

## STEP II, 2009, Q10 EC

**Q10** In general, one can be forgiven for approaching a collisions question in an automatic way; applying the *Conservation of Linear Momentum* (CLM) and *Newton's Experimental Law of Restitution* (NEL or NLR) for both initial collisions. Most candidates did the routine stuff quite well but then got bogged down in the ensuing algebra. The nice thing about this question is that it can also be done without the need for the use of CLM at all. The NEL statements give a relationship between the final velocities ( $v_1$  to  $v_4$ , say) of the four particles, and then equating for the times to the following collisions at  $O$  uses these velocities without ever requiring to have them in terms of  $u$ . I was greatly surprised to see such a high proportion of the attempts using some such suitably concise approach, and they were almost guaranteed full marks on the question, and for very little time and trouble.



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