

- 2 A tritium nucleus moves towards a deuterium nucleus as illustrated in Fig. 2.1



Fig. 2.1

The nuclei initially have the same speed  $v$ . The tritium nucleus consists of two neutrons and a proton. The deuterium nucleus consists of a neutron and a proton. The proton and the neutron each have the same mass  $m$ . The collision is elastic.

- (a) State the *principle of conservation of momentum*.

.....  
.....  
..... [2]

- (b) At one instant during the collision between the nuclei, they are both travelling **in the same direction** with the same speed.

Calculate this speed, in terms of  $v$ .

$$\text{speed} = \dots \quad v \quad [2]$$

- (c) Explain why it is **not** possible for the nuclei to stop at the same instant during the interaction.

.....  
.....  
..... [2]

(d) Determine the final speed of each nucleus in terms of  $v$ .

$$\text{speed of deuterium} = \dots \quad v$$

$$\text{speed of tritium} = \dots \quad v \quad [4]$$

[Total: 10]

