

Next-Time Question

A 1-meter long spear is thrown at a relativistic speed through a pipe that is 1 meter long. Both these dimensions are measured when each is at rest. When the spear passes through the pipe, which of these statements best describes what is observed?



- a) The spear shrinks so that the pipe completely covers it at some point.
- b) The pipe shrinks so that the spear extends from both ends at some point.
- c) Both shrink equally so the pipe completely covers it at some point.
- d) Any of these, depending on the motion of the observer.



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Answer: d, any of these, depending on the motion of the observer. Observe from a rest position with respect to the pipe and at some point the contracted spear will be completely covered by the pipe. Or travel along with the spear and you'll see that both ends of the spear at some point extend from the contracted pipe. Or move between the spear and the pipe at a certain intermediate velocity, and see both the spear and the pipe contracted the same amount. So what really happens is relative — it depends on your point of view, or frame of reference!

