Relativistic Length Contraction Drills

1 A muon, passing through the Earth's atmosphere from a height of 18.70 km, is moving at 0.877c. How far does it seem to go?

2 A 4.0-m car, parking in a garage with a proper length of 6.90 m, is moving at 0.953c. Will it fit in the garage?

3 A 4.0-m car parks in a garage with a proper length of 6.70 m but which seems to be 4.72 m. Calculate its speed as a percent of c.

4 A 4.0-m car parks in a garage with a proper length of 8.70 m but which seems to be 6.01 m. Calculate its speed as a percent of c.

5 A muon is moving at 0.998c. If it seems to pass through 1.15 km, what distance does someone on the ground see?

6 An spaceship with a proper length of 242.80 m has a relativistic length of 139.66 m. Calculate its speed as a percent of c.

7 A car is moving at 0.981c. If the garage appears to be 1.09 m, calculate its proper length.

8 A stick with a proper length of 0.70 m is moving at 0.921c. Calculate its relativistic length.

9 A car is moving at 0.665c. If the garage appears to be 6.72 m, calculate its proper length.

10 A stick with a proper length of 0.50 m has a relativistic length of 0.24 m. Calculate its speed as a percent of c.

11 A 4.0-m car parks in a garage with a proper length of 9.00 m but which seems to be 5.58 m. Calculate its speed as a percent of c.

12 A muon passes through the Earth's atmosphere from a height of 16.70 km but which seems to be 8.41 km. Calculate its speed as a percent of c.

13 A car is moving at 0.865c. If the garage appears to be 3.56 m, calculate its proper length.

$1E-8 = 1 \times 10^{-8}$

Answers:

1. 8.99 km 2. No, relativistic length is 2.09 m 3. 0.709 c 4. 0.723 c 5. 18.20 km 6. 0.818 c 7. 5.60 m 8. 0.27 m 9. 9.00 m 10. 0.872 c 11. 0.785 c 12. 0.864 c 13. 7.10 m