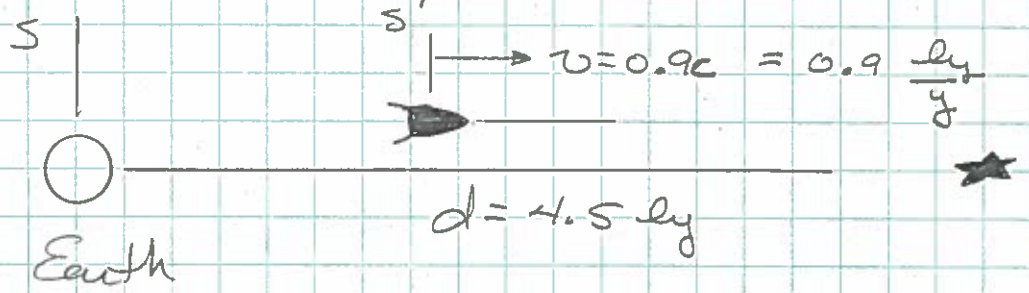

a.) In frame S: $v = \frac{\Delta x}{\Delta t} = \frac{d}{\Delta t}$

$$\Delta t = \frac{d}{v} = \frac{4.5 \text{ ly}}{0.9 \text{ ly/yr}} = \underline{5.0 \text{ y}}$$

b.) S' measures proper time:

$$\Delta t = \gamma \Delta t_p \qquad \gamma = \frac{1}{\sqrt{1 - \frac{v^2}{c^2}}} = 2.294$$

So $\Delta t_p = \frac{1}{\gamma} \Delta t = \underline{2.179 \text{ y}}$

c.) In frame S: trip time = 5 y
signal time = 4.5 y.

So time from launch to arrival of signal = 9.5 y