

Name of the Student: _____

Max. Marks : 18 Marks

Time : 18 Minutes

Q1.

- (a) Radioactive sources that emit alpha, beta or gamma radiation can be dangerous.

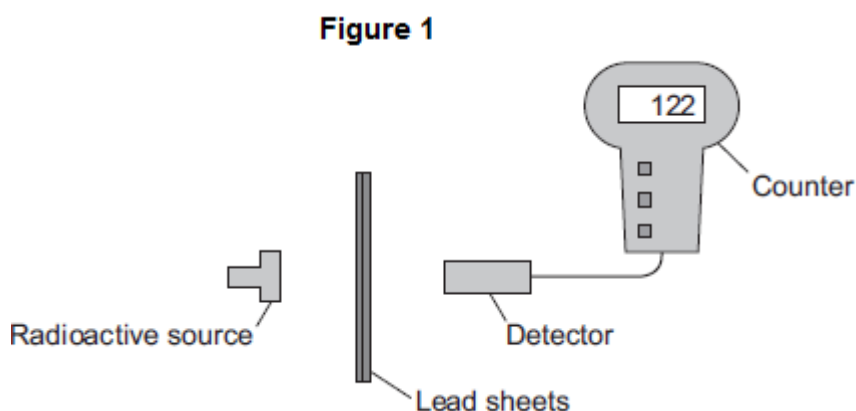
What is a possible risk to health caused by using a radioactive source?

(1)

- (b) In an experiment, a teacher put a 2 mm thick lead sheet in front of a radioactive source. She used a detector and counter to measure the radiation passing through the lead sheet in one minute.

She then put different numbers of lead sheets, each 2 mm thick, in front of the radioactive source and measured the radiation passing through in one minute.

The apparatus the teacher used is shown in **Figure 1**.



- (i) When using a radioactive source in an experiment, how could the teacher reduce the risk to her health?

Suggest **one** way.

(1)

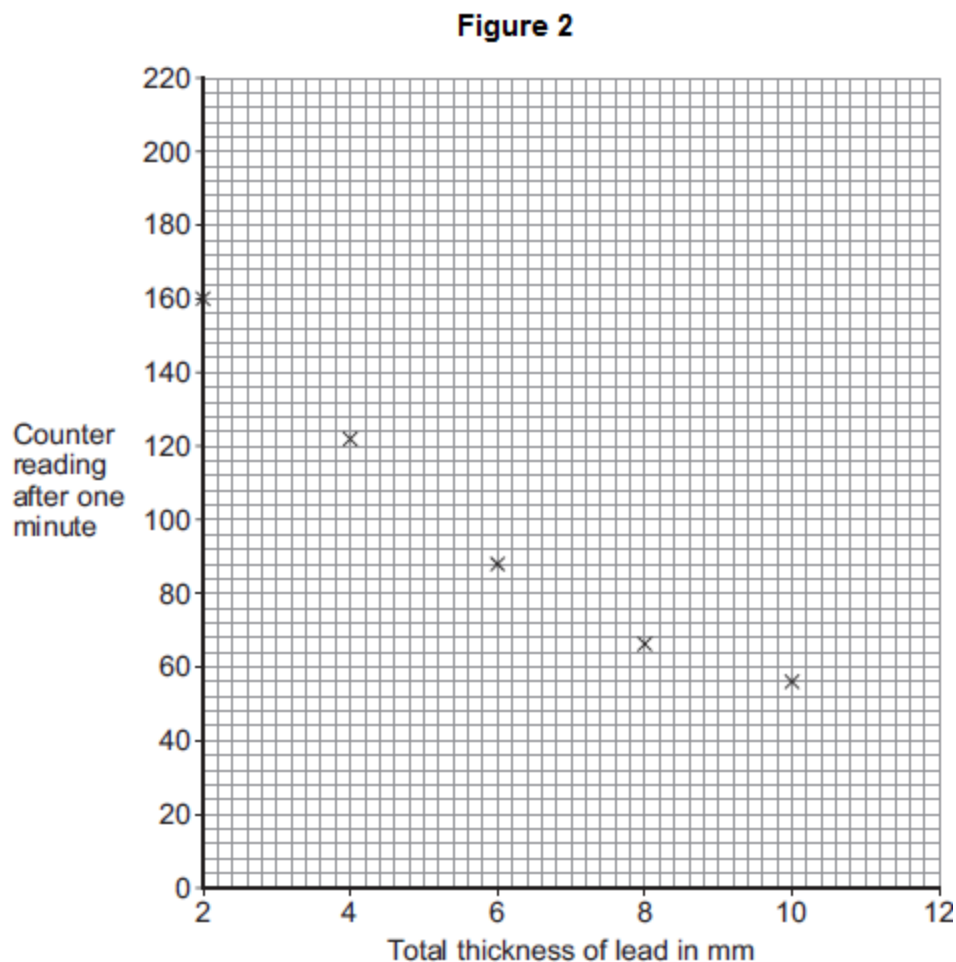
- (ii) The number recorded on the counter is actually higher than the amount of radiation detected from the source.

Complete the following word equation.

The number recorded on the counter	=	The amount of radiation detected from the source	+	_____ radiation
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(1)

- (c) The readings taken by the teacher are plotted in **Figure 2**.



- (i) Draw a line of best fit to complete **Figure 2**.

(1)

- (ii) How does the amount of radiation **absorbed** by the lead change as the total thickness of the lead is increased?

(1)

- (iii) Use **Figure 2** to estimate the reading on the counter when the total thickness of the lead is increased to 12 mm.

Estimated counter reading = _____

(1)

- (d) What type of radiation was emitted from the radioactive source?

Draw a ring around the correct answer.

alpha

beta

gamma

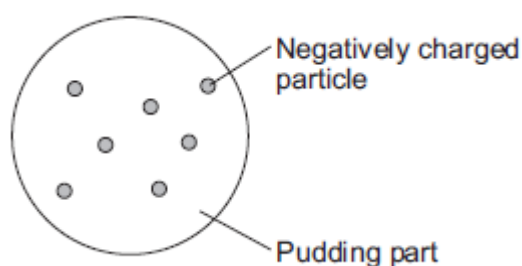
Give a reason for your answer.

(2)

(Total 8 marks)

Q2.

- (a) Over 100 years ago, scientists thought the atom was like a 'plum pudding'. The diagram below shows the plum pudding model of the atom.



The scientists knew that an atom has negatively charged particles. They also knew that an atom has no overall charge.

What did the scientists conclude about the **charge** on the 'pudding part' of the atom?

(1)

- (b) Two scientists named Rutherford and Marsden devised an experiment to investigate the plum pudding model of the atom. The experiment involved firing alpha particles at a thin sheet of gold. The scientists measured how many of the alpha particles were scattered.

Using the plum pudding model, the scientists predicted that only a few of the alpha particles would be scattered by more than 4° .

Over several months, more than 100 000 measurements were made.

- (i) The results from this experiment caused the plum pudding model to be replaced by a new model of the atom.

Explain why.

(2)

- (ii) Suggest **one** reason why other scientists thought this experiment provided valid evidence for a new model of the atom.

(1)

- (c) **In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.**

Describe the model now used for the structure of an atom.

In your answer you should:

- give details of the individual particles that make up an atom
- include the relative masses and relative charges of these particles.

Do **not** include a diagram in your answer.

(6)

(Total 10 marks)