6

(a)

The three most common types of radioactive decay are α, β and γ.

State in Fig. 6.1 the changes to the number of protons and of neutrons that occur within the nuclei after they undergo each type of decay.

type of decay	number of protons	number of neutrons
α		
β		
γ		

Fig. 6.1

[3]

(b)

To illustrate the effect of a magnetic field on the paths of *α, β* and γ radiations when travelling in a vacuum, a student drew the following diagram as shown in Fig. 6.2.

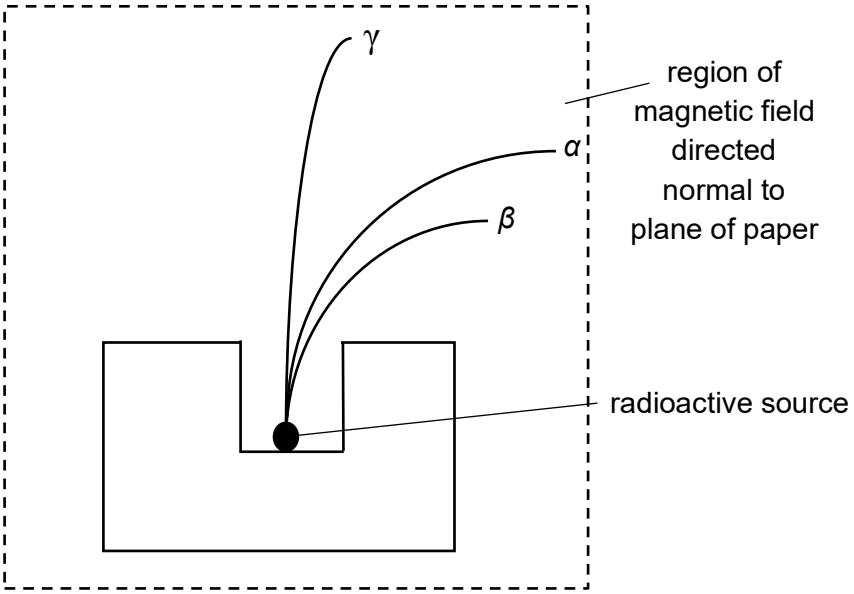

Fig. 6.2

State and explain two errors in the student's illustration.

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……

[4]

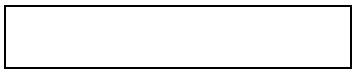
(c)

Cobalt-60 is a radioactive nuclide. It has a mass of 59.9338 u.

Fig. 6.3 shows the products from the radioactive decay of cobalt-60 and their respective masses.

decay product	mass / u
nickel-60	59.9308
β	5.4348×10^{-4}
γ	-

Fig. 6.3



(i)

Describe the energy changes which take place for the radioactive decay of a cobalt-60 nucleus. You need to refer to the different forms of energy involved.

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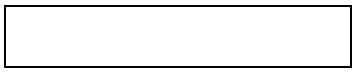

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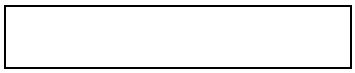
[2]

(ii)

Calculate, in MeV, the energy released during the decay. Leave your answer in two decimal places.



energy = …… MeV

[3]