



General Certificate of Secondary Education

**Additional Science 4463 /
Physics 4451**

PHY2H Unit Physics 2

Mark Scheme

2008 examination - January series

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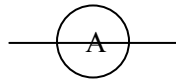
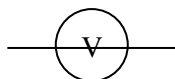
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PHY2H**Question 1**

question	answers	extra information	mark
(a)(i)	ammeter symbol correct and drawn in series	accept 	1
	voltmeter symbol correct and drawn in parallel with the material	do not accept lower case a do not accept 	1
(ii)	adjust / use the variable resistor or change the number of cells	accept change the resistance accept battery for cell accept change the p.d / accept change the voltage accept increase / decrease for change	1
(b)(i)	data is <u>continuous</u> (variable)		1
(ii)	36 (Ω)	correct answer only	1
(iii)	5.4 or their (b)(ii) \times 0.15	allow 1 mark for correct substitution	2
(c)(i)	the thicker the putty the lower the resistance	answer must be comparative accept the converse	1

PHY2H**Question 1 continued**

question	answers	extra information	mark
(ii)	any one from: <ul style="list-style-type: none"> • measuring length incorrectly • measuring current incorrectly • measuring voltage incorrectly • ammeter / voltmeter incorrectly calibrated • thickness of putty not uniform • meter has a zero error 	accept may be different length do not accept different currents do not accept different voltage accept any sensible source of error eg putty at different temperatures do not accept human error without an explanation do not accept pieces of putty not the same unless qualified do not accept amount of putty not same do not accept systematic / random error	1
(iii)	repeat readings	accept check results again accept do experiment again accept do it again	1
total			10

PHY2H**Question 2**

question	answers	extra information	mark
(a)	clothing and seat rub together <u>electrons</u> transfer from seat to driver or <u>electrons</u> transfer from driver to seat	accept friction between clothing and seat accept electrons transfer on its own if first mark scores an answer in terms of <i>rubbing</i> between clothing and seat and <i>charge</i> transfer without mention of electrons gains 1 mark an answer in terms of <i>friction</i> / <i>rubbing</i> and <i>electron transfer</i> without mention of clothing and seat gains 1 mark	1 1
(b)(i)	how wet the air is affects charge (build up) or damp air is a better conductor or damp air has a lower resistance	accept humidity affects charge do not accept fair test or as a control unless explained	1
(ii)	No – it was only the lowest under these conditions or No – there are lots of other materials that were not tested or Yes – the highest value for cotton is smaller than the lowest value for the other materials	accept answer in terms of changing the conditions may change the results do not accept results show that it is <u>always</u> less / smallest	1
total			4

PHY2H**Question 3**

question	answers	extra information	mark
(a)(i)	24(V)		1
(ii)	current always flows in the same direction or current only flows one way		1
(b)(i)	more power / force needed	accept energy transformed faster	1
	work done to lift the scooter uphill	accept it moves against gravity	1
	or work done against gravity	accept energy is transformed to gravitational potential energy	
(ii)	reduces it		1
(c)	375	1 mark for correct substitution 1 mark for an answer = 250 1 mark for an answer = 125	2
(d)	86400	1 mark for correct substitution 1 mark for an answer = 43200 answer 24 gains 1 mark answer 24 Ah gains 2 marks answer 12 Ah gains 1 mark only	2
	coulomb	accept C	1
total			10

PHY2H**Question 4**

question	answers	extra information	mark
(a)(i)	(nuclear) fission	accept fission providing clearly not fusion	1
(ii)	(released) neutrons are absorbed by further (uranium) <u>nuclei</u>	accept hit <u>nuclei</u> for absorbed / hit do not accept atom for nuclei	1
	<u>more neutrons</u> are released (when new nuclei split)	accept for both marks a correctly drawn diagram	1
(iii)	increases by 1 or goes up to 236		1
(b)	any two from: <ul style="list-style-type: none"> • (more) neutrons are absorbed • (chain) reaction slows down / stops • less energy released 	accept there are fewer neutrons accept keeping the (chain) reaction controlled accept heat for energy accept gases (from reactor) are not as hot	2
total			6

PHY2H**Question 5**

question	answers	extra information	mark
(a)(i)	a single force that has the same effect as all the forces combined	accept all the forces added / the sum of the forces / overall force	1
(ii)	constant speed (in a straight line) or constant velocity	do not accept stationary	1
(b)	3	allow 1 mark for correct substitution into transformed equation accept answer 0.003 gains 1 mark answer = 0.75 gains 1 mark	2
	m/s ²		1
(c)	as speed increases air resistance increases	accept drag / friction for air resistance	1
	reducing the resultant force		1
total			7

PHY2H**Question 6**

question	answers	extra information	mark
(a)(i)	velocity includes direction	accept velocity is a vector	1
(ii)	64	allow 1 mark for obtaining values of 16 and 4 from the graph or marking correct area or correct attempt to calculate an area	2
(iii)	any two from: <ul style="list-style-type: none"> • velocity zero from 0 to 4 seconds • increasing in 0.2 s (or very rapidly) to 8 m/s • decreasing to zero over the <u>next 8 seconds</u> 		2
(iv)	momentum before does not equal momentum after or total momentum changes or an external force was applied	ignore reference to energy	1
(b)	to reduce the <u>momentum</u> of the driver		1
	a <u>smaller</u> (constant) force would be needed	do not accept reduces the impact / impulse on the driver	1
total			8