



$$\begin{aligned}
 \text{stick figure} \quad & (ct)^2 = (ct')^2 + (vt)^2 \\
 & \Rightarrow c^2 t^2 - v^2 t^2 = c^2 (t')^2 \\
 & \Rightarrow t^2 (c^2 - v^2) = c^2 (t')^2 \\
 & \Rightarrow (t')^2 = t^2 \left(1 - \frac{v^2}{c^2}\right) \\
 & \Rightarrow t' = t \sqrt{1 - \frac{v^2}{c^2}}
 \end{aligned}$$