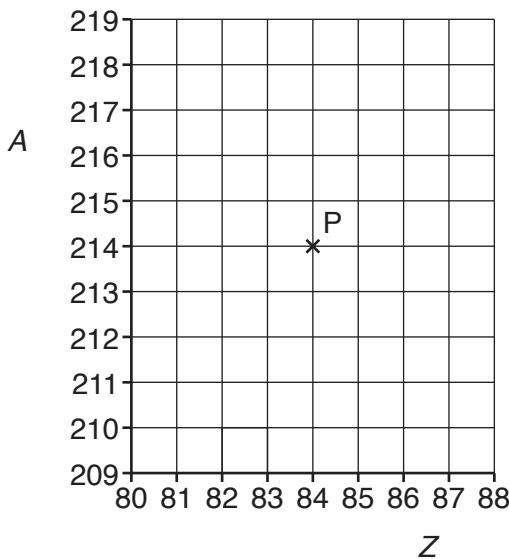


- 7 A graph of nucleon number  $A$  against proton number  $Z$  is shown in Fig. 7.1.



**Fig. 7.1**

The graph shows a cross (labelled P) that represents a nucleus P.

Nucleus P decays by emitting an  $\alpha$  particle to form a nucleus Q.

Nucleus Q then decays by emitting a  $\beta^-$  particle to form a nucleus R.

- (a) On Fig. 7.1, use a cross to represent

- (i) nucleus Q (label this cross Q), [1]
- (ii) nucleus R (label this cross R). [1]

- (b) State the name of the class (group) of particles that includes the  $\beta^-$  particle.

..... [1]

- (c) The quark composition of one nucleon in Q is changed during the emission of the  $\beta^-$  particle. Describe this change to the quark composition.

..... [1]

[Total: 4]

---

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced online in the Cambridge International Examinations Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download at [www.cie.org.uk](http://www.cie.org.uk) after the live examination series.

Cambridge International Examinations is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.