Q1. (2019)

0 6 Lanthanum-140 is a radioactive isotope.

a)

0 6 . 2 Why is it difficult to detect gamma radiation?

[1 mark]

b)

0 6 . 3 Activity is the rate at which a radioactive source decays.

A teacher measured the count-rate from a sample of lanthanum-140 using a Geiger-Muller (G-M) tube.

Explain why the count rate was less than the activity of the sample of lanthanum-140

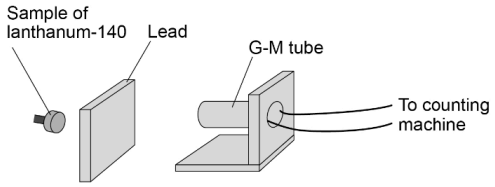
[2 marks]

c)

The teacher investigated how the thickness of lead affected the amount of gamma radiation that could pass through it.

Figure 6 shows the apparatus.

Figure 6



0 6 . 4 Explain why the teacher stood as far away from the apparatus as possible.

[2 marks]

d)

Table 1 shows the results.

Table 1

Thickness of lead in cm	Count rate in counts per second
0.5	110
1.0	60
1.5	33
2.0	18
2.5	10

0 6 . 5 The teacher concluded that the count rate was **not** inversely proportional to the thickness of lead.

Explain why the teacher was correct.

Use the data in **Table 1**.

[3 marks]

Q2. (2022)

0 6 A smoke detector contains a source of alpha radiation in a plastic case.

0 6 . 1 A source of beta radiation in a smoke detector would be more hazardous than a source of alpha radiation.

Explain why.

[2 marks]

Q3. (2023)

0 4 A scientist investigated a sample of a radioactive material to determine if it would be suitable for medical use.

a)

0 4 . 1 The method, results and conclusions of the scientist will need to be checked by other scientists before the results of the investigation are published.

What name is given to this checking process?

[1 mark]

b)

0 4 . 2 There is an increased risk of cancer if the scientist is irradiated by nuclear radiation.

What property of nuclear radiation causes the increased risk of cancer?

[1 mark]

Q4. (2024)

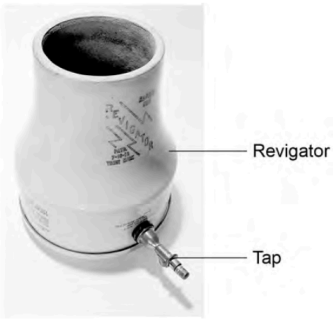
0 5 Some people used to think that radioactive substances had health benefits.

In the 1920s, a water container called a revigator was sold.

The walls of a revigator contain radioactive isotopes.

Figure 6 shows a revigator.

Figure 6



The revigator was filled with water and left overnight.

People then drank the water from the revigator.

0 5 . 1 The water was irradiated and contaminated by the radioactive isotopes in the walls of the revigator.

Explain how irradiating and contaminating the water affected the hazard caused by drinking the water.

[4 marks]