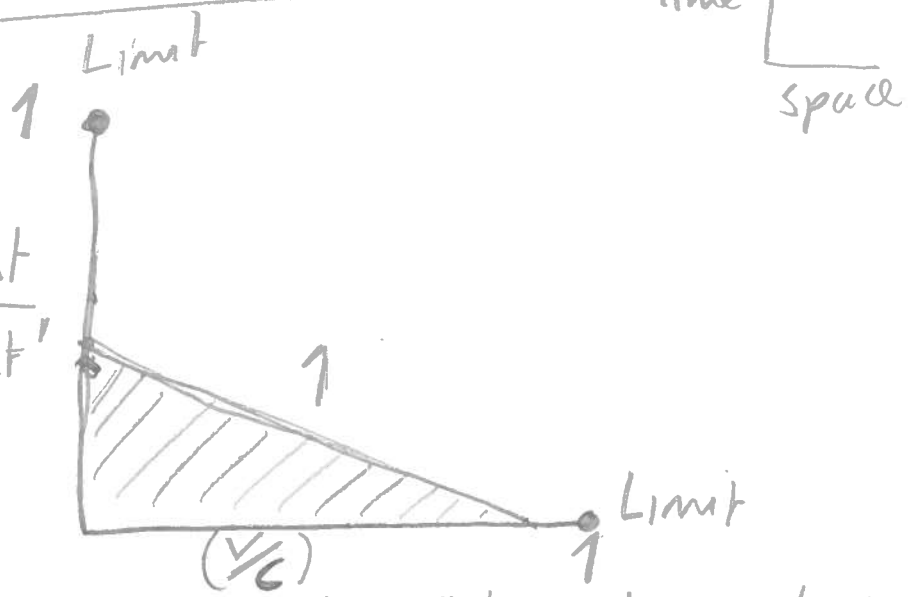


The speed of light is the only speed there is through space time.

Divide into space-time

$$\frac{\Delta t}{\Delta t'} = \frac{\text{time experienced by object at } v}{\text{time experienced by observer at } v=0 \text{ of moving object}}$$



Distance travelled in 1 second if travelling at speed v

Pythagorus

$$1^2 = \left(\frac{\Delta t}{\Delta t'}\right)^2 + \left(\frac{v}{c}\right)^2$$

$$\left(\frac{\Delta t}{\Delta t'}\right)^2 = 1 - \frac{v^2}{c^2}$$

$$\frac{\Delta t}{\Delta t'} = \sqrt{1 - \frac{v^2}{c^2}}$$

$$\Delta t' = \frac{\Delta t}{\sqrt{1 - \frac{v^2}{c^2}}}$$

eg ↓
Travel at 90% speed of light

$$\left(\frac{\Delta t}{\Delta t'}\right)^2 = 1^2 - 0.9^2$$

$$\frac{\Delta t}{\Delta t'} = 0.44$$

$$\frac{\Delta t'}{\Delta t} = 2.29$$

Time experienced by observer is 2.3 times that of object at rest

OR
 $\Delta t = 0.44 \Delta t'$
where $\Delta t'$ is time at zero velocity

Moving clocks Run SLOW

