Answer on question #52482, Physics, Relativity

Question   Imagine an astronaut on a trip to Sirius, which lies 8 light-years from Earth. Upon arrival at Sirius, the astronaut finds that the trip lasted 6 years. If the trip was made at a constant speed of 0.8c, how can the 8-light-year distance be reconciled with the 6-year duration?

Solution   Time of trip measured from Earth is

$$\frac{8}{0.8} = 10 \, yr$$

Due to time dilation

$$\delta t = \frac{\delta t'}{\sqrt{1 - \frac{v^2}{c^2}}}$$

(where δt is time measured on Earth) time of trip, measure inside traveling ship is

$$10\sqrt{1 - 0.8^2} = 6 \, yr$$