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Mark Scheme (Results)

Summer 2014

Pearson Edexcel GCSE in Physics (5PH2F) Paper 01

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

Question Number	Answer	Acceptable answers	Mark
1(a)(ii)	current (1) potential difference/voltage (1) Note: award one mark if these answers are in the wrong order	amps / A /mA/ amperage/ampage accept rate of flow of charge but, charge flowing is insufficient ignore electricity ie rate of flow of electricity does not score pd / p.d./ volts / V/ mV / kV etc can accept e.m.f / emf just potential is insufficient accept numerical responses with correct unit award one mark for: meter 1 = ammeter NOT ampmeter AND meter 2 = voltmeter NOT voltameter	**(2)**

Question Number	Answer	Acceptable answers	Mark
1(b)	substitution 0.4 x 6 x 20 (1) evaluation 48 (J) (1) Ignore any unit given by the candidate	 Ignore power of 10 until evaluation e.g. 1 mark for 4.8 Give full marks for correct answer, no working	**(2)**

Question Number	Answer	Acceptable answers	Mark
1(c)	p.d. for current of 0.3 A = 3.0 (V) (1) substitution 3.0 ÷ 0.3 (1) evaluation 10 (Ω) (1) Ignore any unit given by the candidate	3 (V) seen in any calculation is enough for a mark check graph if no other mark 3 ÷ 0.3 gains two marks 0.3 ÷ 3 (= 0.1) gains 1 mark (for 3 V) or bald 0.1 scores 1 mark (for 3V) Allow clear ecf from incorrect reading from graph for maximum 2 marks ie their reading ÷ 0.3 but 0.3 ÷ 0.3 does NOT score unless 0.3 written on graph Give full marks for correct answer, no working DO NOT award any marks for POT error where there is no working.	**(3)**

(Total for Question 1 =8 marks)

Question Number	Answer	Acceptable answers	Mark
2(ai)	**B** momentum (1)		**(1)**

Question Number	Answer	Acceptable answers	Mark
2 (aii)	power (1)		**(1)**

Question Number	Answer	Acceptable answers	Mark
2 (bi)	Substitution: ½ x0.8 x 25^2 (1) Evaluation 250 (1) 0.25 kJ scores 3 marks J bod j (1)	 Allow both marks for correct answer with no method shown. Ignore power of 10 until evaluation e.g. 2 marks for 25 J 1mark for 25 W Nm ignore kg $(m/s)^2$ Unit mark is independent of numerical answer.	**(3)**

Question Number	Answer	Acceptable answers	Mark
2 (bii)	250 (1) Ignore any unit given by the candidate	Allow ecf from 1(bi)	**(1)**

Question Number	Answer	Acceptable answers	Mark
2 (biii)	A suggestion to include: work done = force x distance (1) (force) used over a longer distance (1)	 ignore references to more power, greater speed, longer time, larger force, momentum and how far javelin travels. the longer they are pushing (it/the javelin) [bod distance] they can push the javelin (forward) for longer [bod distance] the arm can move further	**(2)**

(Total for Question 2 =8 marks)

Question Number	Answer	Acceptable answers	Mark
3(a)	repel (1) charge (1) positive (1) electrons (1)		**(4)**

Question Number	Answer	Acceptable answers	Mark
3(b)(i)	An explanation linking any **three** from the following: • Droplets have same charge (1) • (droplets) repel (one another) (1) • (This produces) a fine spray/mist (1) • attraction between droplets and plant (1) • This improves coverage OR Spray covers whole [leaf /plant] top and underside of leaf/ gives a fine coating/ even coat (1) • Less spray used/wasted/ falls onto soil (so saves money) (1)	Ignore references to attracting or repelling insects. ignore droplets are positive /negative droplets spread out (produce an) even spray droplets attracted to negative/opposite charge (on plant) or spray will stick to leaves/plant better/more chance of spray landing on/hitting plant or spray (lands) evenly on plant none is wasted/Less will run off the leaves/Same amount of spray will cover a larger area(so saves money)	**(3)**

Question Number	Answer	Acceptable answers	Mark
3(b)(ii)	10 minutes = 600 seconds (1) substitution 0.008 x 600 (1) evaluation 4.8 (C) (1) Ignore any unit given by the candidate	 ECF from their time eg 2 marks for 0.08 if their time is 10 0.8/8/8.0/80 gains 1 mark (bod POT error) Power of ten error max of 2 marks eg 480 gains 2 marks Award 3 marks for correct answer, no working No power of ten error mark if answer less than 0.008 as probably dividing Award 2 marks for 0.08, no working	**(3)**

