8 **(a)** In the following list, underline all particles that are leptons.

    antineutrino   positron   proton   quark   [1]

(b) A stationary nucleus of magnesium-27, $^{27}_{12}$Mg, decays by emitting a β^- particle and γ radiation. An incomplete equation to represent this decay is

$$^{27}_{12}\text{Mg} \rightarrow \text{X} + \beta^- + \gamma.$$

(i) State the nucleon number and the proton number of nucleus X.

                nucleon number = ...

                proton number = ...
                                                                        [2]

(ii) State the name of the interaction that gives rise to this decay.

    ....[1]

(iii) State **two** possible reasons why the sum of the kinetic energy of the β^- particle and the energy of the γ radiation is less than the total energy released during the decay of the magnesium nucleus.

    1. ....

    ....

    2. ....

    ....
                                                                        [2]

                                                                        [Total: 6]