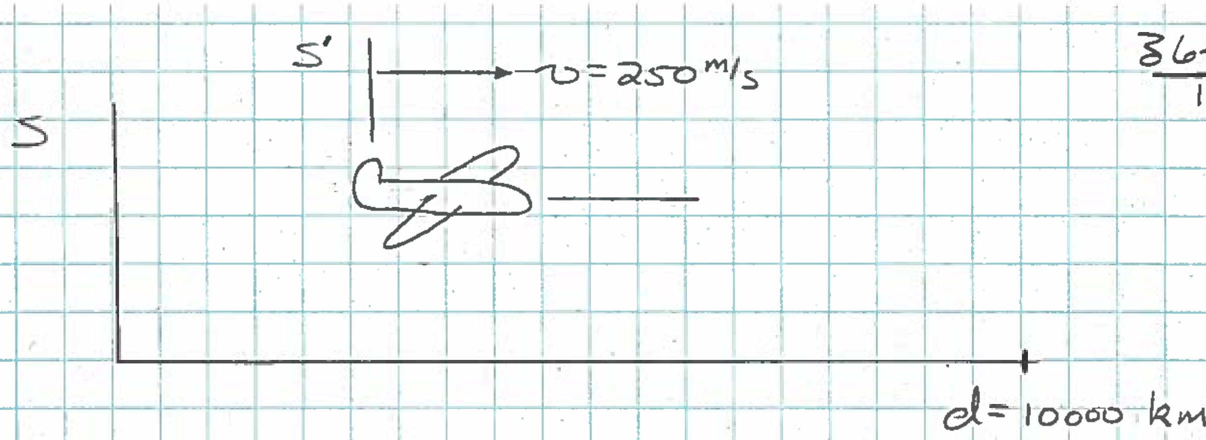

NOTE, just "unfold" the round trip.

In frame S, the trip time is

$$\Delta t = \frac{d}{v} = 40000 \text{ s}.$$

S' measures the proper time, Δt_p

$$\Delta t = \gamma \, \Delta t_p$$

$$\Delta t_p = \frac{1}{\gamma} \Delta t = \sqrt{1 - \frac{v^2}{c^2}} \, \Delta t$$

It's here that since $v = 250$ m/s, your calculator chokes and says $\gamma = 1$. Actually it's close to 1, but not equal to 1.

Write the eqn this way:

$$\Delta t_p = \left(1 - \frac{v^2}{c^2}\right)^{1/2} \Delta t$$

The binomial expansion to first order is:

$$(1 + z)^n \approx 1 + nz \quad \text{for } z \ll 1$$

So:

$$\Delta t_p \approx \left(1 - \frac{1}{2}\frac{v^2}{c^2}\right) \Delta t$$

or

$$\Delta t - \Delta t_p \approx \frac{1}{2}\frac{v^2}{c^2} \Delta t = 1.389 \times 10^{-8} \text{ s}$$

$$= \underline{13.89 \text{ ns}}$$