Eduqas Physics GCSE
Topic 9.1: Nuclear atom and isotopes
Questions by topic

1.

Scientists sometimes replace one scientific model with a different model.

For example in the early 20th Century the plum pudding model of the atom was replaced by the nuclear model of the atom.

Explain what led to the plum pudding model of the atom being replaced by the nuclear model of the atom.

[6 marks]

2.

(a) Draw a ring around the correct answer to complete the sentence.

The particles in the nucleus of the atom are

electrons and neutrons.
electrons and protons.
neutrons and protons.

(1)

(b) Complete the table to show the relative charges of the atomic particles.

Particle	Relative charge
Electron	–1
Neutron	
Proton	

(2)

(c) (i) A neutral atom has no overall charge.

Explain this in terms of its particles.

.....

.....

.....

.....

(2)

(ii) Complete the sentence.

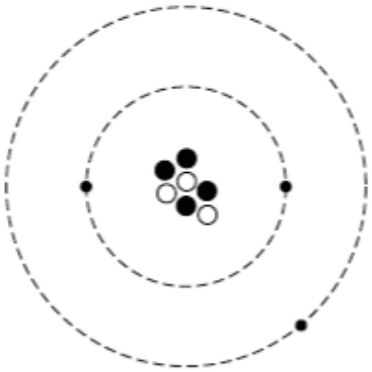
An atom that loses an electron is called an .....

and has an overall ..... charge.

(2)

3.

The diagram represents an atom of lithium.



(a) (i) Complete the following table of information for an atom of lithium.

Number of protons	
Number of electrons	
Number of neutrons	

(2)

(ii) What is the mass number of a lithium atom?

Draw a ring around your answer.

3	**4**	**7**	**10**

Give a reason for your answer.

.....

.....

(2)

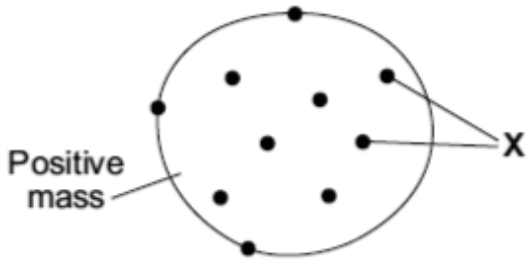
(b) Complete the following sentence by drawing a ring around the correct line in the box.

An atom that has lost an electron is called

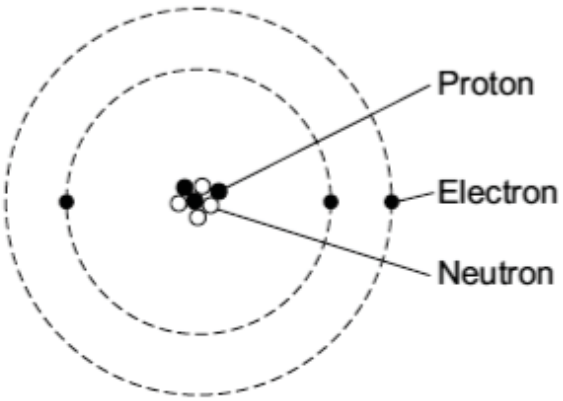
an ion
an isotope
a positive atom

4.

The diagrams show two different models of an atom.



'Plum pudding' model



Model used today

(a) The particles labelled '**X**□ in the plum pudding model are also included in the model of the atom used today.

What are the particles labelled '**X**' ?

.....

(1)

(b) Scientists decided that the 'plum pudding' model was wrong and needed replacing.

Which **one** of the following statements gives a reason for deciding that a scientific model needs replacing?

Tick (✓) **one** box.

The model is too simple. ☐

The model has been used by scientists for a long time. ☐

The model cannot explain the results from a new experiment. ☐

(c) The table gives information about the three types of particle that are in the model of the atom used today.

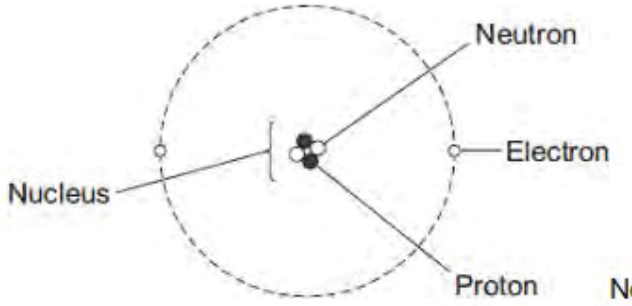
Particle	Relative mass	Relative charge
	1	+1
	very small	–1
	1	0

Complete the table by adding the names of the particles.

(2)
(Total 4 marks)

5.

The diagram shows the structure of an atom.



Not drawn to scale

(a) In 1931 scientists thought that atoms contained **only** protons and electrons.

Suggest what happened in 1932 to change the idea that atoms contained only protons and electrons.

