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ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Secondary Education

Additional Science 4463 / Physics 4451

PHY2H Unit Physics 2

Standardisation

Mark Scheme

2008 examination – June 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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PHY2H

Question 1

	answers	extra information	mark
(a)(i)	4 (V)	allow **1** mark for correct substitution	2
(ii)	5 (V) or (9 – their (a)(i)) correctly calculated	e.c.f do **not** allow a negative answer	1
(b)(i)	thermistor	c.a.o	1
(ii)	0°C to 20°C		1
total			5

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Question 2

	answers	extra information	mark
(a)(i)	protons neutrons	answers may be in either order	1 1
(ii)	86		1
(iii)	two **fewer** protons and two **fewer** neutrons **or** 84 protons 134 neutrons	do **not** accept two fewer protons and neutrons do **not** accept 218 protons and neutrons	1
(b)(i)	0.4	accept $\frac{2}{5}$ / accept 40% for 2 marks allow **1** mark for correct totalling = 1.8 allow **1** mark for a clearly correct method with a clearly incorrect total	2
(ii)	any **one** from: • nuclear weapon testing • nuclear power (stations) • nuclear accidents • medical	 do **not** accept nuclear accept nuclear/ radioactive waste accept X-rays	1
(c)(i)	2	accept 2:1 accept twice as big ignore units	1

Question 2 continues on the next page

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Question 2 continued

	answers	extra information	mark
(ii)	No with a reasonable reason explained only going for two weeks so **or** even staying for a year		1
	total exposure well under lowest limit for causing cancer **or**	**1** mark is for a time frame **1** mark is for correctly relating to a dose	1
	Yes with a reasonable reason explained all levels of radiation are (potentially) hazardous (1) harm caused by lower doses may not have been recorded (1) **or** evidence may not be complete **or** insufficient research into effect of small doses	accept low doses could still cause cancer accept all levels affect you do **not** accept radiation dose is high(er) do **not** accept level of background radiation is higher in Germany	
total			10

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Question 3

	answers	extra information	mark
(a)(i)	as one goes up so does the other **or** (directly) proportional	 accept change by the same ratio	1
(ii)	steeper straight line through the origin	judge by eye	1
(iii)	Yes with reason eg data would have been checked / repeated **or** No with reason eg does not apply to all conditions / cars / drivers **or** are only average values **or** Maybe with a suitable reason eg cannot tell due to insufficient information	 accept produced by a reliable/ official/ government source do **not** accept it needs to be reliable	1
(b)(i)	stopping distance = thinking distance + braking distance		1

(ii)	any **two** from: • smooth road / loose surface • rain / snow / ice • badly maintained brakes • worn tyres • downhill slope/gradient • heavily loaded car	factors must be to do with increasing braking distance accept wet road/ petrol spills do **not** accept condition of road unless suitably qualified accept worn brakes accept bad/ worn/ rusty brakes do **not** accept old brakes accept bald tyres accept lack of grip on tyres do **not** accept old tyres	2
total			6

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Question 4

	answers	extra information	mark
(a)	alternates between positive and negative	accept switches accept (constantly) changes accept goes up and down	1 1
(b)	potential difference between the neutral and earth (terminal) **or** potential of the neutral terminal with respect to earth	accept voltage for p.d	1
(c)(i)	0.025 (s)		1
(ii)	40 (Hz)	accept 1 ÷ their (a)(i)	1
total			5

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Question 5

	answers	extra information	mark
(a)	4	allow **1** mark for extracting correct information 12	2
	m/s^2	ignore negative sign	1
(b)	9 (s)		1
total			4

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Question 6

	answers	extra information	mark
(a)(i)	droplets will repel each other even coating of glue/ sand (on the paper)	accept droplets will spread out	1 1
(ii)	sand (becomes) positively charged repelled away from positive / lower plate	accept attract <u>positively</u> charged sand allow attracted to the (negatively) charged glue/ paper opposite charges attract does not score unless qualified	1 1
(b)	0.002 coulombs	allow **1** mark for correct transformation **and** substitution accept C do **not** accept c accept 2mC or 2 milli coulombs for **3** marks	2 1
total			7

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Question 7

	answers	extra information	mark
(a)	4 (m/s)	**1** mark for correct transformation of either equation **1** mark for correct substitution with or without transformation **1** mark for correct use of 0.6N max score of **2** if answer is incorrect	3
(b)	**greater** change in momentum **or** **greater** mass of air (each second) **or** increase in velocity of air	accept speed for velocity	1
	force upwards increased **or** force up greater than force down	lift force is increased do **not** accept upthrust accept weight for force down	1
(c)	• increase the time **to stop**		1
	• decrease rate of change in momentum or same momentum change	accept reduced deceleration/ acceleration	1
	• reducing the force on the toy	do **not** accept answers in terms of the impact/ force being absorbed do **not** accept answers in terms of energy transfer do **not** credit impact is reduced	1
total			8