Minkowski Diagram II

Minkowski diagrams do not preserve angles and scales. Units on the primed and unprimed axes are related by the following scale factor:

$$\frac{S'}{S} = \sqrt{\left(1 + \frac{v^2}{c^2}\right) \Big/ \left(1 - \frac{v^2}{c^2}\right)}.$$

In the illustration below we use

$$\frac{v}{c} = 0.6 \quad \Rightarrow \sqrt{1 - v^2/c^2} = 0.8.$$

Length contraction:

Moving rod viewed from S: $\ell = \ell'\sqrt{1 - v^2/c^2}$ [line (ii)].

Moving rod viewed from S': $\ell' = \ell\sqrt{1 - v^2/c^2}$ [line (i)].

Time dilation:

Moving clock viewed from S: $\Delta t = \dfrac{\Delta t'}{\sqrt{1 - v^2/c^2}}$ [line (iii)].

Moving clock viewed from S': $\Delta t' = \dfrac{\Delta t}{\sqrt{1 - v^2/c^2}}$ [line (iv)].