AQA GCSE Physics | 8463

SPECIFICATION POINT 4.4.2.4

Radioactive contamination

Mark schemes and examiner comments

Tier	**Foundation**
Question groups	**4**
Available paper years	**2009–2024**

Using this booklet

1. Booklet answer numbers match the question booklet.
2. Use the original question number within marking tables.
3. Examiner comments are included where available.

Name: _____ **Date:** _____

Where a precise marking extract is unavailable, the full source document is included in an appendix. Any missing mark scheme is explicitly identified.

4.4.2.4 Radioactive contamination

Answer 01 · Mark scheme

March 2009 | PHY1BP | Original Q8 | Legacy

Eight	**1**	**3**	**2**	**1**

4.4.2.4 Radioactive contamination

Answer 02 · Mark scheme

June 2011 | PHY1F | Original Q8 | Legacy

Question 8

question	answers	extra information	mark
8(a)(i)	decommissioning		1
8(a)(ii)	level of radiation **or** radiation dose (to workers) decreased	accept the isotope / cobalt(-60) has decayed (a lot) accept the isotope / cobalt(-60) has decayed in 2 half lives accept exposed to less radiation do **not** accept no radiation left	1
	less hazardous / dangerous (to workers health)	accept safer do **not** accept there is no hazard accept allows reactor to cool (down) an answer of radiation levels decrease by 75 % or drops to 25 % gains **2** marks	1
8(b)(i)	more in favour **or** fewer against	quoting figures alone is insufficient do **not** accept it increases ignore any reasons given	1

Question 8 continues on the next page

4.4.2.4 Radioactive contamination

PHY1F

Question 8 continued

question	answers	extra information	mark
8(b)(ii)	any **one** from: • sample too small • do not know how many (people) were asked • different people asked (in different years) • sample not representative (of population) • people did not understand the questions • do not know who carried out the surveys • do not know if surveys asked same questions	do **not** accept they are biased unless acceptable reason for bias given	1

Question 8 continues on the next page

4.4.2.4 Radioactive contamination

PHY1F

Question 8 continued

question	answers	extra information	mark
8(b)(iii)	any **one** from: • no / less pollutant gases produced • reliable source (of energy / electricity) • running out of fossil fuels • conserve fossil fuels • meet increasing demand • less reliance on imported fossil fuels / electricity • concentrated energy source(s) • lower transportation costs for fuel • to replace old <u>nuclear</u> power stations	accept a named gas accept does not contribute to global warming accept a named fossil fuel accept fossil fuels won't have to be used accept named fossil fuel ignore references to efficiency / job creation / local economy / selling electricity	1
8(c)	economic issues		1
Total			**7**

4.4.2.4 Radioactive contamination

Answer 03 · Mark scheme

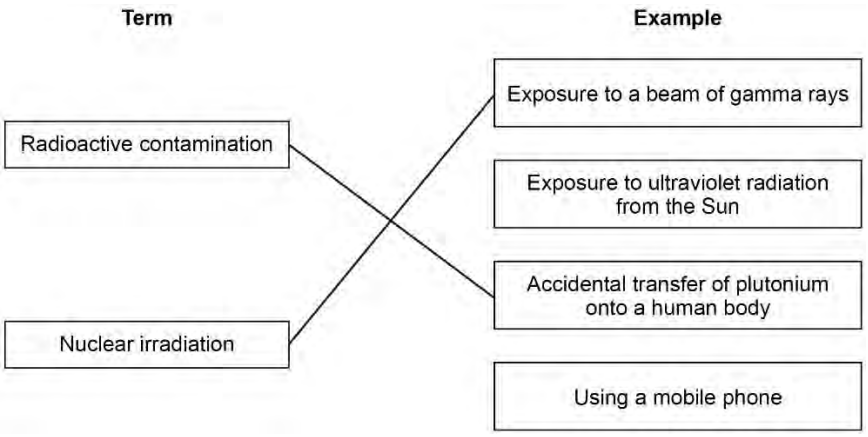
June 2023 | 8463/1F | Original Q3

Question 3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.1	protons neutrons	this order only	1 1	AO1 4.4.1.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.2	the time taken for half the nuclei in a sample to decay		1	AO1 4.4.2.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.3	carbon-18		1	AO3 4.4.2.3

Question	Answers	Mark	AO / Spec. Ref.
03.4	 1 mark for each correct line additional line from a box on the left negates the mark for that box	1 1	AO1 4.4.2.4

