

Relativity Test
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1. At what speed does a clock move if it runs at a rate which is one-half the rate of a clock at rest?
2. At what speed does a meter stick move if its length is observed to shrink to 0.5 m?
3. The average lifetime of a π meson in its own frame of reference is 26.0 ns. (this is its proper lifetime)
 - if the π meson moves with speed $0.95c$ with respect to the Earth, what is its lifetime as measured by an observer at rest on Earth?
 - What is the average distance it travels before decaying as measured by an observer at rest on Earth?
4. An atomic clock is placed in a jet airplane. The clock measures a time interval of 3600s when the jet moves with speed 500 m/s. How much larger a time interval does an identical clock held by an observer at rest on the ground measure?
5. A rod of length L_0 moves with speed v along the horizontal direction. The rod makes an angle θ_0 with respect to the x' axis.
 - Determine the length of the rod as measured by a stationary observer.
 - Determine the angle θ the rod makes with the x axis.