Name: KEY

PHYSICS 2220 - QUIZ #11 - SPRING 2009

1. A space traveler takes off from Earth and moves at speed $0.9999c$ toward the star Arcturus, which is 36 light years distant as measured by an observatory on Earth.

   a. How much time will have elapsed by Earth clocks when the traveler reaches Arcturus?

$$\Delta t_{moving} = \frac{\text{distance}}{\text{speed}} = \frac{36\ ly}{(0.9999)(1\ ly/yr)}$$

$$= \boxed{36.0036\ yrs}$$

   b. How much older will the traveler be when she reaches Arcturus than when she started the trip?

$$\Delta t_{rest} = \Delta t_{moving}\sqrt{1 - \frac{v^2}{c^2}}$$

$$= (36.0036\,yrs)\sqrt{1 - \left(\frac{0.9999c}{c}\right)^2}$$

$$= \boxed{0.509\ year}$$