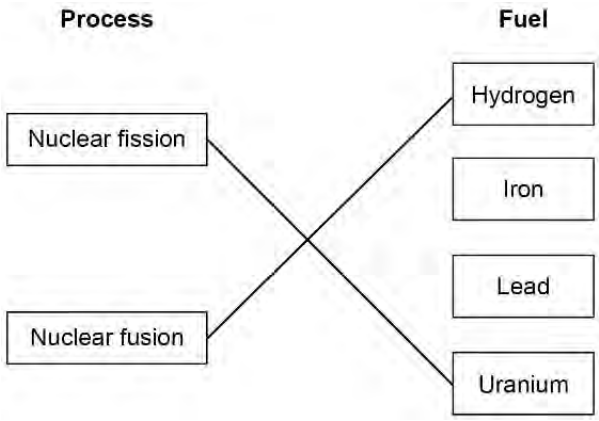
4.4.2.4 Radioactive contamination

Answer 03 · Mark scheme

June 2023 | 8463/1F | Original Q3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.5	to remove radioactive dust from their shoes		1	AO3 4.4.2.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.6	number of days = $\frac{0.072}{0.00050}$ number of days = 144		1 1	AO2 4.4.3.1

Question	Answers	Mark	AO / Spec. Ref.
03.7	 1 mark for each correct line additional line from a box on the left negates the mark for that box	1 1	AO1 4.4.4.1 4.4.4.2

Total Question 3	11

4.4.2.4 Radioactive contamination

Answer 04 · Mark scheme

June 2024 | 8463/1F | Original Q6

Question 6

Question	Answers	Mark	AO / Spec. Ref.
06.1	2 marks for 4 correct answers 1 mark for 2 or 3 correct answers	2	AO1 4.4.3.1

Source of background radiation	Natural	Man-made
Cosmic rays	✓	
Medical X-rays		✓
Nuclear accidents		✓
Radon gas	✓	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.2	rock **C**		1	AO1 4.4.2.1
	(because) alpha is stopped by (one sheet of) paper **or** (one sheet of) paper significantly decreased the radiation detected	MP2 dependent on scoring MP1 allow alpha is the least penetrating	1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.3	rock **A**		1	AO1 4.4.2.1
	(because) beta radiation is stopped by (a thick) aluminium (sheet) **or** the (thick) aluminium (sheet) significantly decreased the radiation detected	MP2 dependent on scoring MP1	1	

4.4.2.4 Radioactive contamination

Answer 04 · Mark scheme

June 2024 | 8463/1F | Original Q6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.4	wearing protective gloves		1	AO3 4.4.2.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.5	the activity is half the original activity		1	AO3 4.4.2.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.6	the greater the activity, the greater the risk of harm		1	AO1 4.4.3.3

Total Question 6	**9**

4.4.2.4 Radioactive contamination

Answer 03 · Examiner comments June 2023 | 8463/1F | Original Q3

Question 3 (Low and Standard Demand)

03.1 29% of students scored 2 marks, while 27 % of students scored 1 mark for this question about isotopes..

03.2 51% of students knew what half-life means.

03.3 77 % of students correctly identified the least stable isoptope.

03.4 Students found this question difficult with only 38% scoring 2 marks and 21% scoring 1 mark for this question about irradiation and contamination.

03.5 68% of students identified the purpose of the sticky floor.

03.6 72% of students scored 2 marks on this calculation question.

03.7 This question discriminated well with 46 % of students scoring 2 marks and 20 % of students scoring 1 mark for this question about fission and fusion

Answer 04 · Examiner comments June 2024 | 8463/1F | Original Q6

Question 6 (Low / Standard demand)

06.1 Students were more successful at identifying cosmic rays as natural and medical X-rays as man-made. Students were less confident about nuclear accidents and radon gas and often got these the wrong way round. 70% of students scored 2 marks, while 27% of students scored 1 mark.

06.2 A question that discriminated well, with 27% of students scoring 2 marks and 24%

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Answer 04 · Examiner comments June 2024 | 8463/1F | Original Q6

scoring 1 mark. A number of students stated that alpha is stopped by paper but had ticked the wrong box, so scored no marks. Many students were unable to draw the correct conclusion from the given data, perhaps they had learned the fact but not observed the practical demonstration.

06.3 A question that discriminated well, with 27% of students scoring 2 marks and 44% scoring 1 mark. A number of students stated that beta is stopped by aluminium but had ticked the wrong box, so scored no marks. Many students were unable to draw the correct conclusion from the given data, perhaps they had learned the fact but not observed the practical demonstration.

06.4 94% of students correctly identified a precaution to prevent contamination.

06.5 81% of students correctly identified the activity after one half-life.

06.6 86% of students correctly linked activity to risk of harm.