

UNIVERSITY OF ALABAMA
Department of Physics and Astronomy

PH 102 / LeClair

Summer II 2009

Quiz 1: Relativity

Instructions:

1. Answer all questions below. They have equal weight.
2. Express your answer with the appropriate units and significant digits
3. Show your work for full credit.

1. Neutrons have an average lifetime of 15 minutes when at rest in the laboratory. What is the average lifetime (measured in the lab) of a neutron moving at a speed of $0.5c$?

2. If a duck has a time dilation factor of 10, what is its speed?

3. A bassist taps the lowest E on his bass at 140 beats per minute during one portion of a song. What tempo would an observer on a ship moving *toward* the bassist at $0.70c$ hear?