

Name of the Student: _____

Max. Marks : 24 Marks

Time : 24 Minutes

Q1.

Sources of background radiation are either natural or man-made.

(a) Which **two** of the sources listed in the table are natural sources of background radiation?

Tick **two** boxes.

Cosmic rays

Medical X-rays

Nuclear power stations

Nuclear weapons testing

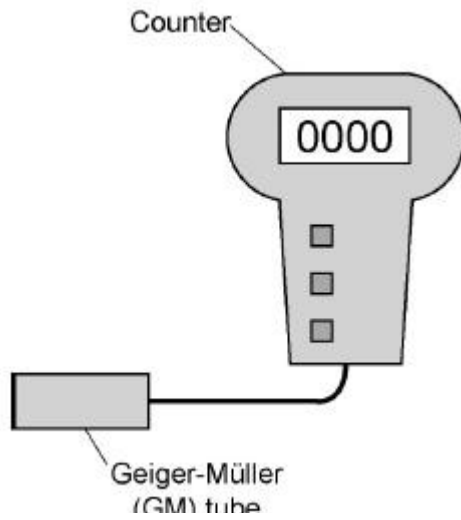
Radon gas

(2)

A teacher used a Geiger-Müller (GM) tube and counter to measure the background radiation in his laboratory.

Figure 1 shows the GM tube and counter.

Figure 1



(b) The table gives three readings taken by the teacher at three different times on the same day.

Counts in 1 minute
16
21
18

What is the most likely reason for the readings being different?

Tick **one** box.

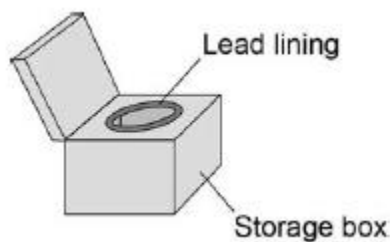
- Radioactive decay is a random process.
- The air pressure in the laboratory increased.
- The background radiation increased during the day.
- The temperature in the laboratory decreased.

(1)

(c) The teacher takes a radioactive source from a storage box.

Figure 2 shows the box.

Figure 2



Why does storing the radioactive source in the box reduce the risk of radiation exposure to the teacher?

Tick **one** box.

The lead lining absorbs the emitted radiation.

The lead lining reflects the emitted radiation.

The lead lining transmits the emitted radiation.

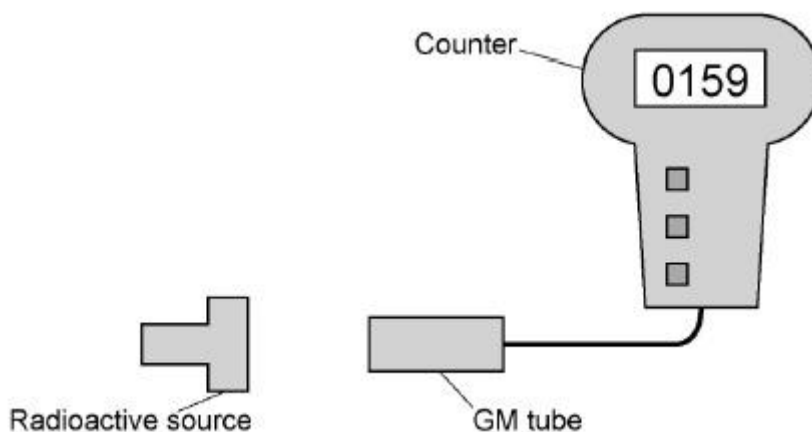
(1)

- (d) **Figure 3** shows how the teacher used the GM tube and counter to measure the radiation emitted from the radioactive source.

The counter was reset to zero.

The count after one minute was 159.

Figure 3



How should the teacher calculate the counts from the radioactive source?

Tick **one** box.

Add the background count to 159

Divide the background count by 159

Multiply the background count by 159

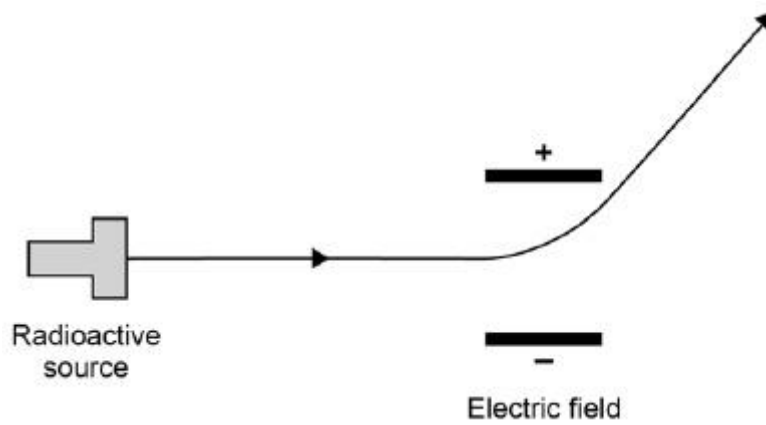
Subtract the background count from 159

(1)

- (e) The teacher passed the radiation through an electric field.

Figure 4 shows the path that the radiation took through the electric field.

Figure 4



What type of radiation was being emitted by the radioactive source?

Tick **one** box.

Alpha Beta Gamma Neutron

Explain the reason for your answer.

(3)
(Total 8 marks)

Q2.

Atoms contain three types of particle.

(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
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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 _____

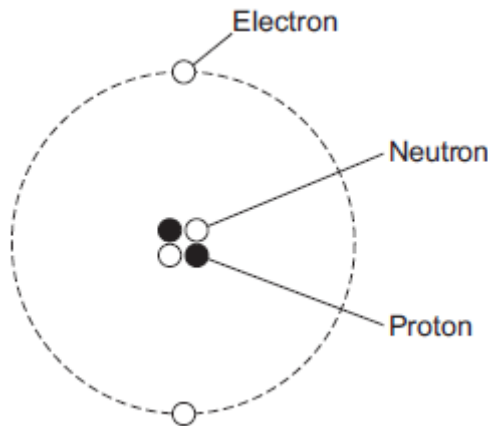
and has an overall _____ charge.

(2)

(Total 7 marks)

Q3.

- (a) The figure below shows a helium atom.



- (i) Which **one** of the particles in the atom is **not** charged?

Draw a ring around the correct answer.

electron neutron proton

(1)

- (ii) Which **two** types of particle in the atom have the same mass?

_____ and _____

(1)

(iii) What is the atomic number of a helium atom?

Draw a ring around the correct answer.

2 4 6

Give a reason for your answer.

(2)

(b) Alpha particles are one type of nuclear radiation.

(i) Name **one** other type of nuclear radiation.

(1)

(ii) Use the correct answer from the box to complete the sentence.

electrons	neutrons	protons
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The difference between an alpha particle and a helium atom is that the alpha particle does **not** have any _____ .

(1)

(iii) Which **one** of the following is a property of alpha particles?

Tick (✓) **one** box.

Have a long range in air

Are highly ionising

Will pass through metals

(1)

(c) Doctors may use nuclear radiation to treat certain types of illness.

Treating an illness with radiation may also harm a patient.

(i) Complete the following sentence.

The risk from treating a patient with radiation is that the radiation may _____ healthy body cells.

(1)

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

Radiation may be used to treat a patient if the risk from the

radiation is

much bigger than
about the same as
much smaller than

the possible benefit of having

the treatment.

(1)

(Total 9 marks)