Practice Question Set For GCSE
**Subject : Physics**
**Paper-1 Topic : 6_Radioactivity**



**Name of the Student**:_____
**Max. Marks : 23 Marks** **Time : 23 Minutes**

Q1.

(a) Positrons are antiparticles of electrons.
The photograph shows a PET scanner that uses positrons to locate the site of a brain tumour.

Positrons are emitted by the radioactive isotope fluorine-18.
The fluorine-18 is attached to glucose.
The glucose is injected into the patient's blood stream and collects at the site of the tumour.

(i) Fluorine-18 has a half-life of 1.8 hours.
State one advantage and one disadvantage of using a substance with such a short half-life.

1. Advantage

**(1)**

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2. Disadvantage

**(1)**

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(ii) When a positron meets an electron they annihilate each other.
Explain how this enables the site of the tumour to be located.

**(4)**

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*(b) Positrons (β+ particles) are emitted from the nuclei of some atoms.
Electrons (β− particles) are emitted from the nuclei of other atoms.
The table gives some information about quarks.

| quark | charge (compared to the charge on a proton) |
|---|---|
| u | +2/3 |
| d | −1/3 |

Describe, in terms of quarks, how β+ particles are emitted from the nuclei of some atoms and β− particles are emitted from the nuclei of others.

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**(Total for Question = 12 marks)**

Q2.

Some rocks contained uranium when they were formed.

Radioactive decay in these rocks produces radon gas.

Explain why people living near these rocks have an increased health risk from background radiation.

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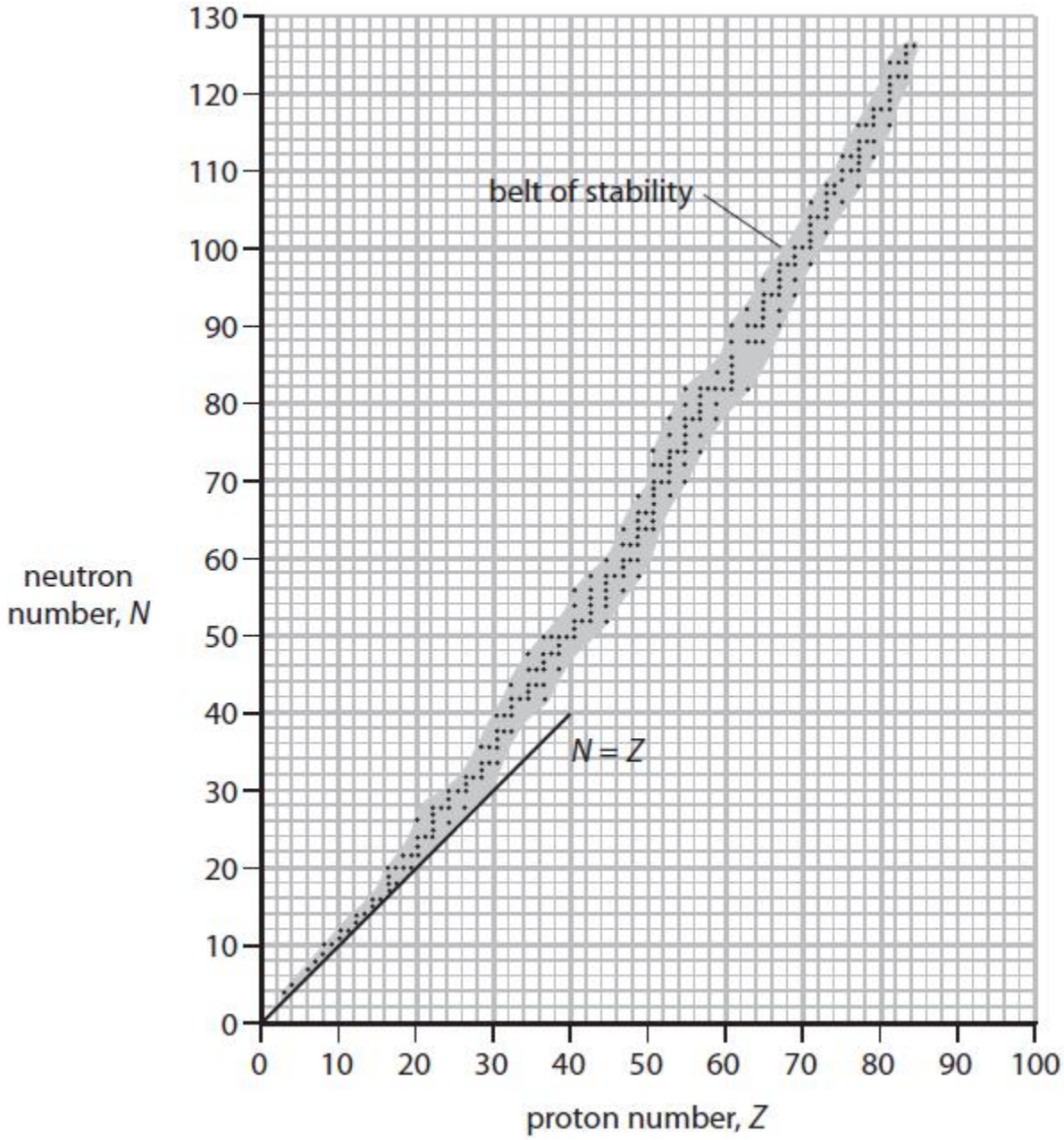
Q3.

(a) The diagram shows the stability curve for nuclear isotopes.




Complete the sentence by putting a cross (☒) in the box next to your answer.
An isotope above the curve will undergo $\beta^-$ decay because it has

(1)

- ☐ **A** too few protons
- ☐ **B** too many protons
- ☐ **C** too few neutrons
- ☐ **D** too many neutrons

(b) Which statement is correct for $\beta^+$ and $\beta^-$ particles?

Put a cross (☒) in the box next to your answer.

(1)

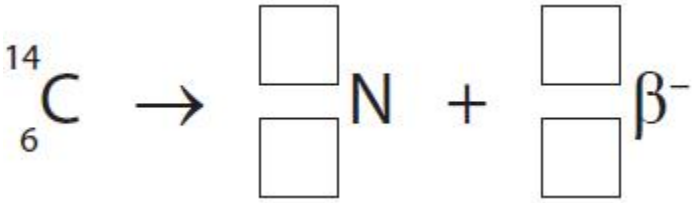
- ☐ **A** a $\beta^+$ is positively charged and a $\beta^-$ is negatively charged
- ☐ **B** the mass of a $\beta^+$ is 1800 times the mass of a $\beta^-$

☒ **C** the charge on a $\beta^+$ is twice the charge on a $\beta^-$
☒ **D** a $\beta^+$ is a proton and a $\beta^-$ is an electron

(c) Carbon-14 decays by emitting a $\beta^-$ particle to form an isotope of nitrogen.

Complete the nuclear equation for this decay by filling in the boxes.

**(2)**



(d) Protons and neutrons both contain quarks.

Describe the arrangement of quarks in a proton.

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(e) Explain what happens to a nucleus during $\beta^+$ decay.

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