

## Relativistic Length Contraction Drills

- 1 A stick with a proper length of 1.60 m has a relativistic length of 0.91 m. Calculate its speed as a percent of  $c$ .
- 2 A stick with a proper length of 1.10 m has a relativistic length of 0.81 m. Calculate its speed as a percent of  $c$ .
- 3 A muon is moving at  $0.629c$ . If it seems to pass through 12.90 km, what distance does someone on the ground see?
- 4 A muon passes through the Earth's atmosphere from a height of 9.70 km but which seems to be 6.26 km. Calculate its speed as a percent of  $c$ .
- 5 A 4.0-m car parks in a garage with a proper length of 5.50 m but which seems to be 4.20 m. Calculate its speed as a percent of  $c$ .
- 6 A stick is moving at  $0.913c$ . If its relativistic length is 0.82 m, calculate its proper length.
- 7 A stick with a proper length of 1.60 m has a relativistic length of 0.79 m. Calculate its speed as a percent of  $c$ .
- 8 A stick with a proper length of 1.50 m has a relativistic length of 1.11 m. Calculate its speed as a percent of  $c$ .
- 9 A stick with a proper length of 1.00 m is moving at  $0.880c$ . Calculate its relativistic length.
- 10 An spaceship with a proper length of 277.50 m has a relativistic length of 104.08 m. Calculate its speed as a percent of  $c$ .
- 11 A 4.0-m car, parking in a garage with a proper length of 9.90 m, is moving at  $0.982c$ . Will it fit in the garage?
- 12 A car is moving at  $0.846c$ . If the garage appears to be 4.00 m, calculate its proper length.
- 13 A muon is moving at  $0.881c$ . If it seems to pass through 8.52 km, what distance does someone on the ground see?

### Answers:

1.  $0.822c$  2.  $0.681c$  3. 16.60 km 4.  $0.764c$  5.  $0.646c$  6. 2.00 m 7.  $0.871c$  8.  $0.673c$  9. 0.47 m 10.  $0.927c$  11. No, relativistic length is 1.87 m 12. 7.50 m 13. 18.00 km