

STEP II, 2013, Q11

- 11 Three identical particles lie, not touching one another, in a straight line on a smooth horizontal surface. One particle is projected with speed u directly towards the other two which are at rest. The coefficient of restitution in all collisions is e , where $0 < e < 1$.
- (i) Show that, after the second collision, the speeds of the particles are $\frac{1}{2}u(1 - e)$, $\frac{1}{4}u(1 - e^2)$ and $\frac{1}{4}u(1 + e)^2$. Deduce that there will be a third collision whatever the value of e .
- (ii) Show that there will be a fourth collision if and only if e is less than a particular value which you should determine.



NextStepMaths.com

To view mark schemes, fully worked solutions and examiner's comments, and for more details about tutoring and other services offered, go to [NextStepMaths.com](https://www.NextStepMaths.com)