Mark Scheme (Results)

January 2018

Pearson Edexcel GCSE
In Physics (5PH2F)
Paper 01

edexcel

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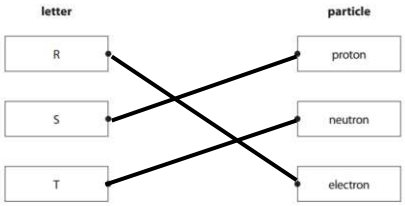
General Marking Guidance

- 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.
- 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.

Question Number	Answer	Acceptable answers	Mark
1(a)		All 3 lines correct for 2 marks 1 OR 2 lines correct for 1 mark more than one line from/to any box loses the mark for that box	**(2)**

Question Number	Answer	Acceptable answers	Mark
1 (bi)	electron(s) (1)		**(1)**

Question Number	Answer	Acceptable answers	Mark
1 (bii)	(direct current) is a movement of charge in one direction (only) (1)	the particles/charges / electrons or they (only) move {one way/one direction/from the sphere to the ground} ignore charges move directly {through the wire/to the ground} OR go straight to the ground/ go in a straight line	**(1)**

Question Number	Answer	Acceptable answers	Mark
1 (biii)	**A** the same type of electric charge		**(1)**

Question Number	Answer	Acceptable answers	Mark
1 (c)	3 x 60 or 180 (1) Substitution: 0.50 x 180 (1) Evaluation 90 (C) (1)	accept 0.5 x 3 for 1 mark and 1.5 for 2 marks (ie cand has not converted mins to secs) Allow full marks for correct answer with no working shown.	**(3)**

Total for Q1 = 8 marks

Question Number	Answer	Acceptable answers	Mark
2(a)	Any two from: (household) smoke/fire alarms irradiating food sterilisation of equipment gauging thicknesses tracing leaks in (underground) pipes diagnosis of cancer treatment of cancer {nuclear/atomic} weapons	accept both answers on one line allow any other correct use apply list rule ignore in hospitals ignore explosives	**2**

Question Number	Answer	Acceptable answers	Mark
2(b)	idea of halving mass (1) 4(.0) (mg) (1)	8(.0) (mg) allow a series e.g. 16, 8, 4,2,1, 0.5, 0.25.....for 1 mark accept idea of 2 half-lives for this mark ignore 60 ÷ 2 AND 10 ÷ 2 (too vague) for this mark allow both marks for correct answer with no working shown. no power of ten error on this item	**2**

Question Number	Answer	Acceptable answers	Mark
2(c)	An explanation linking two from: Radiation/it is ionising (1) Radiation/it can cause specified damage e.g. cancer or damage/mutate DNA (1) if dose/exposure is too high (1)	 (causes) ionisation/(can) ionise cells/ tissue ignore death/make you ill accept radiation/it can {mutate/damage/kill} cells accept radiation poisoning/sickness ignore it/radiation is harmful/dangerous accept for both marks: too much radiation can cause cancer (after a while) OR {damage/kill} cells/ tissue if absorb(ing) too much (radiation) there are likely to be more pairs from candidates responses	**2**

Question Number	Answer	Acceptable answers	Mark
2(d)	a description including any **two** from: idea of initial treatment (1) idea of containment (1) idea of long term storage or reprocessing (1)	(radioactive waste/fuel rods/it) put under water or vitrification any description of immobilising waste by combining with inert material eg put it in a concrete block/glass sealing in (stainless) steel (cylinder) accept suitable (sealed) {cylinder/box/ container/barrel} eg metal barrel (long term) storage (deep) underground put in (salt/coal) mines or any underground cavern (radioactive) waste is reprocessed/turned into new fuel can be combined with any of the above points to score up to two marks ignore keep it away from people/houses ignore dump it in the sea/send it into space/ burn it	**2**

Total for Q2 = 8 marks

Question Number	Answer	Acceptable answers	Mark
3(a)	**C** 1 joule per second, J/s		**1**

Question Number	Answer	Acceptable answers	Mark
3(bi)	Substitution (work done =) 1400 x 6(.0) (1) Evaluation (1) 8400 (J) or 8.4×10^3 (J)	 8.4 x any other power of 10 = 1 mark 8.4 kJ for 2 marks Give full marks for correct answer with no working.	**2**

Question Number	Answer	Acceptable answers	Mark
3(b)(ii)	substitution $0.5 \times 1200 \times 20^2$ (1) evaluation of v squared 0.5 x 1200 x 400 (1) evaluation 2.4×10^5 (J) OR 240 000 (J) (1)	 accept 400 seen anywhere for this mark e.g. 480 000 gets 1 mark (forgot ½) 2.4 x any other power of 10 = 2 marks Give full marks for correct answer with no working.	**(3)**

Question Number	Answer	Acceptable answers	Mark
3(c)	An explanation linking: thinking distance (for car Q) is greater (than car P) (1) With correct factor affecting thinking distance e.g. alcohol, drugs, tiredness (1) An explanation linking: braking distance (for car Q) is greater (than car P) (1) With correct factor increasing braking distance for car Q e.g. worn brakes, icy/muddy/slippy road surface, less friction between tyres and road surface, car Q has greater mass (1)	 accept reaction time is longer (for car Q) The thinking distance explanation and braking distance explanation can be in either order. If no other marks scored accept A statement that stopping distance for car Q is greater (than car P) for 1 mark accept reverse arguments correctly explained.	**(4)**

Total for Q3 = 10 marks

Question Number	Answer	Acceptable answers	Mark
4(a)(i)	• box 1: proton circled • box 3: sister circled • box 4: electrons circled all three points for 1 mark		**(1)**

