Practice Question Set For GCSE
Subject : Physics
Paper-1 Topic: Atomic Structure (High Demand)

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Name of the Student:_____
Max. Marks : 25 Marks **Time : 25 Minutes**

Q1.

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

(a) 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)

(b) 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)

(c) The activity of a radioactive source is the rate at which the nuclei of the source decay.

What is the unit for the activity of a radioactive source?

_____

(1)

(d) The scientist placed a radiation detector near the sample and measured the count-rate.

Explain why the count-rate is less than the activity of the sample.

_____

_____

_____

_____

(2)

(e) The scientist recorded the count-rate from the sample with the radiation detector at different distances from the sample.

Table 1 shows the results.

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Table 1

Distance between the sample and the detector in centimetres	Count-rate in counts/second
2.0	300
5.0	24
10.0	0

Explain which type of radiation was emitted by the sample.

_____

_____

_____

_____

(2)

(f) The scientist moved the detector closer to the sample and started a stopwatch.

The scientist measured the count-rate from the sample at different times.

Table 2 shows some of the results.

Table 2

Time in minutes	Count-rate in counts/second
0	1568
30	**X**
60	98

The scientist realised that 30 minutes is a whole number of half-lives.

Calculate the value of **X** in **Table 2**.

_____

_____

_____

_____

_____

X = _____ counts/second

(3)

(g) The scientist had a second sample of the radioactive material.

The scientist made appropriate measurements, then calculated the half-life of each sample.

Why was the half-life calculated from the second sample slightly different from the half-life

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calculated from the first sample?

Tick (✓) **one** box.

Radioactive decay is a random process.	☐
The count-rate from a radioactive sample is predictable.	☐
The samples were at different temperatures.	☐
The size of each sample was different.	☐

(1)

(Total 11 marks)

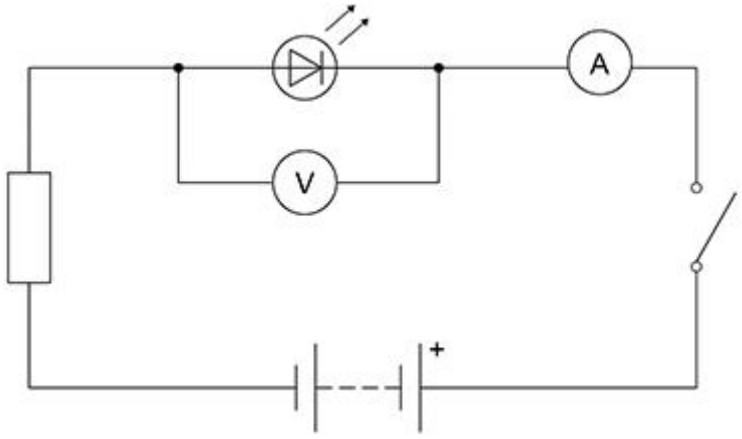
Q2.

The camera in a mobile phone uses an LED to provide light when taking a photograph.

A student investigated how the potential difference across an LED varies with the current in it.

Figure 1 shows the circuit used.

Figure 1



(a) The student closed the switch. The voltmeter gave a reading of 5.0 V

The ammeter gave a reading of 0 mA

The LED did not emit any light.

Explain how the student should have changed the circuit to make the LED emit light.

_____

_____

_____

_____

(2)

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(b) The student changed the circuit so that the LED emitted light.

The current in the circuit was 290 mA

The power of the LED was 0.98 W

Calculate the potential difference across the LED.

Use the Physics Equations Sheet.

Give your answer to 2 significant figures.

_____

_____

_____

_____

_____

_____

_____

_____

Potential difference (2 significant figures) = _____ V

(5)

A traditional camera uses a flash unit to provide light.

Figure 2 shows a flash unit on a traditional camera.

Figure 2



(c) The flash unit emits light from xenon gas in a fluorescent tube.

What happens when a xenon atom emits light?

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Tick (✓) **one** box.

Electrons in the atom fall to a lower energy level.	☐
Electrons in the atom move to a higher energy level.	☐
Electrons leave the atom, causing ionisation.	☐
Electrons transfer to the atom from the electrical circuit.	☐

(1)

(d) When the flash unit is used there is a mean potential difference of 200 V across the fluorescent tube.

The flash of light lasts for 2.8×10^{-4} s

1.4 J of energy is transferred.

Calculate the mean current.

Use the Physics Equations Sheet.

Mean current = _____ A

(6)

(Total 14 marks)

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