(Total for Question 3 =10 marks)

Question Number	Answer	Acceptable answers	Mark
4(ai)	**D** 150 m **(1)**		**(1)**

Question Number	Answer	Acceptable answers	Mark
4(aii)	**B** at 7 s **(1)**		**(1)**

Question Number	Answer	Acceptable answers	Mark
4(aiii)	6 (s) **(1)**		**(1)**

Question Number	Answer	Acceptable answers	Mark
4(aiv)	Substitution: 15 ÷ 6 (1) Evaluation 2.5 (m/s^2) (1)	Allow ecf from 4(aiii) Must be 15 divided by their 4(aiii) ECF allowed from first marking point ie evaluation of 15 divided by their answer from 4(aiii) Award 2 marks for correct answer, no working	**(2)**

Question Number	Answer	Acceptable answers	Mark
4(bi)	100 - 30 (1) 70 (N) (1)	100 + 30 or 130 gains 1 mark Award 2 marks for correct answer, no working	**(2)**

Question Number	Answer	Acceptable answers	Mark
4(bii)	550 (N) (1)	539 (N) allow use of g = 9.8 N/kg 539.55 (N) for use of g = 9.81N/kg Award mark for correct answer, no working	**(1)**

Question Number	Answer	Acceptable answers	Mark
4(c)	An explanation linking (combined) mass is less (1) smaller force required for same acceleration OR more acceleration from same force (1)	ignore references to weight, friction or backwards force ignore “easier to accelerate” as in stem less force needed (to accelerate)	**(2)**

(Total for Question 4 =10 marks)

Question Number	Answer	Acceptable answers	Mark
5(a)(i)	proton(s) (1)	NOT photon	**(1)**

Question Number	Answer	Acceptable answers	Mark
5(a)(ii)	electron(s) (1)		**(1)**

Question Number	Answer	Acceptable answers	Mark
5(b)(i)	evidence of halving activity eg line on graph at 80 (Bq) or two lines at, say, 100 and 50. (1) 8 (days) gains both marks (2)	accept halving in answer space e.g. 160 -> 80 or 80 -> 40 or 160 ÷ 2 = 80 NOT 160 ÷ 40 or 131 ÷ {2 or 4} or 40 ÷ 2 (unless clearly an activity)	**(2)**

Question Number	Answer	Acceptable answers	Mark
5(b)(ii)	idea of two half-lives (1) but, 16 (days) gains both marks (2)	halving of 800 twice, e.g. 400 AND 200 seen Allow ECF from graph eg allow half-life from graph x 2 for both marks	**(2)**

Question Number		Indicative Content	Mark
QWC	***5(c)**	A discussion including some of the following points Advantages - (currently) large resources of **fuel**/ **fuel** (reserves) will last a long time - (Produces) large amount of (electrical) energy/electricity - Does not produce (much/any) carbon dioxide - Does not produce (much/any) sulphur dioxide - Does not add to global warming/climate change - Good safety record (under normal operating conditions) - Only small amount of fuel needed to produce large amount of energy/electricity - Reliable supply/provides continuous supply of electricity (for a long time) - Reduces dependence on foreign supplies of energy - Conserves fossil fuel supplies - (Spent) fuel can be processed (to produce fuel for other reactors) - Provides employment/jobs Disadvantages - Produces nuclear/radioactive {waste/materials} - nuclear/radioactive waste/materials can cause mutations in DNA/cells/people/animals - Non- renewable (energy source) - Difficulties in transporting nuclear/radioactive waste/material - Difficulty in (safely) storing/disposing nuclear waste/material - Nuclear accidents (can) pollute large areas - Nuclear accidents pollute for a long time - Accept named example of accidents eg Fukishima, Chernobyl, 3-mile island - Mining and processing fuel both produce large amounts of carbon dioxide - Expensive to build and/or decommission (nuclear power stations) - Reference to target for terrorist attacks - Produces material which can be used to develop nuclear weapons/by terrorists - Negative public perception OWTTE ignore references such as unsightly, large area needed, noisy as true for most large buildings. Ignore cost of generation or restating stem ie generates electricity or supplies electricity to homes etc.	**(6)**

