is at $\chi = 0 =$

$$x = vt = \frac{v}{c}(ct) = 0, 5 ct, ct = 2x$$



->clicker question



Two events with $s^2=0$ are lightlike separated - light can travel between them.

There exists a frame of reference where these two points are simultaneous

This is called spacelike separation.

The distance in the frame it which the two points are at the same time is called the proper distance (or proper length)

There exists a frame of reference where these two points happen at the same

This is called timelike separation.

The distance in the frame it which the two points are at the same time is called the proper time and is equal to

$$\frac{\sqrt{s^2}}{c} = \sqrt{\frac{s^2}{c^2}}$$