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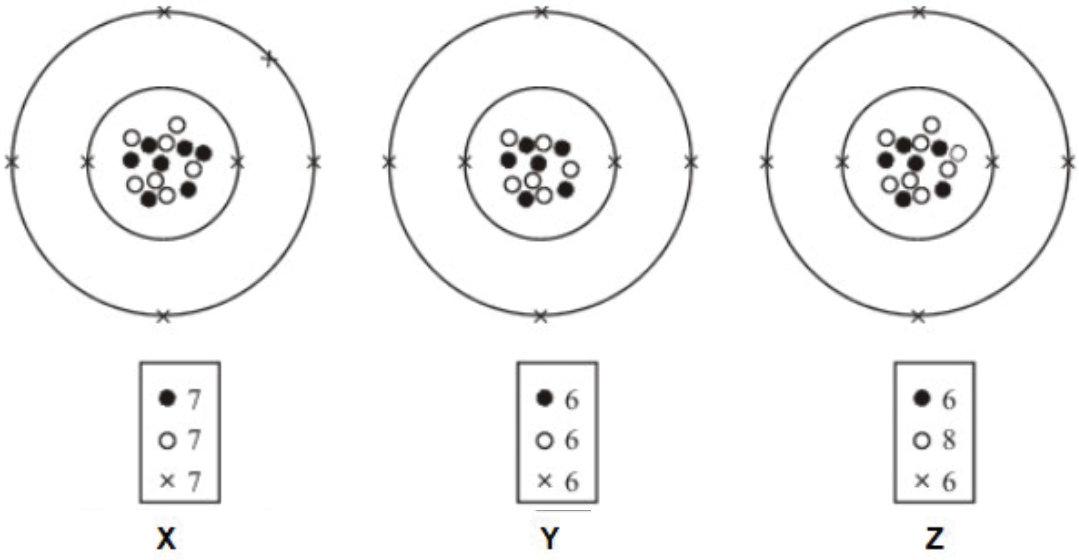
(1)

6.

(a) The diagrams represent three atoms **X**, **Y** and **Z**.



Which **two** of the atoms are from the same element?

.....

Give a reason for your answer.

.....

.....

(2)

7.

(c) Uranium has two natural isotopes, uranium-235 and uranium-238.
Uranium-235 is used as a fuel inside a nuclear reactor.
Inside the reactor, atoms of uranium-235 are split and energy is released.

(i) How is the structure of an atom of uranium-235 different from the structure of an atom of uranium-238?

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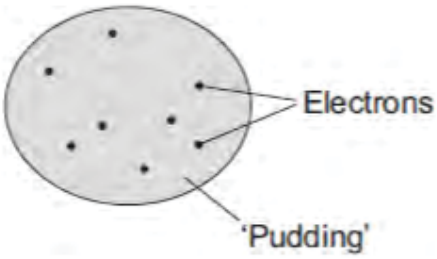
(1)

8.

The 'plum pudding' model of the atom was used by scientists in the early part of the 20th century to explain atomic structure.



(a) Those scientists knew that atoms contained electrons and that the electrons had a negative charge. They also knew that an atom was electrically neutral overall.

What did this allow the scientists to deduce about the 'pudding' part of the atom?

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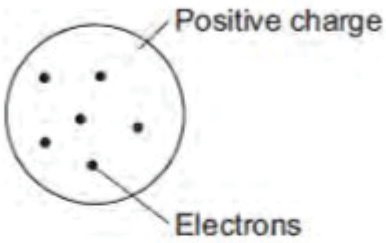
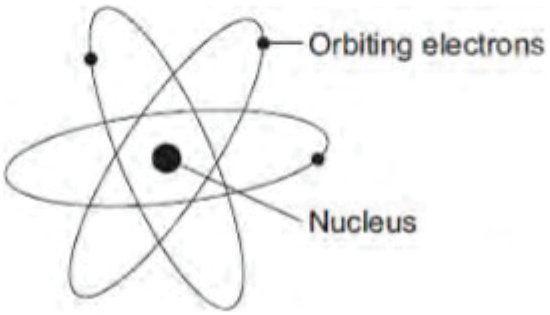
(1)

9.

In the early part of the 20th century, scientists used the 'plum pudding' model to explain the structure of the atom.



Following work by Rutherford and Marsden, a new model of the atom, called the 'nuclear' model, was suggested.



Describe the differences between the two models of the atom.

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(Total 4 marks)

10.

Use the Data Sheet to help you answer this question.

This question is about elements and atoms.

(a) About how many different elements are found on Earth?
Draw a **ring** around the correct number.

40 **50** **60** **70** **80** **90**

(1)

(b) The following are parts of an atom:

electron **neutron** **nucleus** **proton**

Choose from the list the one which:

(i) has no electrical charge; .....

(ii) contains two of the other particles; .....

(iii) has very little (negligible) mass. .....

(3)

(c) Scientists have been able to make new elements in nuclear reactors. One of these new elements is fermium. An atom of fermium is represented by the symbol below.

$$^{257}_{100}\mathrm{Fm}$$

(i) How many protons does this atom contain? .....

(ii) How many neutrons does this atom contain? .....

(2)

(Total 6 marks)