7 A stationary nucleus X decays by emitting a β^+ particle to form a nucleus of carbon-13 ($^{13}_{6}C$). An incomplete equation to represent this decay is

$$X \rightarrow {}^{13}_{6}C + \beta^+.$$

(a) State the name of the class (group) of particles that includes β^+.

.....[1]

(b) nucleus X, state the number of

protons, ...

neutrons. ..... [1]

(c) The carbon-13 nucleus has a mass of 2.2×10^{-26} kg. Its kinetic energy as a result of the decay process is 0.80 MeV.

Calculate the speed of this nucleus.

speed = ... $m\,s^{-1}$ [3]

(d) Explain why the sum of the kinetic energies of the carbon-13 nucleus and the β^+ particle cannot be equal to the total energy released by the decay process.

.....

.....[1]

[Total: 6]