Mark Scheme (Results)

Summer 2015

Pearson Edexcel GCSE in
Physics (5PH2H) Paper 01
Unit P2: Physics for your future

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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.
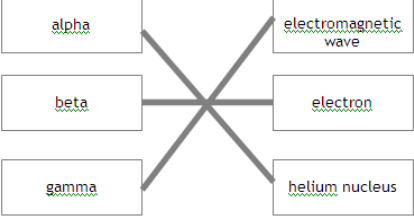- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

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.

Full marks will be awarded if the candidate has demonstrated the above abilities.

Questions where QWC is likely to be particularly important are indicated (QWC) in the mark scheme, but this does not preclude others.

Question Number	Answer	Acceptable answers	Mark
1(a)	Three lines as shown: alpha — helium nucleus beta — electron gamma — electromagnetic wave (2)	Any one line correct only scores 1 mark	**(2)**

Question Number	Answer	Acceptable answers	Mark
1(b)	An explanation linking Absorb (more) neutrons (1) (to) reduce the number of fission reactions (1)	ignore slow down neutrons slow down (the rate of) the reaction/fission	**(2)**

Question Number	Answer	Acceptable answers	Mark
1(c)(i)	**B** electrostatic repulsion of protons		**(1)**

Question Number	Answer	Acceptable answers	Mark
1(c)(ii)	A description to include • (two/or more/smaller) nuclei combine/fuse/join (1) • (to produce) a larger nucleus (1)	{(two or more) hydrogen nuclei/protons OR deuterium and tritium} combine/fuse (forming) helium nucleus ONLY penalise use of atoms instead of nuclei ONCE ignore references to release of energy as this is given earlier in the question.	**(2)**

Total for Question 1 = 7 marks

Question Number	Answer	Acceptable answers	Mark
2(a)	C (gain electrons)		**(1)**

Question Number	Answer	Acceptable answers	Mark
2(b)	An explanation linking • (Force of) attraction (1) • (plates have) opposite charge (to dust) (1)	Plates have a positive charge Ignore different charge	**(2)**

Question Number	Answer	Acceptable answers	Mark
2(c)(i)	transferred to plate / lost (1)	neutral / become discharged	**(1)**

Question Number	Answer	Acceptable answers	Mark
2(c)(ii)	An explanation linking any two of • Metal is a conductor (1) • Electrons / (negative) charge moves (through the plates/ wire) (1) • Towards the voltage supply / earth /ground (1)	Metal not an insulator Plates / charges are earthed	**(2)**

Question Number	Answer	Acceptable answers	Mark
2(d)	Substitution: $Q = 1.2 \times 10^{-3} \times 40$ (1) Evaluation: 0.048 or 4.8×10^{-2} (1) C / coulombs (1)	Give 2 marks for correct answer with no working shown Unit mark is independent Allow for 1 mark 48 (with incorrect or no units) Allow for 2 marks 48 C Allow for all 3 marks 48 mC	**(3)**

Total for Question 2 = 9 marks

Question Number	Answer	Acceptable answers	Mark
3(a)(i)	**A**		**(1)**

Question Number	Answer	Acceptable answers	Mark
3(a)(ii)	A description to include any two of • Gravitational / potential energy reduces (1) • kinetic energy increases (1) • total energy remains constant (1)	Ignore energy changes resulting from impact with sand GPE reduces KE increases Allow GPE is transferred to KE for 2 mark	**(2)**

Question Number	Answer	Acceptable answers	Mark
3(b)	A explanation linking • (work is done) displacing the sand (1) with EITHER • (as) <u>kinetic</u> energy of the ball(s) has been transferred (1) OR • by the force between the ball and the sand (1)	sand moving/ pushing/ blowing upwards OWTTE or ball sinking into sand	**(2)**

Question Number	Answer	Acceptable answers	Mark
3(c)(i)	transposition mass = momentum / velocity (1) substitution mass = 0.46 / 6.2 (1) evaluation 0.074 (kg) / 74g (1)	Subst. and transform. either order 1 mark only can be scored for correct substitution after incorrect transposition. Give full marks for correct answer with no working. Answers that round to 0.074 (kg) 0.07 (kg)	**(3)**

Question Number	Answer	Acceptable answers	Mark
3(c)(ii)	substitution (impact) force = 0.46 / 0.17 (1) evaluation 2.7 (N) (1)	Give full marks for correct answer with no working. Ignore power of ten error until evaluation Answers which round to 2.7 Allow ECF if candidate has used mass from part (i) in F=m(v-u) / T F= 6.2 -0 X 0.074 (1) 0.17 = 2.7 (N) (1)	**(2)**

Total for Question 3 = 10 marks

Question Number	Answer	Acceptable answers	Mark
4 (a)(i)	B 21		(1)

Question Number	Answer	Acceptable answers	Mark
4 (a)(ii)	A $^{39}_{19}\text{K}$		(1)

Question Number	Answer	Acceptable answers	Mark
4(a)(iii)	A description to include any two of • (nucleus/isotope is) unstable (1) • (nucleus/isotope is) radioactive (1) • decay is random (1) • long half life (1)		(2)

