1. A particle A has mass m and a particle B has mass km, where k is a constant. The particles are moving towards each other in opposite directions along the same straight line when they collide directly.

Immediately before the collision, the speed of A is $3u$ and the speed of B is $2u$.

As a result of the collision, the speed of each particle is halved and the direction of motion of each particle is reversed.

(a) Find the value of k.

(3)

(b) Find, in terms of m and u, the magnitude of the impulse exerted on B by A in the collision.

(3)

(Total for Question 1 is 6 marks)