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Mark Scheme (Results)

Summer 2013

GCSE Physics (5PH2F)
Paper 01

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Summer 2013
Publications Code UG036891

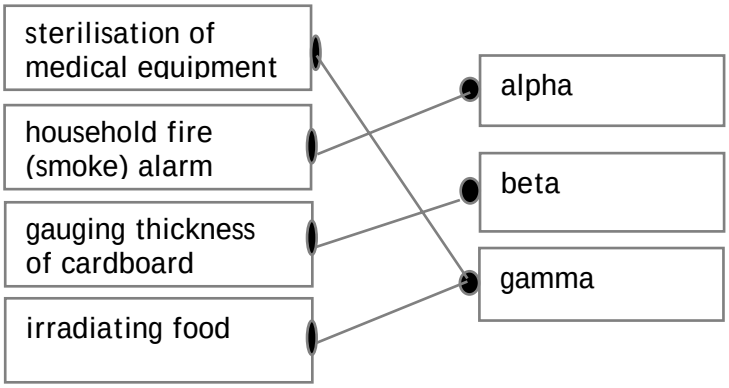
General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- For questions worth more than one mark, the answer column shows how partial credit can be allocated. This has been done by the inclusion of part marks eg (1).
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

Quality of Written Communication

Questions which involve the writing of continuous prose will expect candidates to:

- Write legibly, with accurate spelling, grammar and punctuation in order to make the meaning clear
- Select and use a form and style of writing appropriate to purpose and to complex subject matter
- Organise information clearly and coherently, using specialist vocabulary when appropriate.

Question Number	Answer	Acceptable answers	Mark
1(a)		one mark for each correct line	**(4)**

Question Number	Answer	Acceptable answers	Mark
1(b)	☒ **D**		**(1)**

Question Number	Answer	Acceptable answers	Mark
1(c)	☒ **B** becquerel		**(1)**

Question Number	Answer	Acceptable answers	Mark
1(d)	A description including any **two** from: • secure storage (1) • avoid direct contact (1) • wear protective clothing (1) • minimise exposure (1) • shielding (1) • minimise dose (1) • monitor exposure (1) • protect other people (1)	either the purpose, such as to prevent radiation getting out or a description such as lead-lined box/locked away when not in use. do not touch / use tongs /wash after handling lead lined suits/aprons/masks/gloves ignore goggles long distance away / not pointing towards body/ keep sources shielded /stand behind shields short time wear film badge/use Geiger counter (to monitor radiation levels) warning signs / barriers / restricted areas /controlled areas	**(2)**

Question Number	Answer	Acceptable answers	Mark
2 (a)	an explanation linking: balloons repel (1) (because) they have like charges (1)	balloons repulse / push away (from each other/to the side) same charge / both positive / both negative accept like charges repel for 2 marks	**(2)**

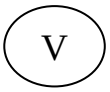
Question Number	Answer	Acceptable answers	Mark
2 (b)(i)	☒ **D** an equal positive charge		**(1)**

Question Number	Answer	Acceptable answers	Mark
2(b)(ii)	an explanation linking any two of friction (between cloth and balloon) (1) transfer of electrons (1) (electrons/negative charges move) from cloth to balloon (1)	 charge/electrons move accept balloon gains electrons from the cloth for 2 marks	**(2)**

Question Number	Answer	Acceptable answers	Mark
2(b)(iii)	a description including **two** from the following: • balloon becomes discharged (1) • metal /cabinet is a conductor (1) • electrons {move through / on to} metal / cabinet (1)	 earthed / neutral (negative) charge for electrons accept electrons move to earth for 2 marks	**(2)**

Question Number	Answer	Acceptable answers	Mark
2(b)(iv)	(surface of) wall (becomes) positively charged /charged by induction (1)	charges on the wall separate charge closest to the surface of the wall is opposite to the charge on the balloon	**(1)**

Question Number	Answer	Acceptable answers	Mark
3 (a)	☒ D a variable resistor		**(1)**

Question Number	Answer	Acceptable answers	Mark
3(b)(i)	 connected in parallel with lamp (1)	recognisable symbol such as a box with letter V inside or box with the word voltmeter inside it accept voltmeter across both lamp and ammeter	**(1)**

Question Number	Answer	Acceptable answers	Mark
3(b(ii)	Substitution R = 6.0 / 0.26 (1) Evaluation = 23 (1)	 An answer which rounds to 23 Give full marks for correct answer no working	 **(2)**

Question Number	Answer	Acceptable answers	Mark
3(c)(i)	point correctly plotted at 2.0, 0.14 to within half a small square (1) smooth curve of best fit connecting all given points within half a small square (1)	Judge curve by eye. If more than one line present then ignore any that appear to be erased or deleted. Ignore any part of line which goes beyond given points. If plotted point is incorrect then allow ecf for line	**(2)**

Question Number	Answer	Acceptable answers	Mark
3(c)(ii)	a description including **two** of the following: • current increases as voltage increases (1) • current is not proportional to the pd (1) • gradient gets less (1)	Allow reverse argument positive correlation (between them) graph is not a straight line not in equal steps current does not increase as much (as it gets higher) accept resistance has increased with increase in current for two marks	**(2)**

