

Q3)

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There's only one sure way of doing relativity problems,

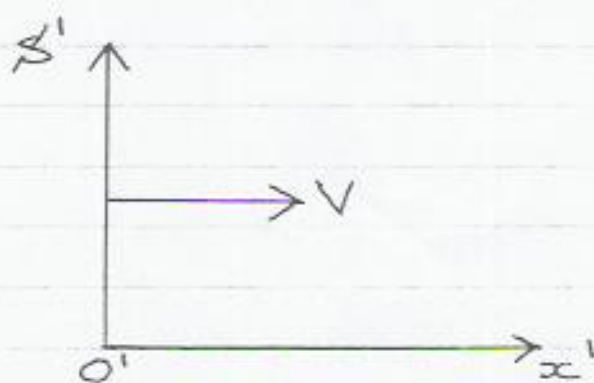
(a) Draw "standard configuration" axes.

(b) Write down the Lorentz transformation equations.

(c) Read, & re-read, the question to identify which values refer to the un-primed frame (S) & which refer to the primed (S') frame.
[This is really where the work is !!]

(d) Substitute values for question asked into the Lorentz equations & find answer!!

So here goes!



$$x' = \frac{x - Vt}{\sqrt{1 - \frac{V^2}{c^2}}}$$

$$v_x' = \frac{v_x - V}{1 - \frac{Vv_x}{c^2}}$$

$$t' = \frac{t - \frac{Vx}{c^2}}{\sqrt{1 - \frac{V^2}{c^2}}}$$

also, $\mathbf{p} = \frac{m \mathbf{v}}{\sqrt{1 - \frac{v^2}{c^2}}}$ and

$$E = \frac{mc^2}{\sqrt{1 - \frac{v^2}{c^2}}}$$