Mark Scheme (Results)

Summer 2014

Pearson Edexcel GCSE
in Physics (5PH2H) Paper 01

Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications are awarded by Pearson, the UK's largest awarding body. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information visit our qualifications websites at www.edexcel.com or www.btec.co.uk. Alternatively, you can get in touch with us using the details on our contact us page at www.edexcel.com/contactus.

Pearson: helping people progress, everywhere

Pearson aspires to be the world's leading learning company. Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: www.pearson.com/uk

Summer 2014
Publications Code UG040014

Question Number	Answer	Acceptable answers	Mark
1(a)(i)	**A -** negative charge has moved from the cloth to the rod		**(1)**

Question Number	Answer	Acceptable answers	Mark
1(a)(ii)	An explanation linking they repelled (1) (strips had) like charge (1)	 push away same (type of) charge	**(2)**

Question Number	Answer	Acceptable answers	Mark
1(b)(i)	An explanation linking any **two** from charges are separated (1) possibility of a spark (1) ignite the fuel (1)	ignore ref to electric shock pd between plane and ground cause fire / explosion	**(2)**

Question Number	Answer	Acceptable answers	Mark
1(b)(ii)	An explanation linking **three** from Metals are (good) conductors (1) Electrons/(negative) charge can flow through wire (1) charge goes from/to the ground / earth (1) discharge the tank/aircraft/pipes (1)	Reject flow of positive charge for this mark plane is earthed/grounded charge does not build up/dissipates Allow no pd between plane and ground so no spark possible for 2 marks	**(3)**

(Total for Question 1 = 8 marks)

Question Number	Answer	Acceptable answers	Mark
2(a)	**A -** 1 joule per coulomb		**(1)**

Question Number	Answer	Acceptable answers	Mark
2(b)(i)	Substitution (1) 1800 = 230 x I Transformation (1) I = 1800 / 230 Evaluation (1) 7.8 (A) substitution and transposition can be in either order	current = power / pd Any value which rounds to 7.8 such as 7.8261 Allow full marks for correct answer with no working shown	**(3)**

Question Number	Answer	Acceptable answers	Mark
2(b)(ii)	Using E = I x V x T: Substitution (1) 7.8 x 230 x 2 (x 60) Evaluation(1) 220 000 (J) (note: incorrect conversion of time loses the evaluation mark)	Allow ecf from 2(b)(i) Using energy = power x time 1800 x 2 (x 60) (1) Values which round to 220 000 such as 216 000 (J) 215 280 (J) Allow correct conversion to MJ or kJ Allow full marks for correct answer with no working shown	**(2)**

Question Number	Answer	Acceptable answers	Mark
2(b)(iii)	An explanation linking two from Energy is transferred (1) (as a result of) collisions of electrons (1) with ions/atoms / lattice (1)	electrons collide with each other for 2 marks	**(2)**

(Total for Question 2 = 8 marks)

Question Number	Answer	Acceptable answers	Mark
3 (a)(i)	C - power		**(1)**

Question Number	Answer	Acceptable answers	Mark
3 (a)(ii)	energy work	Must be in correct order	**(1)**

Question Number	Answer	Acceptable answers	Mark
3 a(iii)	Substitution 50 x 4 (1) Evaluation 200 (kg m/s) (1)	Allow full marks for correct answer with no working shown	**(2)**

Question Number	Answer	Acceptable answers	Mark
3 a(iv)	Substitution 450 / 1.5 (1) Evaluation 300 (N) (1)	Allow full marks for correct answer with no working shown Allow (1) for 167 (N) obtained by 450-200 / 1.5	**(2)**

Question Number	Answer	Acceptable answers	Mark
3 (a)(v)	An explanation to include (quantity has) a size and a direction	ignore any named examples	**(1)**

Question Number	Answer	Acceptable answers	Mark
3 (b)	An explanation which uses conservation of momentum to link three from Mother and daughter have different mass (1) Momentum is conserved / is zero to start with (1) Both have same size momentum (after the push) (1) so speed of the daughter is greater than that of the mother (1)	An explanation based on Newton's laws and linking three from Each have a different mass (1) Each experience the same size force / action and reaction are equal (1) Each experiences a different acceleration (1) so speed of the daughter is greater than that of the mother (1)	**(3)**

(Total for Question 3 = 10 marks)

Question Number	Answer	Acceptable answers	Mark
4 (a)	B → ←		**(1)**

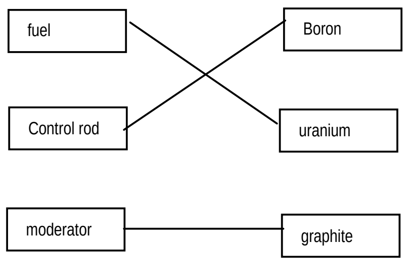
Question Number	Answer	Acceptable answers	Mark
4 (b)	**A –** 0 N		**(1)**

Question Number	Answer	Acceptable answers	Mark
4(c)(i)	Substitution (1) 1.2 = (20 – 13) / t Transposition (1) t = (20-13)/1.2 Evaluation 5.8 (s) (1) substitution and transposition can be in either order	1.2 = 7 / t t = 7/1.2 5.833 (etc) Give full marks for correct answer, no working	**(3)**