Question Number	Answer	Acceptable answers	Mark
3(c)(iii)	a suggestion to include: there is still a current (when control is at min position) (1) make the battery last longer (1)	to break the circuit to switch **the current** off accept flow of electricity/charge/electrons for current {battery / energy} would be {drained /used up/ wasted} otherwise accept reverse arguments ignore reference to power / volts	**(2)**

Question Number	Answer	Acceptable answers	Mark
4(a)(i)	does not emit (ionising) radiation / no (radioactive) decay	it is not radioactive	**(1)**

Question Number	Answer	Acceptable answers	Mark
4 (a)(ii)	☒ **B** 5		**(1)**

Question Number	Answer	Acceptable answers	Mark
4 (a)(iii)	$^{8}_{4}Be$ ☒ A		**(1)**

Question Number	Answer	Acceptable answers	Mark
4(b)(i)	helium beryllium (1) (1) helium	daughter in right hand boxes daughter	**(2)**

Question Number	Answer	Acceptable answers	Mark
4(b)(ii)	a comparison which describes any **three** of the following: similarities: • produce (more) neutrons (1) • produce 'daughter' (nuclei) (1) • release energy (1) • split a (bigger) nucleus (1) • (triggered by) a neutron coming in (1) • nucleus becomes unstable (before splitting) (1) differences: • uranium daughters are different from each other/ beryllium daughters are the same (1) • uranium daughters are heavier than beryllium daughters (1)	different elements / smaller nuclei for daughters do not accept split an atom neutron is absorbed	**(3)**

Question Number	Answer	Acceptable answers	Mark
4(b)(iii)	a description including: neutron(s) (from first fission) (1) (go on to) cause another fission (1)	collide with another nucleus /atom	**(2)**

Question Number	Answer	Acceptable answers	Mark
5 (a) (i)	8 – 0 (m/s)	8	**(1)**

Question Number	Answer	Acceptable answers	Mark
5(a)(ii)	substitution 8 / 5 (1) evaluation (1) 1.6 (m/s^2)	ecf from (i) full marks for correct answer (or ecf) with no working shown.	 **(2)**

Question Number	Answer	Acceptable answers	Mark
5(a)(iii)	0	Nil / nothing / zero / none (no mark for no response)	**(1)**

Question Number	Answer	Acceptable answers	Mark
5(b)	substitution F = 1200 x 0.8 (1) evaluation (1) 960 (N)	 full marks for correct answer with no working shown.	 **(2)**

Question Number		Indicative Content	Mark
QWC	***5(c)**	an explanation linking some of the following points: compared to a car with just the driver, a fully loaded car will • have a greater mass / be heavier • greater kinetic energy / momentum • experience the same braking force (when brakes are applied) • require a greater braking force (than available) to stop (in the same distance) • have a smaller acceleration / deceleration • take a longer time to come to rest (from given speed) • travel greater distance in this time • needs to do more work with same amount of force • use of relevant equations such as F = ma, work done = F x d • consequence of driver distractions	**(6)**
Level	**0**	No rewardable content	
1	**1 - 2**	• a limited explanation using one idea from the indicative content eg fully loaded car is heavier. • in answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy	
2	**3 - 4**	• a simple explanation which links ideas from the indicative content eg it is heavier and so it takes a longer distance to stop • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy	
3	**5 - 6**	• a detailed explanation which links several ideas from the indicative content e.g. It has more momentum and so it will take a longer time to stop. This means that it will travel a further distance. The answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors	

Question Number	Answer	Acceptable answers	Mark
6(a)	kinetic (energy)	Movement (energy) KE	**(1)**

Question Number	Answer	Acceptable answers	Mark
6(b)	substitution: 0.6 x 20 (1) evaluation 12 (1) J (1)	give 2 marks for correct answer no working unit is an independent mark joules, Nm, kgm^2/s^2 , Ws	**(3)**

Question Number	Answer	Acceptable answers	Mark
6(c)	substitution: 0.5 x 18 (1) evaluation 9.0 (1)	9 give full marks for correct answer no working	**(2)**

Question Number		Indicative Content	Mark
QWC	***6(d)**	a description including some of the following points: • chemical to kinetic while in his hand • kinetic (gradually) to potential while rising / from 0-10 m • eventually all potential at 10 m with a little thermal (heat) energy • some mention of conservation of energy • potential (gradually) to kinetic as falls / 10 m-0 • with a little more thermal (heat) energy • at 0 m sound energy • at 0 m thermal (heat) energy	**(6)**
Level	**0**	No rewardable content	
1	**1 - 2**	• a limited description which identifies a change in one relevant type energy or a transfer of energy from one form to another e.g. kinetic energy increases OR kinetic energy changes to sound. • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy	
2	**3 - 4**	• a simple description giving detail of a relevant energy change/transfer e.g. kinetic energy changes into potential energy as it moves upwards OR kinetic energy increases as it falls. • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy	
3	**5 - 6**	• a detailed description of a sequence of relevant energy changes /transfers e.g. kinetic energy is transferred into potential energy as it rises. This then changes back into kinetic energy as it falls back down. • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors	

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Order Code UG036891 Summer 2013

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