3. Read the passage in the resource folder carefully, before answering the questions which follow.

Answer the following questions in your own words. Direct quotes from the original passage will not be awarded marks.

(a) Write a balanced reaction equation (using the notation ${}^{A}_{Z}X$) for the DT fusion reaction (paragraph 4). [2]

(b) Show that the official definition of confinement time does in fact have the correct units (or dimensions) of time (paragraph 9). [2]

(c) Explain briefly why each of the three conditions of the Lawson criterion is important in achieving 'breakeven' (paragraphs 6-11). [3]

(d) Explain why the 'plasma particles are forced to spiral around the magnetic field lines' (paragraphs 12-15 & diagrams 2 & 3). Hint: consider the forces acting on charged particles travelling parallel and perpendicular to the magnetic field lines. [4]

(e) Explain briefly, in your own words, **three** potential advantages of fusion over fossil fuel or fission power stations (paragraphs 18-24). [3]

(f) (i) Use conservation of momentum to confirm that the figures for the sharing of kinetic energy (20% and 80%) given at the end of paragraph 4 are correct. Assume that in the fusion reaction an intermediate stage occurs where a stationary compound nucleus of mass 5u then splits to give a neutron of mass 1u and a helium nucleus of mass 4u (see diagram 1 and paragraph 4). [4]

(ii) Discuss briefly what might happen to the high energy neutrons produced in the reaction. [2]