Question Number	Answer	Acceptable answers	Mark
4(b)(i)	1250 (million years) (1)	Between 1200 and 1300 (my) inclusive	(1)

Question Number	Answer	Acceptable answers	Mark
4(b)(ii)	2 half lives (1) 2500 (million years) (1)	Allow ecf from (bi) Give full marks for answer between 2400 and 2600 with no working.	(2)

Question Number	Answer	Acceptable answers	Mark
4(c)	An explanation linking any three from • Radon is radioactive (1) • Radon can escape from rocks and buildings (1) • Radon can be inhaled (1) • Radiation (from radon) can cause cancer (1) • Radon emits alpha (1)	Ignore radiation from rocks themselves Radon enters/gets trapped in buildings/homes / increases background radiation (breathed into) lungs (DNA) mutation / cell damage (Highly) ionising radiation	**(3)**

Total for Question 4 = 10 marks

Question Number	Answer	Acceptable answers	Mark
5(a)(i)	force (1)	If than one word given then 0 marks.	**(1)**

Question Number	Answer	Acceptable answers	Mark
5 (a)(ii)	B 0.07kg		**(1)**

Question Number	Answer	Acceptable answers	Mark
5 (a)(iii)	Arrow pointing (vertically) upwards (1) Value of 1.2 (N) (written near to arrow) (1)	Marks are independent of each other	**(2)**

Question Number	Answer	Acceptable answers	Mark
5(b)(i)	Substitution $\dfrac{90}{1000} \times 3.3$ (1) evaluation 0.30 (N) (1)	A value which rounds to 0.30 eg 0.297 Give full marks for correct answer with no working Ignore power of ten error until evaluation Allow 1 mark for 297 even with no working shown	**(2)**

Question Number		Indicative Content	Mark
QWC	*5(b)(ii)	An explanation demonstrating some of the following: Descriptions of the graph - Accelerates upwards during stage1 - Maximum velocity is reached at the end of stage 1 - Accelerates downwards / decelerates during stage 2 - Accelerates during stage 3 - Comes to rest during stage 4. Interpretations of the shape of the graph - Fuel is burnt creating thrust in stage - Thrust is upwards in stage 1/ - Gravity/weight (is always) a downward force - Fuel runs out at end of stage 1/ has ran out by stage 2 - Still going up during/ max height at end of stage 2 - Starts to fall at start of stage 3 - Negative velocity during stage 3 because it is falling. - Rapid deceleration / collision with the ground during stage 4/end of stage 3 Explanations for changes in velocity - Resultant force upwards/ thrust greater than gravity force during stage 1 - Acceleration non-linear because mass is decreasing / resultant force is increasing - Linear deceleration in stage 2/3 because force of gravity is constant - Resultant downward force/only gravity/ weight is acting during stage 2 and 3 - Large resultant force of impact during stage 4	(6)

Level	0	No rewardable content
1	1 - 2	• A limited explanation involving descriptions of the graph. • E.g. The rocket gets faster as it goes up during stage 1. The rocket slows down during stage 2 • 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 explanation involving interpretations of the shape of the graph e.g. The rocket's velocity increases during stage 1 because the burning fuel provides a force. The rocket accelerates downwards during stage 3 • 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 includes descriptions and interpretations for the shape of the graph including an explanation. E.g. The rocket's acceleration during stage 1 is increasing because it is losing mass as the fuel is burnt. It then slows down until it reaches maximum height at the end of stage 2 • 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 Question 5 = 12 marks

Question Number	Answer	Acceptable answers	Mark
6 (a)(i)	**B**		**(1)**

Question Number	Answer	Acceptable answers	Mark
6 (a)(ii)	substitution V = 0.039 x 185 (1) evaluation 7.215 (which is about 7.2) (V) (1)	Substitution 7.2 = I x 185 (1) transposition I = 7.2 ÷ 185 (1)	**(2)**

Question Number	Answer	Acceptable answers	Mark
6 (a)(iii)	**C** (same as)		**(1)**

Question Number	Answer	Acceptable answers	Mark
6(a)(iv)	An explanation to include The resistance (of the LDR) changes Greater resistance when in the dark	LDR has less resistance in the light	**(2)**

Question Number		Indicative Content	Mark
QWC	***6(b)**	An explanation linking some of the following. • less current is used at night-time • Resistance (of LDR or circuit) would increase with less ambient light • Higher resistance will allow less current (in the circuit) (ORA) • Less current in circuit means less energy from the battery • Less power required in the dark ORA for light conditions • Less current means less energy transferred (per second) • Total energy transferred is less during night time (than it would otherwise have been) due to the higher resistance of the LDR	**(6)**
Level	**0**	No rewardable content	
1	**1 - 2**	• A limited explanation linking the light level to EITHER resistance OR current. eg. It increases the resistance in the dark. • 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 explanation linking the light level to TWO of resistance, current, energy. eg. At night-time its resistance would increase. This would reduce the current from the battery • 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 linking the light level to resistance AND current, AND energy. e.g. At night-time the resistance would be more. This would reduce the current and mean that the battery will not have to supply as much energy. • 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 Question 6 = 12 marks