



General Certificate of Secondary Education

Science B 4462 / Physics 4451

PHY1H Unit Physics 1

Mark Scheme

2008 examination - January series

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PHY1H

Question 1

question	answers	extra information	mark
(a)(i)	any one from: <ul style="list-style-type: none"> • coal • oil • (natural) gas 	do not accept fossil fuels accept diesel accept biofuel or a named biofuel eg wood / straw accept household / industrial waste owtte	1
(ii)	0.3	accept 30% if 2 marks not awarded then: allow 1 mark for 30 (without%) allow 1 mark for 0.3 with a unit or % allow 1 mark for identification of energy input and output eg 20 sq input and 6 sq output or 4 sq input and 1.2 sq output or 40 sq input and 12 sq output even if subsequent working incorrect allow 1 mark for correct expression of 1.2 over 4 or 12 over 40 or 6 over 20 (squares)	2
(iii)	(nuclear) fission	accept fission provided it is not fusion	1

Question 1 continues on the next page

PHY1H

Question 1 continued

question	answers	extra information	mark
(b)(i)	small proportion of <u>energy</u> / <u>power</u> is wasted or transfers most / more / a lot of <u>energy</u> / <u>power</u> usefully	accept little / less <u>energy</u> / <u>power</u> / <u>heat</u> is wasted do not accept it wastes no <u>energy</u> / <u>power</u>	1
(ii)	it decreases the current / uses low current or it increases the voltage / potential difference or uses high voltage / potential difference smaller the current the smaller the energy loss	accept pd for potential difference accept power / heat for energy loss	1 1
(c)(i)	as a control	accept to make a comparison do not accept fair test on its own	1
(c)(ii)	so people know how much data the link was based on or people can <u>judge</u> the significance / reliability of the link	accept idea that larger numbers are better do not accept significance / reliability on its own ignore reference to accuracy	1

Question 1 continues on the next page

PHY1H**Question 1 continued**

question	answers	extra information	mark
(iii)	other possible factors may be responsible or have not been investigated named factor eg environment / genetic		1 1
(iv)	first box ticked plus reason or second box plus reason	acceptable reason such as so people know there may be a risk as soon as possible / so that other scientists can use findings acceptable reason such as no point to worry / confuse / panic people (until the research has been confirmed) accept idea that it may lead to wrong advice do not accept in case they are wrong	1
total			12

PHY1H**Question 2**

question	answers	extra information	mark
(a)	£15	allow 1 mark for use of 125 (kWh) allow 1 mark for an answer 1500 allow both marks for 1500 pence / p allow 1 mark for correct calculation of annual cost for either freezer (£27 and £42)	2
(b)	£45 or their (a) \times 3	allow 1 mark for correct use of 3 allow 1 mark for $12 - 9 = 3$	2

Question 2 continues on the next page

PHY1H

Question 2 continued

question	answers	extra information	mark
(c)	<p>any two from:</p> <p><u>yes plus</u> explanation</p> <ul style="list-style-type: none"> less electricity / energy needed / used less (fossil) fuels burned less polluting gases emitted <p>or</p> <p><u>no plus</u> explanation</p> <ul style="list-style-type: none"> old freezer must be disposed of hazardous chemicals inside freezer (lot of) energy used in producing new freezer 	<p>the marks are for the explanation</p> <p>accept less energy wasted</p> <p>accept a named fossil fuel do not accept conserving (fossil) fuels</p> <p>accept a named polluting gas / greenhouse gases / carbon emissions / reduce global warming accept an answer in terms of nuclear fuel eg less nuclear fuel required (1) less nuclear waste (1)</p> <p>accept CFC gases</p>	2
total			6

PHY1H**Question 3**

question	answers	extra information	mark
(a)(i)	makes it warmer / raises the temperature	accept produces convection (current) accept makes it less dense	1
(ii)	reduced or slows down		1
(b)(i)	electrical energy (to run the pump) must be paid for	accept electricity for electrical energy accept electricity is needed for the pump accept it uses electricity accept because of the pump	1
(ii)	more useful (heat) energy is transferred into the house than the energy used to operate the pump or reduced cost of heating the house is greater than the cost of running the (electrical) pump or costs little to run compared to the savings made	accept for 1 mark reduces energy bills or reduced fuel costs / heating costs owtte do not accept it's cheap	2
total			5

PHY1H**Question 4**

question	answers	extra information	mark
(a)(i)	beta and gamma	both answers required accept correct symbols	1
(ii)	alpha and beta	both answers required accept correct symbols	1
(iii)	gamma	accept correct symbol	1
(b)	nothing (you do to a radioactive substance / source) changes the count rate / activity / rate of decay / radiation (emitted) or (reducing) the temperature does not change the activity / count rate / rate of decay / radiation (emitted)	accept it = radiation emitted	1
(c)(i)	has <u>one</u> more neutron	correct answer only	1
(ii)	14 days	no tolerance allow 1 mark for showing a correct method on the graph	2

Question 4 continues on the next page

PHY1H**Question 4 continued**

question	answers	extra information	mark
(iii)	any two from: <ul style="list-style-type: none">• beta particles / radiation can be detected externally• beta particles / radiation can pass out of / through the plant• long half-life gives time for phosphorus to move through the plant / be detected / get results• phosphorus-32 is chemically identical to phosphorus-31• phosphorus-32 is used in the same way by a plant as phosphorus-31		2
total			9

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Question 5

question	answers	extra information	mark
(a) E	C or 0.18 mm		1
(b) E	0.6 m	allow 1 mark for correct transformation and substitution allow 1 mark for changing frequency to Hz answer 600 gains 1 mark	2
(c) E	creates an alternating current with the same frequency as the radio wave or it gets hotter	accept 'ac' for alternating current accept alternating voltage accept signal for radio wave	1 1
(d) E	X-rays cannot penetrate the atmosphere or X-rays are absorbed (by the atmosphere)	accept atmosphere stops X-rays do not accept atmosphere in the way before reaching Earth ignore explanations	1
total			6

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Question 6

question	answers	extra information	mark
(a) E	big bang theory – universe started at one point (then expanded)		1
	steady state theory – universe has no origin / has always existed	accept an answer in terms of mass eg steady state theory mass is created	1
(b)(i) E	wavelength (of light) increases	accept answers in terms of frequency decrease accept wavelength stretched but not wave stretched	1
	or wavelength / light moves to red end of spectrum	do not accept galaxy moves to the red end of the spectrum do not accept light becomes red / redder	
(ii) E	red-shift is evidence / supports idea of expanding universe	accept prove for support	1
	both theories use the idea / accept / explain why the universe is expanding		1
(c) E	to find evidence to support one or both theories	accept prove for support accept to gain more knowledge about the universe	1
	or to find evidence to disprove one or both theories		

Question 6 continues on the next page

PHY1H**Question 6 continued**

question	answers	extra information	mark
(d) E	answer involves (religious) belief or no / insufficient evidence	accept it cannot be tested	1
total			7