3 Three uniform small spheres *A*, *B* and *C* have equal radii and masses $2m$, $4m$ and m respectively. The spheres are moving in a straight line on a smooth horizontal surface, with *B* between *A* and *C*. The coefficient of restitution between each pair of spheres is *e*. Spheres *A* and *B* are moving towards each other with speeds $2u$ and u respectively. The first collision is between *A* and *B*.

(i) Find the velocities of *A* and *B* after this collision. [3]

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Sphere *C* is moving towards *B* with speed $\frac{4}{3}u$ and now collides with it. As a result of this collision, *B* is brought to rest.

(ii) Find the value of *e*. [4]

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(iii) Find the total kinetic energy lost by the three spheres as a result of the two collisions.　　[3]

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