AQA GCSE Physics | 8463

SPECIFICATION POINT 4.2.5.2

Electric fields

Mark schemes and examiner comments

Tier	**Higher**
Question groups	**6**
Available paper years	**2008–2024**

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.

4.2.5.2 Electric fields

Answer 01 · Mark scheme

Question 4

question	answers	extra information	mark
(a)(i)	beta and gamma	both answers required accept correct symbols	1
(ii)	alpha and beta	both answers required accept correct symbols	1
(iii)	gamma	accept correct symbol	1
(b)	nothing *(*you do to a radioactive substance / source*)* changes the count rate / activity / rate of decay / radiation (emitted) **or** *(*reducing*)* the temperature does not change the activity / count rate / rate of decay / radiation (emitted)	accept it = radiation emitted	1
(c)(i)	has <u>one</u> more neutron	correct answer only	1
(ii)	14 days	no tolerance allow **1** mark for showing a correct method on the graph	2

Question 4 continues on the next page

4.2.5.2 Electric fields

PHY1H

Question 4 continued

question	answers	extra information	mark
(iii)	any **two** from: • beta particles / radiation can be detected externally • beta particles / radiation can pass out of / through the plant • long half-life gives time for phosphorus to move through the plant / be detected / get results • phosphorus-32 is chemically identical to phosphorus-31 • phosphorus-32 is used in the same way by a plant as phosphorus-31		2
total			9

4.2.5.2 Electric fields

Answer 01 · Mark scheme January 2008 | PHY1H | Original Q4 | Legacy

PHY1H

Answer 02 · Mark scheme November 2008 | PHY1BP | Original Q1 | Legacy

Question	Key		
One	**A**	alpha radiation	**3**
	B	beta radiation	**4**
	C	gamma radiation	**2**
	D	visible light	**1**

Answer 03 · Mark scheme June 2010 | PHY1BP | Original Q7 | Legacy

Seven	1	2	2	1

Answer 04 · Mark scheme November 2011 | PHY1BP | Original Q5 | Legacy

Five	**2**	**3**	**2**	**4**

4.2.5.2 Electric fields

Answer 05 · Mark scheme

June 2018 | 8463/1H | Original Q1

Question	Answers	Extra information	Mark	AO/ Spec. Ref
01.1	transfer of <u>electrons</u> from the carpet to the student	mention of positive charge moving negates both marks	1 1	AO1 4.2.5.1
01.2	three arrows perpendicular to sphere's surface with all arrows directed inwards and distributed evenly around sphere		1	AO1 4.2.5.2
01.3	there is a potential difference between the student and the tap which causes electrons / charges to transfer from the student **or** which causes electrons / charges to transfer to the tap which earths the charge	do **not** accept the tap / sink is charged allow the tap is earthed	1 1 1	AO1 4.2.1.2 4.2.1.3 4.2.5.1
01.4	carpet / copper has a low resistance lower / no build-up of charge (on the student) **or** (so there is a) smaller / no potential difference between student and tap / earth	allow carpet is a conductor **or** copper is a conductor	1 1	AO3 4.2.5.1 4.2.1.3
Total			**8**	

4.2.5.2 Electric fields

Answer 06 · Mark scheme

June 2024 | 8463/1H | Original Q4

Question 4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.1	<u>electrons</u> are transferred to the student		1	AO1 4.2.5.1
	(so) her hair is negatively charged	allow each hair has the same (negative) charge	1	
	(and) like charges repel	do not accept student being positively charged for MP1 and MP2	1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.2	the region (around a charged object) where another charged object experiences a force	allow space / area for region allow particle for object	1	AO1 4.2.5.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.3	(electric field strength) decreases		1	AO1 4.2.5.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.4	$Q = 2 \times 10^{-6}$ (C)		1	AO2 4.2.4.2
	$0.6 = 2 \times 10^{-6} \times V$	allow a correct substitution of an incorrectly / not converted value of Q	1	
	$V = \frac{0.6}{2\times10^{-6}}$	allow a correct rearrangement of an incorrectly / not converted value of Q	1	
	$V = 300\,000$ (V)	allow an answer consistent with an incorrectly / not converted value of Q	1	

4.2.5.2 Electric fields

Answer 06 · Mark scheme

June 2024 | 8463/1H | Original Q4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.5	decreased electrical resistance of air		1	AO3 4.2.5.1

Total Question 4	**10**

4.2.5.2 Electric fields

Answer 06 · Examiner comments

June 2024 | 8463/1H | Original Q4

Question 4 (Standard/High Demand)

04.1 Students answers were generally very confused with this question and statements about transfer of positive electrons or protons or even neutrons were commonly seen. Students struggled to understand that when you are in contact with a charged object you have the same charge as that object. It was common to see statements about the dome being negative so the student (and her hair) are positively charged. If a student said that the student was positively charged they could not score mark points 1 and 2, but they could still score mark point 3 if they said that like / same charges repel. 10% of students scored 3 marks, while 15% scored 2 marks and 32% scored 1 mark.

04.2 Only 8% of students scored a mark on this question. An answer of 'the area / space / region where an electron experiences a force' was creditworthy as were other examples of charged particles or ions. 'The area where other charged particles experience repulsion or attraction' was also creditworthy. Neither of these examples were seen often, however.

04.3 92% scored a mark for this question. A surprisingly large number of students made statements like 'as you get closer to the dome, the field strength increases' answering the question in the opposite way to the way it was set out. They scored a mark but would have saved a lot of time by writing 'it decreases.'

04.4 Some students did not convert, or incorrectly converted, the unit of charge and scored 3 marks.. Some students incorrectly converted the unit for charge and also spuriously converted the energy by multiplying or dividing by a power of ten. These students made two mistakes, so scored a maximum of 2 marks on this question. 36% of students scored all 4 marks, while 56% of students scored 3 marks for this calculation of potential difference.

04.5 80% of students identified the factor that would increase the distance a spark can jump between two objects.