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ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Secondary Education

Additional Science 4463 / Physics 4451

PHY2F Unit Physics 2

Mark Scheme

2009 examination – January series

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting ensures that the mark scheme covers the candidates' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for the standardisation meeting each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting they are required to refer these to the Principal Examiner.

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Question 1

question	answers	extra information	mark
1	**four** lines correct **List A** the nuclei of two atoms joining together the nucleus of an atom splitting into several pieces an atom losing an electron an electric charge moving through a metal **List B** gamma emission electric current ionisation nuclear fission nuclear fusion	allow **1** mark for each correct line if more than 1 line is drawn from a box in List A, mark each line incorrect	4
Total			**4**

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Question 2

question	answers	extra information	mark
2(a)	230 50		1 1
2(b)(i)	has a plastic case **or** does not have a metal case or plastic is an insulator	accept outside is plastic accept cover / handle/ hair dryer is plastic / non-conductor accept is double insulated	1
2(b)(ii)	copper		1
Total			**4**

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Question 3

question	answers	extra information	mark
3(a)(i)	**Y** and **Z**	both required, in either order	1
3(a)(ii)	**X**	and no other	1
3(b)(i)	cause a spark cause a fire / explosion	 accept blow up for explosion do **not** accept this mark if the reason given makes no sense e.g. if fuel reacts with the pipe it causes an explosion	1 1
3(b)(ii)	The charge will flow to earth		1
Total			**5**

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Question 4

question	answers	extra information	mark
4(a)	voltmeter	and no other do **not** accept voltage	1
4(b)(i)	variable resistor		1
4(b)(ii)	0.10 – 0.30	accept 0.1 – 0.3 accept 0.3 – 0.1 accept 0.30 – 0.10	1
4(b)(iii)	3.3 (W)	allow **1** mark for correct data choice allow ***2*** marks for substitution of correct data i.e. 0.30 × 11.0 the following answers gain **2** marks 0.10 / 0.30 / 0.80 / 1.75 allow **1** mark for substitution of incorrect of data incorrectly calculated e.g. 0.20 × 4.0 = 0.6 scores **1** mark	3
4(c)	increases		1
Total			**7**

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Question 5

question	answers	extra information	mark
5(a)(i)	half / ½ / 50%	accept 1 (part) in 2 (parts)	1
5(a)(ii)	(the) food (we eat) is radioactive	accept because of the food (we eat) accept we breathe in radon radon in the air is neutral	1
(b)	higher in village B		1
	by 6 units	allow **1** mark for correctly obtaining a height difference of 180 (m)/ 4 times higher – this refers to height and not radiation levels accept for **3** marks in village A it is 2 units (extra) and in village be it is 8 units (extra) allow **1** mark for a correct radiation calculation based on incorrect height readings	2
Total			**5**

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Question 6

question	answers	extra information	mark
6(a)(i)	10800	allow **1** mark for correct substitution i.e. 900 × 12	2
6(a)(ii)	arrow pointing towards the left	allow anywhere on the diagram or at bottom of the page	1
6(b)	zero velocity is zero	accept 0 / none / nothing accept speed for velocity accept stopped / not moving accept a calculation i.e. 900 × 0 = 0	1 1
Total			**5**

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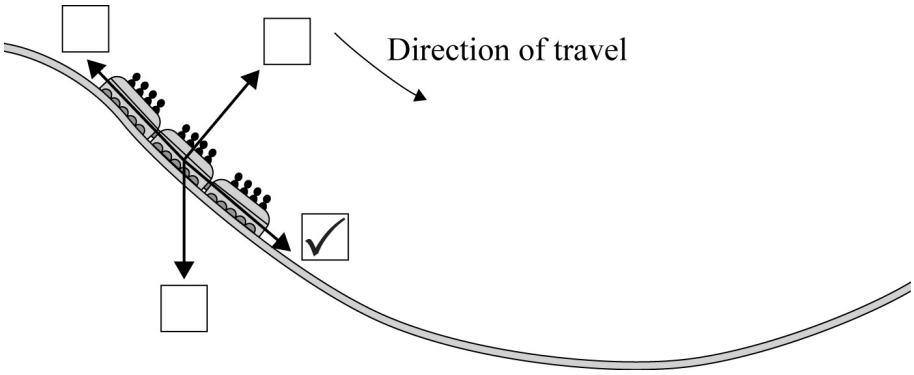
Question 7

question	answers	extra information	mark
7(a)	correct box ticked  		1
7(b)	each passenger has a different mass	accept weight for mass ignore other irrelevant factors about the person e.g. mass and height do **not** accept a list with incorrect factors e.g. mass and position accept passengers started with different (gravitational) potential energy	1
7(c)(i)	30	ignore added units	1
7(c)(ii)	2400	accept their (c)(i) × 80 correctly calculated for both marks allow **1** mark for correct substitution of their (c)(i) and 80 an answer of 800 gains **1** mark only if answer to (c)(i) is not 10	2
Total			**5**

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Question 8

question	answers	extra information	mark
8(a)(i)	4.5	allow **1** mark for correct substitution i.e. 9 ÷ 2	2
8(a)(ii)	m/s^2	accept answer given in (a)(i) if not contradicted here	1
8(a)(iii)	speed		1
8(a)(iv)	straight line from the origin passing through (2s, 9 m/s)	allow **1** mark for straight line from the origin passing through to t = 2 seconds allow **1** mark for an attempt to draw a straight line from the origin passing through (2,9) allow **1** mark for a minimum of 3 points plotted with no line provided if joined up would give correct answer. Points must include(0,0) and (2,9)	2
8(b)(i)	**B** smallest (impact) force on all/ every/ any surfaces	if **A** or **C** given scores **0** marks in total these marks are awarded for comparative answers	1 1 1

Question 8 continues on the next page

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Question 8 continued

8(b)(ii)	(conditions) can be repeated **or** difficult to measure forces with human athletes	 accept answers in terms of variations in human athletes e.g. athletes may have different weights area / size of feet may be different difficult to measure forces athletes run at different speeds accept any answer that states or implies that with humans the conditions needed to repeat tests may not be constant e.g. athletes unable to maintain constant speed during tests (or during repeat tests) do **not** accept the robots are more accurate removes human error is insufficient fair test is insufficient	1
Total			**10**