

Name of the Student: \_\_\_\_\_

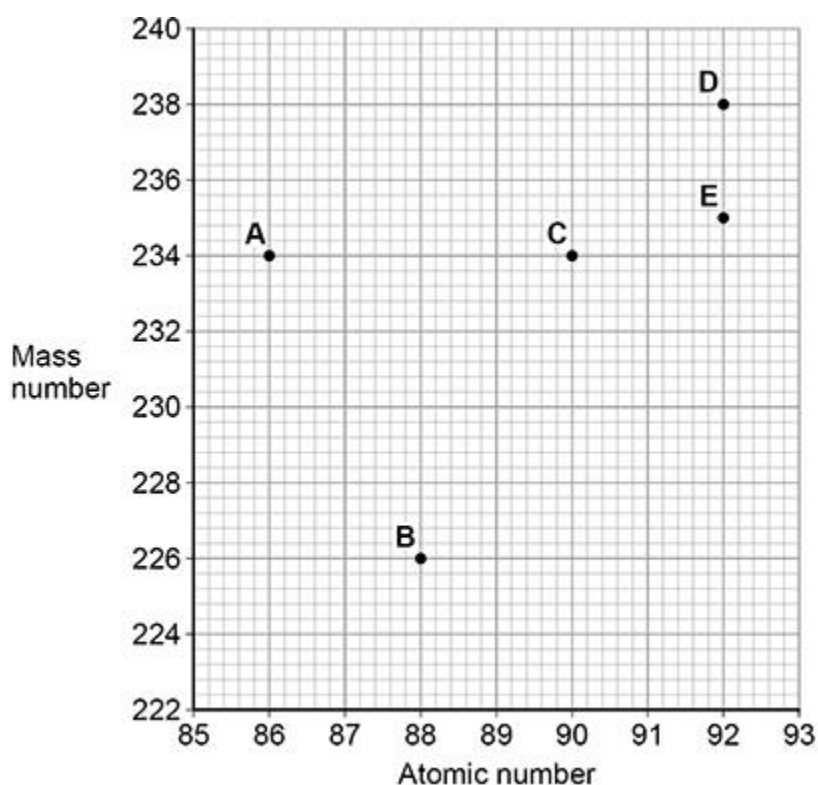
Max. Marks : 18 Marks

Time : 18 Minutes

**Q1.**

**Figure 1** shows the mass number and the atomic number for the nuclei of five different atoms.

**Figure 1**



- (a) How many neutrons are there in a nucleus of atom **A**?

\_\_\_\_\_

(1)

- (b) Which **two** atoms in **Figure 1** are the same element?

Tick (✓) **one** box.

**A and B**

☐

**A and C**

☐

C and D



D and E

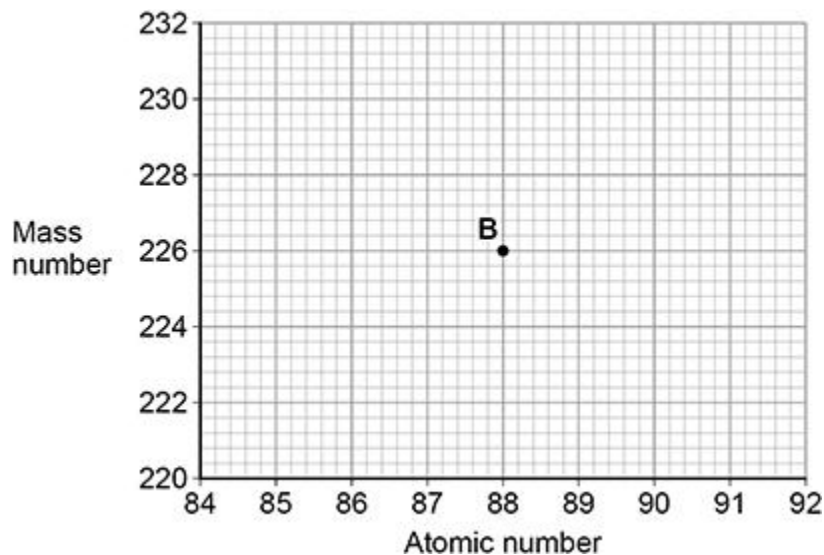


(1)

- (c) Nucleus **B** decays by emitting an alpha particle.

Draw an arrow on **Figure 2** to represent the alpha decay.

**Figure 2**



(2)

- (d) What is meant by the 'random nature of radioactive decay'?

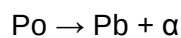
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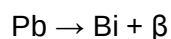
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(1)

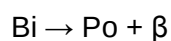
- (e) A polonium (Po) nucleus decays by emitting an alpha particle and forming a lead (Pb) nucleus.



The lead (Pb) nucleus then decays by emitting a beta particle and forms a bismuth (Bi) nucleus.



The bismuth (Bi) nucleus then decays by emitting a beta particle and forms a polonium (Po) nucleus.



Explain how these three decays result in a nucleus of the original element, polonium.

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(3)

(Total 8 marks)

**Q2.**

Radioactive waste from nuclear power stations is a man-made source of background radiation.

- (a) Give **one** other man-made source of background radiation.

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(1)

Nuclear power stations use the energy released by nuclear fission to generate electricity.

- (b) Give the name of **one** nuclear fuel.

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(1)

- (c) Nuclear fission releases energy.

Describe the process of nuclear fission inside a nuclear reactor.

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(4)

- (d) A new type of power station is being developed that will generate electricity using nuclear fusion.

Explain how the process of nuclear fusion leads to the release of energy.

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(2)

- (e) Nuclear fusion power stations will produce radioactive waste. This waste will have a much shorter half-life than the radioactive waste from a nuclear fission power station.

Explain the advantage of the radioactive waste having a shorter half-life.

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(2)

(Total 10 marks)