CAMBRIDGE IGCSE PHYSICS · 0625

PHYSICS



EXAM QUESTION PACK

TOPIC 5: NUCLEAR PHYSICS

SCORE	PERCENTAGE
/	%

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Radioactivity

Question Paper 2

Level	IGCSE
Subject	Physics (0625/0972)
Exam Board	Cambridge International Examinations (CIE)
Topic	General Physics
Sub-Topic	Radioactivity
Booklet	Question Paper 2

Time allowed: **21 minutes**

Score: **/17**

Percentage: **/100**

Grade Boundaries:

9	8	7	6	5	4	3	2	1
>85%	75%	68%	60%	55%	50%	43%	35%	<30%

Question 1

A radioactive substance has a half-life of 2 weeks. At the beginning of an investigation, a sample of the substance emits 3000 β-particles per minute.

How many β-particles will it emit per minute after 6 weeks?

A 0 B 375 C 500 D 1500

Question 2

The table shows the results of an experiment to find the half-life of a radioactive substance.

time / s	count rate from substance / counts / second
0	150
60	120
120	95
180	75
240	60

What is the half-life of the substance?

A. 60 seconds

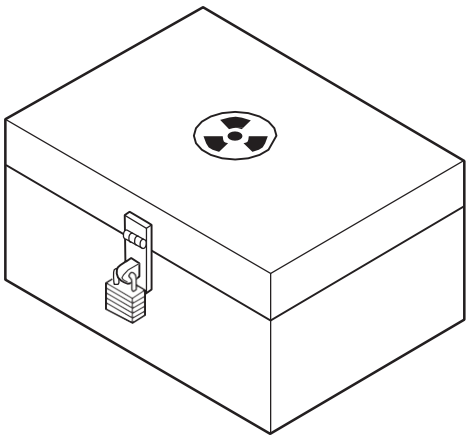
B. 120 seconds

C. 180 seconds

D. 240 seconds

Question 3

The diagram shows a box used for storing radioactive sources.



Which material is best for lining the box to prevent the escape of most radioactive emissions?

A. aluminium

B. copper

C. lead

D. steel

Question 4

Compared with β-particles and γ-rays, α-particles

A are the only type of radiation to carry a charge

. B have the greatest ionising effect.

C. have the greatest penetrating effect.

D. have the smallest mass.

Question 5

In a cathode-ray tube, a hot tungsten cathode releases particles by thermionic emission.

What are these particles?

A. α-particles

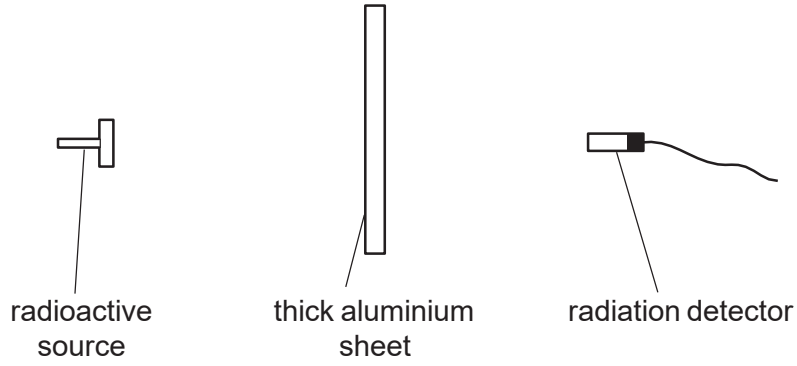
B. electrons

C. protons

D. tungsten atoms.

Question 6

The diagram shows a radioactive source, a thick aluminium sheet and a radiation detector.



The radiation detector shows a reading greater than the background reading.

Which type of radiation is being emitted by the source and detected by the detector?

A α-radiation

B β-radiation

C γ-radiation

D infra-redradiation

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Question 7

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	800	620	480	370	290	220

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

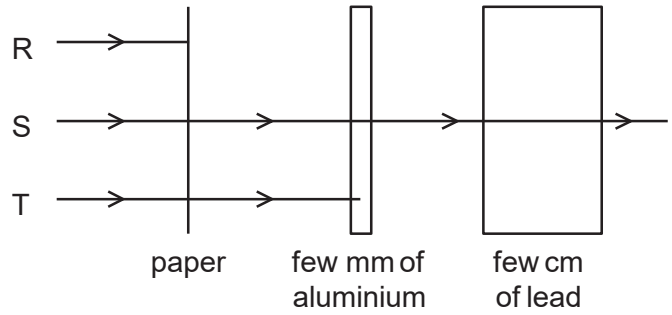
C. between 3 and 4 hours

D. between 4 and 5 hours

Question 8

A radioactive source emits three types of radiation R, S and T.

The diagram shows an experiment set up to study the penetrating properties of R, S and T.



Which types of radiation are R, S and T?

	R	S	T
A	α-particles	β-particles	γ-rays
B	α-particles	γ-rays	β-particles
C	β-particles	α-particles	γ-rays
D	γ-rays	β-particles	α-particles

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Question 9

The half-life of a radioactive substance is 10 minutes. A sample of the radioactive substance contains 2000 nuclei.

