Radioactivity

Question Paper

Course	CIE IGCSE Physics
Section	5. Nuclear Physics
Topic	Radioactivity
Difficulty	Medium

Time Allowed 10

Score /5

Percentage /100

Question 1

A student carried out an experiment to find the half-life of a radioactive substance. Their results are shown in the table below.

Time(seconds)	Count-rate from source(counts per second)
0	300
20	200
40	150
60	100
80	75

What is the half-life of this substance?

A. 20 seconds

B. 40 seconds

C. 60 seconds

D. 80 seconds

[1 mark]

Question 2

Extended tier only

Strontium-90 is a radioactive substance with the nuclide symbol $^{90}_{38}Sr$.

It decays by emitting radiation, as shown by the following equation.

$$^{90}_{38}Sr \rightarrow {}^{90}_{39}Y + ?$$

What is missing in this equation?

A. **α**-particle

B. Neutron

C. **γ**-ray

D. **β**-particle

[1 mark]

Question 3

Extended tier only

A radioactive nucleus emits a **β**-particle.

What happens to the proton number and the nucleon number of this nucleus?

	Proton number	Nucleon number
A	increases by 1	stays the same
B	stays the same	decreases by one
C	decreases by 2	decreases by 4
D	decreases by 1	stays the same

[1 mark]

Question 4

The count rate from a radioactive isotope is recorded every hour. The count rate is corrected for background radiation. The table shows the readings.

time / hours	0	1	2	3	4	5
corrected count rate / counts/s	1200	990	816	673	555	458

What estimate of the half-life of the isotope can be obtained from the readings in the table?

A. between 1 and 2 hours

B. between 2 and 3 hours

C. between 3 and 4 hours

D. between 4 and 5 hours

[1 mark]

Question 5

Extended tier only

A nucleus of uranium ($^{238}_{92}U$) is unstable and decays by emitting an **α**-particle.

Which equation correctly describes this process?

A. $^{238}_{92}U \rightarrow {}^{4}_{2}\alpha + {}^{234}_{90}Th$

B. $^{238}_{92}U \rightarrow {}^{4}_{2}\alpha + {}^{234}_{90}U$

C. $^{238}_{92}U + {}^{4}_{2}\alpha \rightarrow {}^{234}_{90}Th$

D. $^{238}_{92}U \rightarrow {}^{4}_{2}\alpha + {}^{234}_{88}Ra$

[1 mark]