1. [*In this question,* **i** *and* **j** *are horizontal perpendicular unit vectors*.]

A particle A has mass 2 kg and a particle B has mass 3 kg. The particles are moving on a smooth horizontal plane when they collide.

Immediately before the collision, the velocity of A is $5\mathbf{j}\,\text{m s}^{-1}$ and the velocity of B is $(3\mathbf{i} - \mathbf{j})\,\text{m s}^{-1}$

Immediately after the collision, the velocity of A is $(3\mathbf{i} + 2\mathbf{j})\,\text{m s}^{-1}$

(a) Find the total kinetic energy of the two particles before the collision.

(3)

(b) Find, in terms of **i** and **j**, the impulse received by A in the collision.

(2)

Given that, in the collision, the impulse of A on B is equal and opposite to the impulse of B on A,

(c) find the velocity of B immediately after the collision.

(3)

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Question 1 continued

(Total for Question 1 is 8 marks)