

Question 1

Consider muons each traveling at velocity $\frac{c}{2}$ relative to a lab frame. You aim to predict the distance (observed from the lab frame) traveled by such a muon using the muon lifetime. Which of the following is correct?

1. The distance traveled by these muons as predicted using classical physics is the same as that as predicted by special relativity.
2. The distance traveled by these muons as predicted using classical physics is less than that as predicted by special relativity.
3. The distance traveled by these muons as predicted using classical physics is more than that as predicted by special relativity.

Question 2

A muon travels with constant velocity with respect to a lab bench. The length of the lab bench as measured from the muon's rest frame is $L_{\text{muon frame}}$. The length of the lab bench as measured from the frame in which the lab bench is at rest is $L_{\text{lab frame}}$.

What does special relativity imply for these?

1. $L_{\text{lab frame}} = L_{\text{muon frame}}$
2. $L_{\text{lab frame}} > L_{\text{muon frame}}$
3. $L_{\text{lab frame}} < L_{\text{muon frame}}$