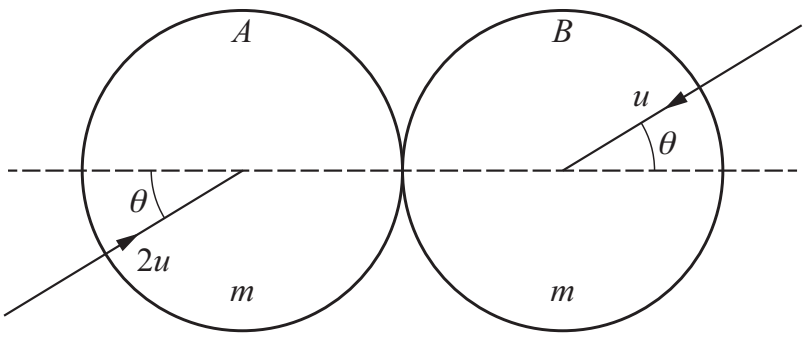
6



Two identical uniform smooth spheres A and B, each with mass m, are moving on a horizontal surface with speeds $2u$ and u respectively when they collide. Immediately before the collision, the spheres are moving parallel to each other in opposite directions such that their directions of motion each make an angle θ with the line of centres (see diagram). As a result of the collision, B moves in a direction which is perpendicular to its initial direction of motion. The coefficient of restitution between the spheres is e.

(a) Find an expression for $\tan\theta$ in terms of e. [6]

As a result of the collision, A moves in a direction which is perpendicular to the line of centres.

(b) Find the value of θ. [2]