

A man stands at one end of a boat which is stationary in water. Neglect water resistance. The man now moves to the other end of the boat and again becomes stationary. The centre of mass of the 'man plus boat' system will remain stationary with respect to water

- (a) in all cases
- (b) only when the man is stationary initially and finally
- (c) only if the man moves without acceleration on the boat
- (d) only if the man and the boat have equal masses

There are no external horizontal forces acting on the 'man plus boat' system. (The forces exerted by the man and the boat on each other are internal forces for the system.) Therefore, the centre of mass of the system, which is initially at rest, will always be at rest.