Question Number	Answer	Acceptable answers	Mark
4(c) (ii)	Substitution 1400 x 1.2 (1) Evaluation 1700 (N) (1)	1680 Allow full marks for correct answer with no working shown	**(2)**

Question Number	Answer	Acceptable answers	Mark
4 (c) (iii)	An discussion to include three of the following points The tow rope does not have to support the weight of the car (1) Tension is caused by accelerating force (plus frictional forces) (1) Tension is 5700 N (in this situation)(1) Forces could be kept below 12,000N (1) If acceleration is kept small (1) Numerical justification using f = m x a (1)	forces are horizontal not vertical / only needs to overcome friction Force is needed to accelerate / resultant force is 0 at constant velocity Force to accelerate is 1700N Forces could be kept small If truck is driven gently/slowly	**(3)**

(Total for Question 4 = 10 marks)

Question Number	Answer	Acceptable answers	Mark
5 (a) (i)		All three correct for 2 marks One or two only correct for 1 mark Reject any box with more than one line	**(2)**

Question Number	Answer	Acceptable answers	Mark
5(a) (ii)	A suggestion to include Neutrons do not need to be captured (by another nucleus) / do not play a part in the fusion process	Fusion does not use neutrons No chain reaction	**(1)**

Question Number	Answer	Acceptable answers	Mark
5 (b)	A description to include Thermal energy used to create steam / boil water(1) (Steam used to drive) turbine (1) (Turbine used to turn) generator (1)	Ignore detail of fission process.	**(3)**

Question Number		Indicative Content	Mark

QWC	***5(c)**	An explanation including some of the following points
		
		• Description of the problem
		  - Nuclei have positive charge
		  - Repel each other
		  - Reduces possibility of suitable collisions
		  - Rate of fusion too small to be useful
		• Description of how this can be overcome
		  o Very high temperature (of fuel)
		  o Very high KE / speed of nuclei
		  o High KE can overcome repulsion
		  o Very high density / pressure
		  o Increases possibility of suitable collisions
			(6)

Level	**0**	No rewardable content	
1	**1 - 2**	A limited explanation e.g. The fuel has to be at a high temperature to start the reaction/to make particles collide. Or The fuel has to be at a very high temperature and pressure. • 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. e.g. We need to overcome repulsion of nuclei to make them collide. This is achieved by having a high temperature and pressure. • 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 • e.g. The nuclei repel each other. To overcome this they need very high kinetic energy which is achieved by generating high temperature and pressure. • 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)	C - kill microbes in the food		**(1)**

Question Number	Answer	Acceptable answers	Mark
6 (b)(i)	From the graph Time taken to fall (from 8000) to 4000 (1) = 5.3 (years) (1)	Any other suitable pair of readings from the graph. Between 5.1 and 5.5 Full marks for correct answer even if no working is evident	**(2)**

Question Number	Answer	Acceptable answers	Mark
6 (b)(ii)	3 x 5.3 (= 15.9 years)	Allow attempt at extrapolation only if the answer is between 15.5 and 16.5 Allow ecf of 3 half lives from bi.	**(1)**

Question Number	Answer	Acceptable answers	Mark
6 (c)(i)	Comparison including any two from Same number of protons (1) Different number of neutrons (1) Cobalt-60 is unstable (1)	 Same atomic/proton number/charge Different nucleon number/mass number/atomic mass Cobalt 60 is radioactive Ignore reference to electrons	**(2)**

Question Number		Indicative Content	Mark
QWC	***6(c) (ii)**	A discussion which includes description of the hazards (H) and / or possible precautions (P) to reduce risks arising from them such as • In either option. o Rods are radioactive (H) o Gamma radiation is highly penetrating / ionising (H) o Radiation from them can cause cancer / damage to organisms / people / environment (H) o Need for shielding (P) o Security to prevent public access (P) • Transportation / reprocessing o Danger of accident during transport (H) o Need to be suitably protected against damage. (P) o Danger of interception/high-jacking/terrorists (H) o Need security (P) o Workers could be exposed to radiation (H) o Special facilities required (P) • Disposal o Can damage environment if not properly contained (H) o Special disposal facilities, not landfill (P) o Remain radioactive for some time (H) o Need to be kept secure while decaying to safe levels. (P) o Relatively short half-life means that very long term storage is not necessary. (P)	**(6)**

Level	0	No rewardable content
1	1 - 2	• a limited description of hazards or precautions in one option e.g. The rods are radioactive. Radiation can cause cancer. When the rods are disposed of then they will remain radioactive for some time. • 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 discussion of hazards for both options or a detailed discussion of one option. • A detail discussion may **either** expand on several descriptive points about the hazard **or** may include suitable precautions. e.g. The gamma radiation from the rods is highly penetrating. If they were simply put into landfill then they could damage the environment and so they would need special storage facilities until they had decayed to a safe level. • 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 discussion of hazards for both options. e.g. Response as above PLUS if they were transported back to the reactor then they must be in very strong containers so that, if there was an accident, they would not be damaged and allow radioactive material to escape. • 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)

Pearson Education Limited. Registered company number 872828
with its registered office at Edinburgh Gate, Harlow, Essex CM20 2JE