How many radioactive nuclei were in the sample half an hour earlier?

A 250 B 4000 C 6000 D 16 000

Question 10

A radioactive substance emits a particle from the nucleus of one of its atoms. The particle consists of two protons and two neutrons.

What is the name of this process?

A α-emission

B β-emission

C γ-emission

D nuclear fission

Question 11

Why are some radioactive sources stored in boxes made from lead?

A. Lead absorbs emissions from the radioactive sources.

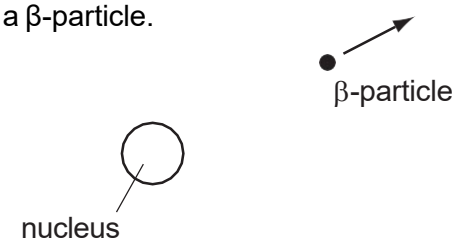
B. Lead decreases the half-life of radioactive sources.

C. Lead increases the half-life of radioactive sources.

D. Lead repels emissions from the radioactive sources.

Question 12

A radioactive nucleus emits a β-particle.



What happens to the proton number (atomic number) of the nucleus?

A It stays the same.

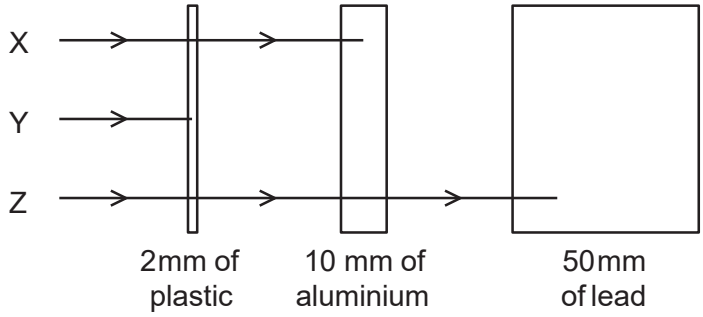
B It increases by 1. C

It decreases by 2. D

It decreases by 4.

Question 13

The diagram shows the paths of three different types of radiation, X, Y and Z.



Which row in the table correctly identifies X, Y and Z?

	X	Y	Z
A	α-particles	β-particles	γ- rays
B	β-particles	α-particles	γ- rays
C	β-particles	γ-rays	α-particles
D	γ-rays	α-particles	β-particles

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Question 14

A powder contains 400 mg of a radioactive material that emits α-particles.

The half-life of the material is 5 days.

What mass of that material remains after 10 days?

A 0 mg B 40 mg C 100 mg D 200 mg

Question 15

Which row shows the relative ionising effects and penetrating abilities of α-particles and β-particles?

	ionising effect	penetrating ability
A	α greater than β	α greater than β
B	α greater than β	α less than β
C	α less than β	α greater than β
D	α less than β	α less than β

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Question 16

A scientist needs to use a source of γ-rays as safely as possible.

Which action will **not** reduce the amount of radiation that reaches the scientist?

A. keeping the distance between the source and the scientist as large as possible

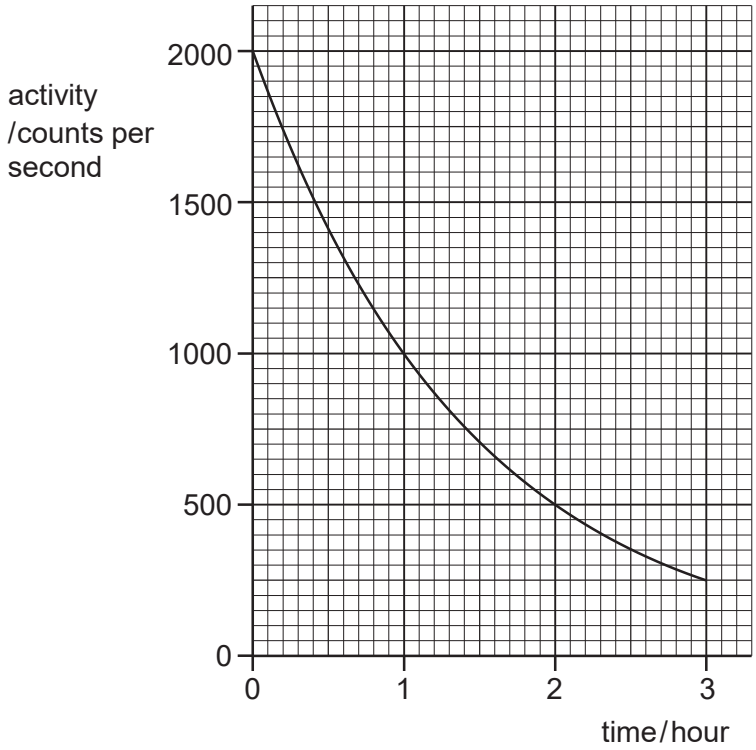
B. keeping the temperature of the source as low as possible

C. keeping the time for which the scientist uses the source as small as possible

D. placing a lead screen between the scientist and the source

Question 17

The graph shows the activity of a radioactive source over a period of time.



What is the half-life of the source?

A $\frac{1}{2}$ hour B 1 hour C $1\frac{1}{2}$ hours D 3 hours

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