Questions

Q1.

The typical size of an atom is

(1)

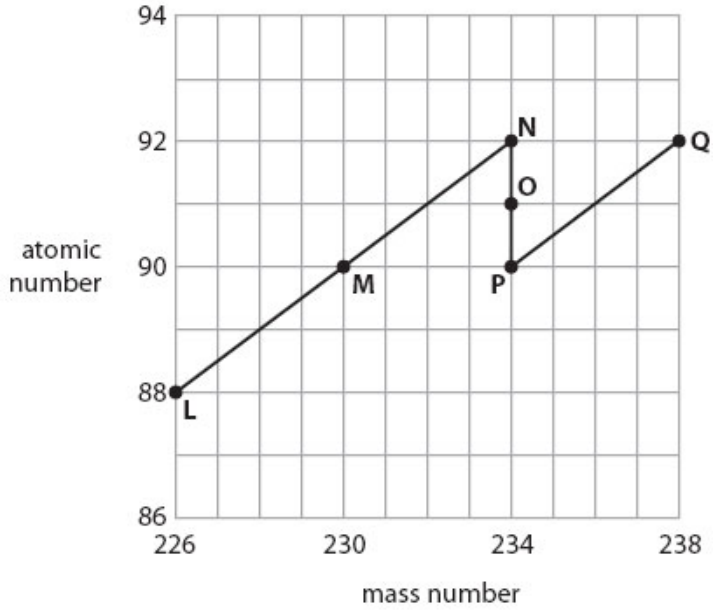
- ☒ **A** 10^{-5} m
- ☒ **B** 10^{-10} m
- ☒ **C** 10^{-15} m
- ☒ **D** 10^{-20} m

(Total for question = 1 mark)

Q2.

Uranium-238 is an isotope of uranium. It may undergo either radioactive decay or nuclear fission.

A nucleus of uranium-238 is shown as **Q** in the chart.



State **two** letters from the chart which show isotopes of the same element.

(1)

.....and ..... .

Q3.

Carbon-13 and carbon-14 are isotopes of carbon.

Nuclei of carbon-13 and carbon-14 can be represented by these symbols

$$^{13}_{6}C \quad \text{and} \quad ^{14}_{6}C$$

Complete the table for an atom of carbon-13 and an atom of carbon-14.

(2)

	number of neutrons in the nucleus	number of electrons in orbit around the nucleus
carbon-13		
carbon-14		

(Total for question = 2 marks)

Q4.

An atom contains electrons, neutrons and protons.

Use words from the box to complete the sentences.

neutral	negative
much larger than a neutron	much smaller than a neutron
positive	the same size as a neutron

(i) The charge on an electron is .....

(1)

(ii) An electron has a mass that is .....

(1)

Q5.

Beryllium-9 is a stable isotope of beryllium.

(i) State the meaning of the term **stable.**

(1)

.....

.....

(ii) Beryllium-9 has an atomic number of 4 and a mass number of 9.
A nucleus of this isotope can be described using this symbol.

$$^{9}_{4}\mathrm{Be}$$

Complete the sentence by putting a cross (☒) in the box next to your answer.

The number of neutrons in this nucleus is

(1)

☒ **A** 4

☒ **B** 5

☒ **C** 9

☒ **D** 13

(iii) Which one of these symbols describes the nucleus of a different isotope of beryllium?

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

(1)

$^{8}_{4}\mathrm{Be}$ ☐ **A** $^{8}_{5}\mathrm{Be}$ ☐ **B** $^{9}_{4}\mathrm{B}$ ☐ **C** $^{9}_{5}\mathrm{Be}$ ☐ **D**

Q6.

The mass of a proton is 1.6726×10^{-27} kg.
The mass of an electron is 9.1094×10^{-31} kg.

Calculate how many times the mass of a proton is greater than the mass of an electron.

Give your answer to two significant figures.

(3)

..... times

(Total for question = 3 marks)

Q7.

An isotope of krypton, krypton-89, is produced in a nuclear reactor.
A nucleus of this isotope can be represented as

$$^{89}_{36}\mathrm{Kr}$$

Describe the structure of a nucleus of krypton-89.

(4)

.....

.....

.....

.....

