



General Certificate of Secondary Education

Additional Science 4463 / Physics 4451

PHY2H Unit Physics 2

Standardisation

Mark Scheme

2009 examination – January series

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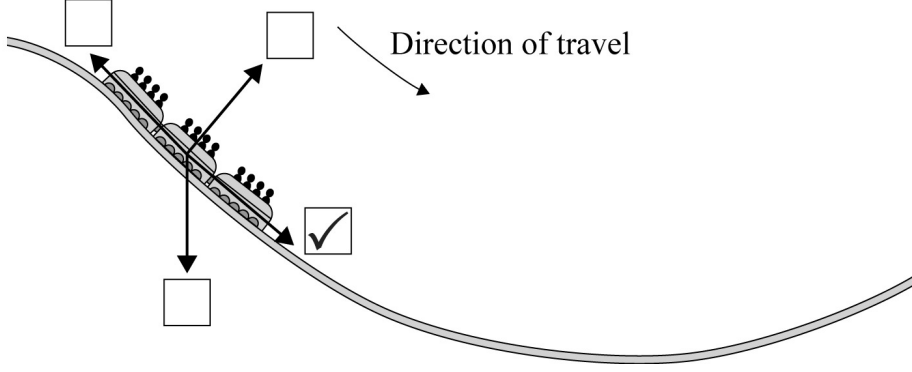
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PHY2H

Question 1

question	answers	extra information	mark
1(a)	correct box ticked 		1
1(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
1(c)(i)	30	ignore added units	1
1(c)(ii)	2400	accept their (c)(i) \times 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

PHY2H

Question 2

question	answers	extra information	mark
2(a)(i)	4.5	allow 1 mark for correct substitution i.e. $9 \div 2$	2
2(a)(ii)	m/s^2	accept answer given in (a)(i) if not contradicted here	1
2(a)(iii)	speed		1
2(a)(iv)	<u>straight</u> line from the <u>origin</u> passing through (2s, 9 m/s)	allow 1 mark for <u>straight</u> 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
2(b)(i)	B smallest (impact) force on <u>all/ every/ any</u> surfaces	if A or C given scores 0 marks in total these marks are awarded for comparative answers	1 1 1

Question 2 continues on the next page

PHY2H**Question 2 continued**

2(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 human error is insufficient fair test is insufficient	1
Total			10

PHY2H

Question 3

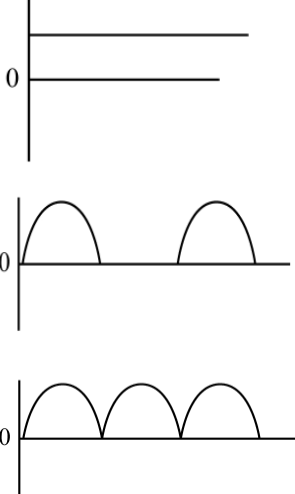
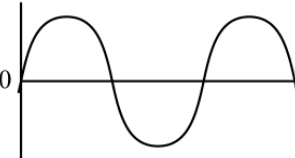
question	answers	extra information	mark
3(a)(i)	30	allow 1 mark for showing correct method i.e. 5×6 or $12 \div 0.4$	2
3(a)(ii)	connected in <u>series</u>	insufficient they are not connected in parallel	1
3(a)(iii)	0.4		1
3(a)(iv)	equally/ evenly	the same is insufficient allow credit for candidates that correctly mention pd across the connecting wires accept (nearly) 2 V (each)	1
3(b)	48 coulombs	do not accept e.c.f. if (a) (iii) = 12 or 5 accept their (a) (iii) \times 120 correctly calculated for both marks allow 1 mark for correct substitution and conversion of time to seconds i.e. charge = 0.4×120 an answer 0.8 scores 1 mark allow 1 mark for their (a) (iii) \times 2 correctly calculated accept C do not accept c do not accept amp seconds	2 1
Total			8

PHY2H**Question 4**

question	answers	extra information	mark
4(a)	soot /ash/ waste gases pass (negatively) charged grid		1
	soot/ash given a <u>negative</u> charge	accept picks up electrons	1
	soot/ash repelled from (negative) grid or soot/ash attracted to (positively charged) metal plates		1
4(b)	charge must increase / build up (producing) a large enough potential difference <u>between</u> dome <u>and</u> (earthed) <u>conductor</u>	accept electrons for charge any reference to positive electrons negates this mark accept voltage for pd any reference to positive earth negates this mark	1 1
Total			5

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Question 5

question	answers	extra information	mark
5(a)	<p>d.c. flows in (only) one direction</p> <p>a.c. <u>changes</u> direction (twice every cycle)</p>	<p>accept a.c. constantly changing direction</p> <p>ignore references to frequency</p> <p>accept answers presented as a clear diagram</p> <p>e.g.</p> <p>dc:</p>  <p>ac:</p> 	<p>1</p> <p>1</p>

Question 5 continues on the next page

PHY2H**Question 5 continued**

5(b)(i)	10	allow 1 mark for correct transformation and substitution i.e. $\frac{2.3}{230}$ or $\frac{2300}{230}$ an answer 0.01 gains 1 mark	2
5(b)(ii)	13A	e.c.f. accept the fuse size that is the next listed value greater than answer (b)(i)	1
Total			5

PHY2H**Question 6**

question	answers	extra information	mark
6(a)	146		1
6(b)	atomic number		1
6(c)(i)	alpha		1
6(c)(ii)	number of protons changes	accept atomic number changes accept <u>loses or gains</u> protons do not accept protons with any other particle e.g. number of protons and neutrons changes incorrect do not accept any reference to mass number	1
Total			4

PHY2H

Question 7

question	answers	extra information	mark
7(a)	<p>any two pairs from:</p> <ul style="list-style-type: none"> • nuclear model mass is concentrated at the centre / nucleus plum pudding model mass is evenly distributed • nuclear model positive charge occupies only a small part of the atom plum pudding model positive charge spread throughout the atom • nuclear model electrons orbit some distance from the centre / nucleus plum pudding electrons embedded in the (mass) of positive (charge) • nuclear model the atom mainly empty space plum pudding model is a 'solid' mass 	<p>to gain credit it must be clear which model is being described do not accept simple descriptions on the diagram without comparison</p> <p>accept the nuclear model has a nucleus/ the plum pudding model does not have a nucleus for 1 mark</p> <p>accept electrons in shells/ orbits provided a valid comparison is made with the plum pudding model do not accept on its own do not accept electrons at edge of plum pudding</p>	<p>4</p> <p>(1)</p> <p>(1)</p> <p>(1)</p> <p>(1)</p> <p>(1)</p> <p>(1)</p> <p>(1)</p>
7(b)	<p>nucleus must be <u>positive</u> to deflect/repel alpha particles</p> <p>nucleus (very) small so few alpha particles deflected backwards</p>	<p>answers in terms of electrons/negative charge causing deflection negates mark answers in terms of reflection negates mark</p> <p>accept most of atom empty space so <u>most</u> pass through</p>	<p>1</p> <p>1</p>

Question 7 continues on the next page

PHY2H**Question 7 continued**

question	answers	extra information	mark
7(c)	many/ 100 000 measurements taken	accept results for measurements accept data valid / reliable	1
	findings could not be explained by plum pudding model	accept a specific finding that could not be explained eg some alpha particles were deflected backwards	1
Total			8