

- 5 (a) Fig. 5.1 shows some properties of the three types of radiation from radioactive decay. Complete the table.

	alpha-particle	beta-particle	gamma ray
mass		$1/1840\ u$	
charge		$-e$	
penetrating ability		stopped by few mm of aluminium	

Fig. 5.1

[3]

- (b) In the early years of the last century, Madame Curie drew an illustration similar to the one in Fig. 5.2 which indicated how the three radiations travelled in air in a uniform magnetic field that is pointing perpendicularly into the page.

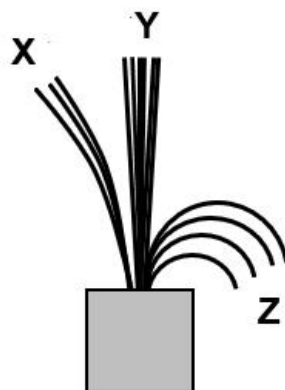


Fig. 5.2 (not drawn to scale)

- (i) Identify the radiations X, Y and Z.

X
 Y
 Z [2]

(ii) State what can be deduced from the following observations:

1. The lines for **X** all have approximately the same length.

.....
[1]

2. The lines for **Z** have different curvatures.

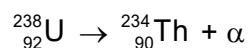
.....
[1]

(iii) A student claimed that the radioactive decay process that produces radiation **Z** has only two products: a daughter nucleus and radiation **Z**.

Explain, with reference to your answer in (b)(ii)2, why the student's claim is not true.

.....
.....
.....
.....
[2]

(c) The equation below



represents the decay of a uranium nucleus by alpha-emission. You may assume that ${}_{92}^{238}\text{U}$ is initially stationary.

The alpha particle has kinetic energy of 4.18 MeV.

Determine the energy released during one decay process.

[Total: 12]

energy = MeV [3]