Question Number	Answer	Acceptable answers	Mark
4(a)(ii)	• box 1: neutron • box 3: daughter • box 4: neutron(s) **Note**: 3 correct for 2 marks 2 correct for 1 mark 1 correct for 0 marks		**(2)**

Question Number	Answer	Acceptable answers	Mark
4(b)	An explanation linking the following points: control rods raised or lowered (1) correct link to number of neutrons absorbed/captured (1) corresponding effect on rate of reaction (1)	 eg control rods raised (so) more neutrons captured or fewer neutrons available for fission reactions (therefore) fewer fission reactions take place less energy is released (as fewer fission reactions) (hence) temperature goes down control rods raised so reaction (rate)increases as fewer neutrons absorbed scores 3 marks	**(3)**

Question Number	Answer	Acceptable answers	Mark
4(c)	A description including any four from: • (there are) 90 particles in the nucleus (1) • protons (1) • (there are) 38 (protons) (1) • neutrons (1) • (there are) 52 (neutrons) (1)	ignore all references to electrons (its) {mass/nucleon} number / A is 90 {atomic/proton} number / positive charge / Z = 38 Numbers must be correctly linked to gain credit e.g. 38 neutrons gets 1 mark (for neutrons) 52 protons and 38 neutrons gains two marks (for protons and neutrons)	**(4)**

	i.e. 38 protons and 52 neutrons gains four marks	90 protons and neutrons gets 3 marks (altogether there are) 90 protons and neutrons. 38 are protons gains 4 marks	

Total for Q4 = 10 marks

Question Number	Answer	Acceptable answers	Mark
5(a)(i)	**D** friction		**(1)**

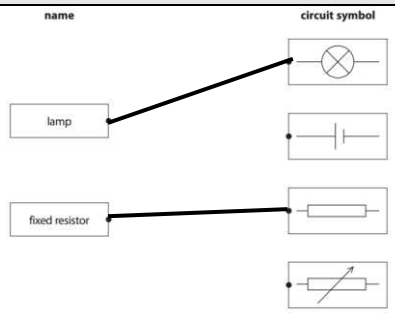
Question Number	Answer	Acceptable answers	Mark
5(a)(ii)	**C** the friction forces are smaller than the forward force		**(1)**

Question Number	Answer	Acceptable answers	Mark
5(a)(iii)	Substitution: (8.0 -2.0) ÷ 5.0 OR 6.0 ÷ 5.0 OR 3.0 ÷ 2.5 (1) Evaluation 1.2 (m/s^2) (1)	Allow both marks for correct answer with no working shown. accept 1.6 (m/s^2) for 1 mark	**(2)**

Question Number	Answer	Acceptable answers	Mark
5(a)(iv)	substitution (force =) 720 x 3.5 (1) evaluation (1) 2500 (N)	 accept 2520 (N) Allow both marks for correct answer with no working shown.	**(2)**

Question Number		Indicative Content	Mark
QWC	***5(b)**	A description including some of the following points • speed increases (at the start) • (speed increases)during the first (roughly) 20 seconds • speed is constant (at the end) • (speed is constant) after 27-30 seconds • acceleration is zero after 27-30 seconds • maximum speed is equal to 45 m/s • terminal velocity of 45 m/s • accelerates at start/up to 27-30 s • acceleration decreases from start/up to 27-30 seconds • skydiver will initially accelerate (downwards) • at 10 m/s^2 • (in first 2 seconds average) acceleration is between 6 m/s^2 and 7 m/s^2	**(6)**
Level	**0**	No rewardable content	
1	**1 - 2**	• A limited description of one section of the graph e.g. the speed increases at the start • 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 of at least two sections of the graph OR one section with numerical detail from the graph e.g. the speed increases at the start and is constant at the end OR the speed is constant at 45 m/s after 30 seconds • 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 at least two sections of the graph with numerical detail from both axes on at least one section e.g. the speed increases at the start AND the speed is constant at 45 m/s after 30 seconds • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors	

Total for Q5 = 12 marks

Question Number	Answer	Acceptable answers	Mark
6(a)		1 mark for each correct line more than one line from/to any box loses the mark for that box	**2**

Question Number	Answer	Acceptable answers	Mark
6(b) (i)	substitution: 3.0 ÷ 0.4 (1) evaluation 7.5 (Ω) (1)	allow both marks for correct answer with no working shown allow POT error for 1 mark	**2**

Question Number	Answer	Acceptable answers	Mark
6(b)(ii)	substitution: 0.4 x 3.0 x 50 (1) evaluation 60 (J) (1)	1.2 x 50 allow both marks for correct answer with no working shown allow power of ten error for max 1 mark eg 6(.0) (J) or 0.6 (J) or 600 (J)	**2**

Question Number		Indicative Content	Mark
QWC	***6(c)**	A description including the following • variable power supply or power supply and variable resistor • lamp in series with variable power supply or power supply and variable resistor • ammeter in series with lamp • voltmeter in parallel with lamp • idea of changing (circuit) resistance • using variable resistor • measure p.d./voltage across lamp • current in lamp Level 2 can be achieved on the circuit diagram	**6**
Level	**0**	No rewardable content	
1	**1 - 2**	a limited description which gives one relevant fact about the investigation.e.g. name some of the apparatus needed • 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 more than one fact about the investigation.e.g. name some of the apparatus needed AND how it is used • 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 the investigation .e.g. name most of the apparatus needed AND how it is used AND how the p.d. is varied • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors	

Total for Q6 = 12 marks

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