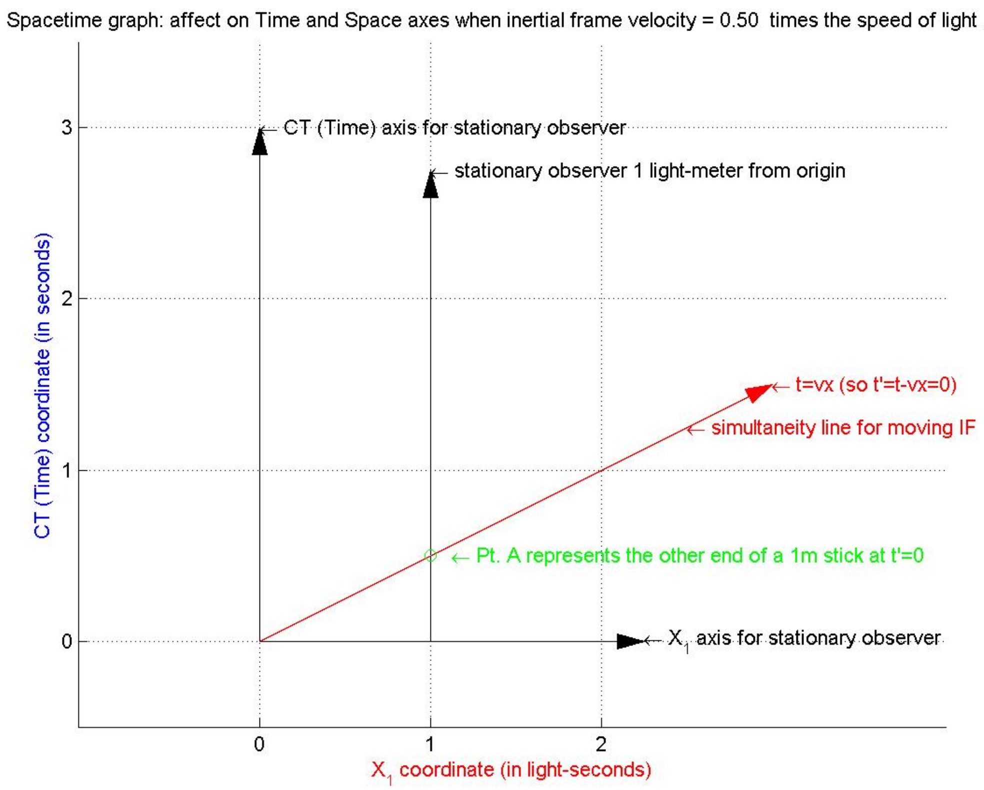
Length contraction.

A meter stick that is moving is shorter than a meter stick at rest!

Suppose that there is a one (1) meter stick in the stationary reference.
In the moving reference frame, suppose that we measure the ends of the meter stick at a common point in time in the moving reference frame.
Assume the velocity of light, $c = 1$, and the velocity v of the moving reference frame is measured in terms of c, the speed of light. Here is the pertinent space-time diagram:



In the moving frame of reference, at $t' = 0$, one end of the meter stick is at the origin, and the other end of the meter stick is at Point A.

Therefore we use the Lorentz Transforms to determine x' at Point A.
At Point A, $x = 1$, and $t' = 0$, where $t = xv$.
So by the Lorentz Transform we have
$x' = \frac{(x-vt)}{\sqrt{1-v^2}} = \frac{x-v(vx)}{\sqrt{1-v^2}} = \frac{x\left(1-v^2\right)}{\sqrt{1-v^2}} = x\sqrt{1-v^2}$.

In un-scaled units of velocity$x' = x\sqrt{1 - \frac{v^2}{c^2}}$.

Since the length of the meter stick in the stationary reference frame is $x = 1$, then $x' < x$.
$\therefore$ the meter stick is contracted in the moving frame of reference by a factor of $\sqrt{1 - \frac{v^2}{c^2}}$.