Level	0	No rewardable content
1	1 - 2	• A limited discussion giving one fact e.g. they give people jobs (in that area) OR they can have accidents like in Japan (after the tsunami). • 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 that states one advantage and one disadvantage OR states more than one advantage OR states more than one disadvantage. e.g. they are a reliable energy source and do not produce any carbon dioxide. OR they do not cause any global warming as they do not produce sulphur dioxide. OR they produce radioactive waste and many people don't want them built. • 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 either advantages or disadvantages AND at least a mention of the other one. e.g. They produce large amounts of electricity and don't produce carbon dioxide but they produce radioactive materials (in the fuel rods). OR They are a reliable source of energy but they can damage large areas if there is an accident and the fuel is non-renewable. • 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(ai)	**B** 1 proton only **(1)**		**(1)**

Question Number	Answer	Acceptable answers	Mark
6(aii)	Same number of protons (as hydrogen) or same atomic number(as hydrogen) **(1)**	Same proton number(as hydrogen) / (they all) have one proton / (their) proton number is 1 accept bottom number is 1/the same NOT same mass / nucleon number NOT same atomic mass ignore references to electrons / neutrons	**(1)**

Question Number	Answer	Acceptable answers	Mark
6(b)(i)	Helium (nucleus has) positive/+ (charge) **(1)** Neutron has no/zero/0 (charge) **(1)**	helium is +(any number >0 and <5) helium has a larger/bigger charge neutron is neutral /neutrally charged/uncharged ignore references to nuclear fusion or masses	**(2)**

Question Number	Answer	Acceptable answers	Mark
6(b)(ii)	An explanation linking (Nuclear fusion/it) occurs in the Sun (1) (The Sun / Fusion provides) energy/heat/light (needed for life on Earth) (1)	 (nuclear fusion/it) is the Sun's energy source OR (it) occurs in stars any valid use of fusion in Sun or stars e.g. • without heat (from Sun) Earth would freeze/have no life • new/heavier elements are made (by fusion/ in stars) eg creates helium	**(2)**

Question Number		Indicative Content	Mark
QWC	***6(c)**	A description including some of the following points Stages involved in a chain reaction: o (neutrons released go on to) collide with other nuclei o causes nuclei to become unstable o (nuclei) split/fission (into daughter nuclei) o releases **more** neutrons o releases energy Control: -Action of the moderator o neutrons need to be slowed down/turned into thermal neutrons o to increase chance of collision o this is achieved with a moderator o carbon/graphite/water/heavy water can be used -Action of control rods o number of neutrons available for collision needs to be controlled o so that reaction proceeds at a steady rate / does not increase o this is achieved by control rods absorbing neutrons o boron / silver/indium/cadmium can be used. Many candidates repeat parts of the question Do NOT give credit for these statements eg neutrons are released during fission	**(6)**

Level	0	No rewardable content
1	1 - 2	• A limited description which gives one relevant fact e.g. (neutrons) cause atoms to split. OR (during fission of uranium atom) neutrons collide with atoms OR (nuclear fission) releases energy OR (3) neutrons are released and two of them are absorbed/taken away • 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 a chain reaction or control OR at least one fact about both. e.g. a neutron collides with (uranium) atoms and causes them to split (into daughter nuclei) OR atoms split releasing **more** neutrons OR an atom splits and releases energy OR (neutrons) cause atoms to split and there are (control) rods to control the neutrons. OR control rods can be lowered into the reactor to absorb neutrons • 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 involving:- • more than two stages of the chain reaction • OR a description involving more than one stage of the chain reaction AND at least one detail about control. • OR a description involving more than one detail about control AND at least one detail about the chain reaction. e.g. Neutrons are slowed down by graphite/water. This makes them more likely to collide with other nuclei. OR neutrons collide with other nuclei and cause them to split releasing more neutrons AND these neutrons hit another nuclei causing it to split OR neutrons collide with other nuclei and cause them to split releasing more neutrons AND there are (control) rods to control the neutrons OR neutrons collide with uranium nuclei causing them to split and release more neutrons. Control rods of boron absorb some of the neutrons. • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately. uses nuclei split and not atoms split. • spelling, punctuation and grammar are used with few errors.

(Total for Question 6 =12 marks)

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