

tutorial #11 [special relativity] .quiz

1) A person on earth notices a rocket approaching from the right at a speed of $0.75c$ and another rocket approaching from the left at $0.65c$. What is the relative speed between the two rockets, as measured by a passenger on one of them?

2) Twins who are 19.0 years of age leave the earth and travel to a distant planet 12.0 light-years away. Assume that the planet and earth are at rest with respect to each other. The twins depart at the same time on different spaceships. One twin travels at a speed of $0.900c$, and the other twin travels at $0.500c$.

a) According to the theory of special relativity, what is the difference between their ages when they meet again at the earliest possible time?

b) Which twin is older?

3) An unstable particle is at rest and suddenly breaks up into two fragments. No external forces act on the particle or its fragments. One of the fragments has a velocity of $+0.800c$ and a mass of 1.67×10^{27} kg, and the other has a mass of 5.01×10^{27} kg. What is the velocity of the more massive fragment? *hint: momentum conservation.*