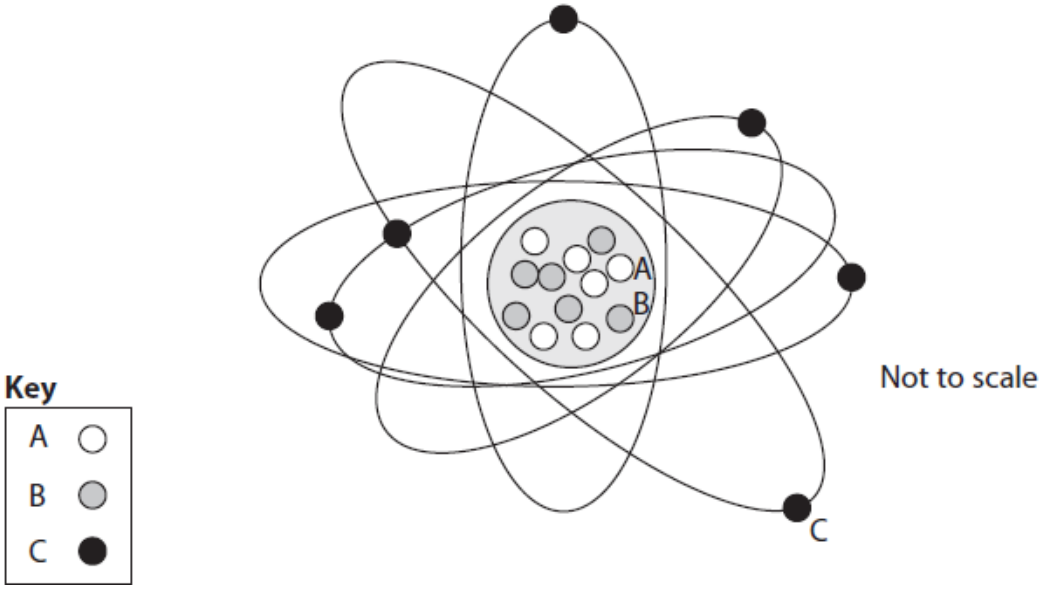
.....

.....

Q8.

The diagram shows an atom of carbon.

A, B and C are three different particles.



(i) Name the three different particles shown.

(3)

A = ...

B = ...

C = ...

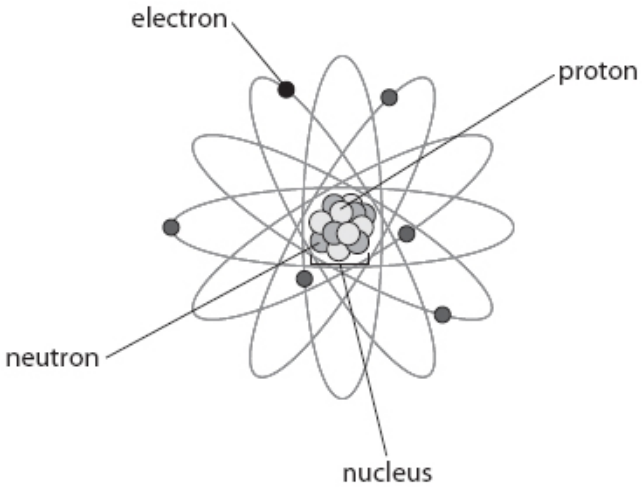
(ii) What is the mass (nucleon) number of this carbon atom?

(1)

.....

Q9.

The diagram shows the structure of an atom.



(i) Complete the sentence by putting a cross (☒) in the box next to your answer.

The size of the charge on each electron is

(1)

☒ **A** a third of the charge on the proton

☒ **B** half the charge on the proton

☒ **C** the same as the charge on the proton

☒ **D** twice the charge on the proton

(ii) Complete the sentence by putting a cross (☒) in the box next to your answer.

The atomic number of a neutral atom is always the same as the number of

(1)

☒ **A** electrons

☒ **B** electrons and neutrons

☒ **C** protons and neutrons

☒ **D** neutrons

Q10.

Carbon-13 and carbon-14 are isotopes of carbon.

Nuclei of carbon-13 and carbon-14 can be represented by these symbols

$^{13}_{6}C$ and $^{14}_{6}C$

Complete the table for an atom of carbon–13 and an atom of carbon–14.

(2)

	number of neutrons in the nucleus	number of electrons in orbit around the nucleus
carbon-13		
carbon-14		

(Total for question = 2 marks)

Q11.

One isotope of the element potassium is potassium-40.

A nucleus of potassium-40 is represented by:

$$^{40}_{19}K$$

(i) Complete the sentence by putting a cross (☒) in the box next to your answer.

The number of neutrons in a nucleus of potassium-40 is

(1)

☒ **A** 19

☒ **B** 21

☒ **C** 40

☒ **D** 59

(ii) Which of these symbols is correct for the nucleus of a different isotope of potassium?

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

(1)

$^{39}_{19}K$ $^{40}_{20}K$ $^{19}_{40}K$ $^{39}_{20}K$

☒ A ☒ B ☒ C ☒ D

(iii) A sample of potassium-40 is left for a long time.

Some of the potassium-40 nuclei will emit gamma radiation as they turn into argon-40 nuclei.

Argon-40 nuclei never change.

Describe what information this gives about the isotope potassium-40.

(2)

.....

.....

.....

.....