13. (a) The speed of the traveler is $v = 0.99c$, which may be equivalently expressed as $0.99\,\text{ly/y}$. Let d be the distance traveled. Then, the time for the trip as measured in the frame of Earth is $\Delta t = d/v = (26\,\text{ly})/(0.99\,\text{ly/y}) = 26.3\,\text{y}$.

(b) The signal, presumed to be a radio wave, travels with speed c and so takes $26.0\,\text{y}$ to reach Earth. The total time elapsed, in the frame of Earth, is $26.3\,\text{y} + 26.0\,\text{y} = 52.3\,\text{y}$.

(c) The proper time interval is measured by a clock in the spaceship, so $\Delta t_0 = \Delta t/\gamma$. Now $\gamma = 1/\sqrt{1-\beta^2} = 1/\sqrt{1-(0.99)^2} = 7.09$. Thus, $\Delta t_0 = (26.3\,\text{y})/(7.09) = 3.7\,\text{y}$.