Version : 1:5 07/07/2008

ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Secondary Education

Physics 4451

PHY1H Unit Physics 1

Mark Scheme

2008 examination – June series

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PHY1H

Question 1

question	answers	extra information	mark
(a)	any **three** from: • (air) particles / molecules / atoms gain energy • (air) particles / molecules / atoms move <u>faster</u> • (air) particles / molecules / atoms move apart • air expands • air becomes less dense • warm / hot air rises	ignore reference to skewer do **not** accept move more do **not** accept move with a bigger amplitude / vibrate more do **not** accept particles expand do **not** accept heat rises if credit is to be given for answers in terms of particles it must be clear they are air particles **not** gas particles	3
(b)	conduction	accept conductor	1

Question 1 continues on the next page

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Question 1 continued

question	answers	extra information	mark
(c)	any **one** from: • temperature of the potato • temperature of the surroundings / room / surface / atmosphere • size / mass / weight / volume of the potato • shape of the potato • surface area of the potato • nature of the surface of the potato • type of surface it is placed on • in a draught • type of potato • whether the skewers are left in or taken out	 do **not** accept heat for temperature accept how hot the potato / room is potato cut open insufficient	1
(d)	(foil) reflects heat (back towards potato) **or** (foil) is a poor emitter (of heat radiation)	reduces heat loss is insufficient do **not** accept reflects hot air accept reduces / stops heat loss by <u>radiation</u> do **not** accept heat is trapped	1
total			6

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Question 2

question	answers	extra information	mark
(a)(i)	soil		1
(a)(ii)	type of surface is a categoric (variable)	accept surface is not a continuous (variable) do **not** accept data is discrete	1
(a)(iii)		mark is for a feasible reason linked to either the skier or golfer accept radiation for UV	1
	skier		
	exposed to high(er) level reflected UV **or** less UV absorbed by the atmosphere	accept snow is a good reflector of UV do **not** accept snow reflects UV accept snow is a poor absorber of UV do **not** accept snow absorbs UV	
	golfer		
	out when Sun's intensity is highest **or** larger area of skin / body exposed	accept when Sun is stronger / hotter accept golfer is outside for longer	
(a)(iv)	any **one** from: • (skin) cancer • premature skin ageing	 accept kills / damages cells accept a correct description do **not** accept suntan accept burn (it)	1

Question 2 continues on the next page

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Question 2 continued

question	answers	extra information	mark
(b)(i)	level of UV **transmitted** is very low	accept energy / rays for UV	1
		accept answers in terms of absorbed / blocked	
	for all wavelengths shown / up to 400 nm	only scores if first mark scores	1
		accept an answer in terms of cannot support 95% claim as measurements cannot be taken from the graph **or** an attempted calculation	
(b)(ii)	glass transmitted most / a lot of UV	accept energy / rays for UV do **not** accept light for UV do **not** accept all UV	1
		accept results (almost) same as no absorbing material	
	or		
	glass absorbed little UV	accept blocks / stops for absorbed do **not** accept no UV	
(c)(i)	Publicity and education ….		1
(c)(ii)	implication of financial gain	accept to promote the product	1
		sunglasses cost a lot of money is insufficient	
total			9

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Question 3

question	answers	extra information	mark
(a)	Hubble telescope is above the (Earth's) atmosphere	accept no / little atmosphere	1
	atmosphere distorts <u>image</u> **or** atmosphere scatters <u>light</u>	do **not** accept light / waves distorted accept picture for image accept no clouds (to block light) accept no light pollution answers in terms of closer to stars neutral	1
(b)	to check it works (correctly) **or** less risk of a fault (once in space)		1
	too far away (for astronauts) to travel to / to fix	accept its difficult to send astronauts to repair / maintain it dangerous / expensive is insufficient	1
(c)	to test the design works	accept idea of fault finding or modifying the design	1
(d)	(visible) light can pass through the atmosphere		1
	X-rays are absorbed by the atmosphere **or** X-rays cannot pass through the atmosphere		1
total			7

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Question 4

question	answers	extra information	mark
(a)(i)	replaced faster than it is used	accept replaced as quick as it is used accept will never run out do **not** accept can be used again	1
(a)(ii)	any **two** from: • wind • waves • tides • fall of water • biomass • geothermal	**two** sources required for the mark do **not** accept water / oceans accept OTEC accept hydroelectric accept a named biomass / biofuel eg wood	1
(b)(i)	any **two** from: • increases from 20 ^{o} to 30 ^{o} • reaches maximum value at 30 ^{o} • then decreases from 30 ^{o} • same pattern for each month	accept peaks at 30 ^{o} for **both** marks accept goes up then down for **1** mark ignore it's always the lowest at 50^{o}	2
(b)(ii)	864	an answer of 108 gains **2** marks allow **1** mark for using 720 value only from table allow **2** marks for answers 852, 816, 768, 825 allow **1** mark for answers 106.5, 102, 96, 103 (.125)	3

Question 4 continues on the next page

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Question 4 continued

question	answers	extra information	mark
(c)	the solar cells will not meet demand at all times of the year / day **or** to make up the shortfall in energy required at certain times of the year **or** to be able to sell surplus electricity (to the National Grid)	accept to maintain a constant supply of electricity / energy accept to provide energy at night do **not** accept because it's cloudy on it's own	1
total			8

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Question 5

question	answers	extra information	mark
(a)(i)	£190	nb mention idea of cost per J in £ will come to an approx figure full credit given allow **1** mark for showing that the energy loss through the roof is ¼ of the total energy loss ie 150 / 600	2
(a)(ii)	£142.50	allow ecf 50 % of their (a)(i) × 1.5 ie their (a)(i) × 0.75	1
(b)	transferred to surroundings / atmosphere **or** becomes spread out		1
total			4

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Question 6

question	answers	extra information	mark
(a)(i)	3 fewer neutrons	accept fewer neutrons accept different number of neutrons do **not** accept different number of electrons	1
(a)(ii)	electron from the nucleus	both points needed	1
(a)(iii)	32 (days)	allow **1** mark for clearly obtaining 4 half-lives	2
(a)(iv)	has a **<u>much</u>** longer half-life little decay happened / still in the atmosphere	accept converse answers in terms of iodine-131 accept it has not reached one half-life yet accept it is still decaying	1 1
(b)	any **two** from: • some children developed TC before 1986 • some children (after 1986) that developed TC did not live in highly contaminated areas • the (large) increase can (only) be explained by (a large increase in) radiation as caused by Chernobyl • all areas would be contaminated (and raise the risk of TC) • no evidence (of effect) of other variables	marks are for reasons	2
(c)	People not exposed (to the radiation but who were otherwise similar)	accept people not affected (by the radiation)	1

Question 6 continues on the next page

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Question 6 continued

question	answers	extra information	mark
(d)		answers should be in terms of nuclear power and **not** why we should not use other fuels	2
	any **two** from:		
	• produce no pollutant / harmful gases	accept named gas or greenhouse gases do **not** accept no pollution	
	• produces a lot of energy for a small mass (of fuel) **or** is a concentrated energy source	accept amount for mass accept high energy density	
	• it is reliable **or** it can generate all of the time		
	• produces only a small volume of (solid) waste	accept amount for volume	
total			11