



Quiz 4

Name: _____ Roll No. _____

Date: 07/11/2014

Time: 25 min.

Total points: 10 (5×2)

1. A spacecraft is moving relative to earth. An observer on earth finds that, between 1 P.M. and 2 P.M. according to her clock, 3601 seconds elapse on the spacecraft's clock. Calculate the speed of the spacecraft with respect to earth.
2. Two rockets A and B move directly towards each other. Rocket A moves towards right at a speed of $0.8c$ and rocket B moves towards left with a speed of $0.6c$. For an observer on earth, rocket A passes point a and rocket B passes point b at time $t = 0$. The points a and b are separated by a distance of 4.2×10^8 m. In the frame of the observer, how much time will pass before the rockets collide?
3. The period of a pendulum is measured to be 3 s in the inertial frame of the pendulum. Calculate the period measured by an observer moving at a speed of $0.95c$.
4. You are packing for a trip to another star, and on your journey you will be traveling at a speed of $0.99c$ in a spacecraft. In your journey can you sleep in a smaller cabin than usual? Explain your answer.
5. A spacecraft is measured to be 125 m long when it is at rest with respect to an observer. If the same spacecraft flies past the observer at a speed of $0.99c$, what length will the observer measure for the starship?