1 A tritium nucleus moves towards a deuterium nucleus as illustrated in Fig. 1.1.
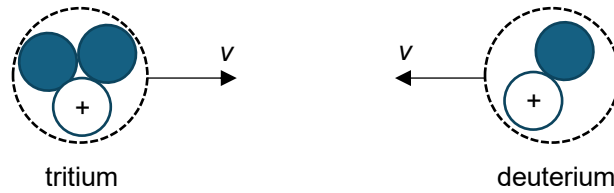

tritium   deuterium

Fig. 1.1

The two nuclei initially have the same speed v and the interaction between the two nuclei is elastic. The tritium nucleus consists of two neutrons and a proton. The deuterium nucleus consists of a neutron and a proton. Assume that the proton and the neutron have the same mass m.

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

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[1]

(b) Explain why it is not possible for the nuclei to stop at the same instant.

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[2]

(c) Determine the final velocities of each nucleus in terms of *v*.

final velocity of deuterium = ...

final velocity of tritium = ... [3]

(d) Given that the interaction between the two nuclei took a total time of t seconds, express the magnitude of the average force that the deuterium nucleus exerts on the tritium nucleus in terms of m, v and t.

magnitude of average force = ……................................ [2]

[Total: 8]