



Mark Scheme (Results)

November 2011

GCSE Physics
5PH1H/01

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Question Number	Answer	Acceptable answers	Mark
1(a)	A		(1)

Question Number	Answer	Acceptable answers	Mark
1(b)(i)	(number of waves =) 7 (1) (distance between floats =) 7×0.8 (1)	Accept 5.6 (m) give full marks for correct answer, no working e.c.f from number of waves if clear 6.4 (m) for 1 mark	(2)

Question Number	Answer	Acceptable answers	Mark
1(b)(ii)	C		(1)

Question Number	Answer	Acceptable answers	Mark
1(b)(iii)	Any one from the following points <ul style="list-style-type: none"> • size (1) • mass (1) • speed (1) • direction of travel (1) 	small light slow fast momentum how far away weight power ke	(1)

Question Number	Answer	Acceptable answers	Mark
1(c)	<ul style="list-style-type: none"> • change of direction (1) • towards the normal (1) • λ shorter than in deep water (1) 	Ignore reflection of EITHER ray or wave must not reach normal if ray and wave contradict then no mark λ shorter for all complete waves in shallow water, at least 2λ drawn, judge by eye	(3)

Question Number	Answer	Acceptable answers	Mark
2(a)	C		(1)

Question Number	Answer	Acceptable answers	Mark
2(b)(i)	Any two from the following points <ul style="list-style-type: none"> • cover box with transparent material (1) • use of reflector (1) • method to increase energy supplied (1) • method to reduce energy loss (1) • paint (box) black/dull/matt (1) 	<p>use glass box</p> <p>mirror / foil</p> <p>{angle to sun} / {warmer place}/lens</p> <p>use insulating box / wooden box / lagging</p> <p>Ignore answers to do with hosepipe</p>	(2)

Question Number	Answer	Acceptable answers	Mark
2(b)(ii)	An explanation linking the following points <ul style="list-style-type: none"> • pipe / water absorbs heat (1) • pipe radiates heat (1) • radiation (rate) increases with temperature(1) • (at constant temperature) absorption <u>rate</u> = radiation <u>rate</u> (1) 	<p>accept takes in for absorbs</p> <p>accept emits for radiates</p> <p>If no other marks given accept output = input or water boils for 1 mark</p>	(3)

Question Number	Answer	Acceptable answers	Mark
2(c)	4000 (1) (4000)/200 (1)	20 (W) give full marks for correct answer, no working accept for 1 mark 4000 10000/200 6000/200 16000/200	(2)

Question Number	Answer	Acceptable answers	Mark
3(a)(i)	D		(1)

Question Number	Answer	Acceptable answers	Mark
3(a)(ii)	B		(1)

Question Number	Answer	Acceptable answers	Mark
3(b)	substitution: (1) $3.0 \times 10^8 = 1.5 \times 10^{10} \times \lambda$ transposition: (1) $\lambda = c/f$ or $(\lambda =) \frac{3.0 \times 10^8}{1.5 \times 10^{10}}$ evaluation: (1) 0.02 (m)	Give full marks for correct answer, no working Allow substitution and transposition in either order if clear Ignore powers of 10 until evaluation e.g. 3/1.5 2 marks $\lambda = f/c$ (0) then 1.5/3 1 mark bald 1.5/3 0 mark 2×10^{-2} (m) ignore formula triangle	(3)

Question Number	Answer	Acceptable answers	Mark
3(c)	An explanation linking two of the following points <ul style="list-style-type: none"> wavelength / frequency (1) are different (1) OR <ul style="list-style-type: none"> toaster on for longer (1) (so) much more energy (1) 	wavelength for toaster different from wavelength for remote. Scores 2 power / intensity of toaster greater than for remote for 2 marks	(2)

Question Number	Answer	Acceptable answers	Mark
3(d)	An explanation linking three of the following points <ul style="list-style-type: none">• gammas change cell growth / eq (1)• (so can) cause uncontrolled growth (1)• (but also can) be focussed to (kill cancer cells)(1)• without damaging other cells	kill / damage cells mutate/damage DNA concentrated / aimed at tumour / penetrate	(3)

Question Number	Answer	Acceptable answers	Mark
4(a)	C		(1)

Question Number	Answer	Acceptable answers	Mark
4(b)	5 (cm)	5.0, +5, -5, ± 5 ignore unit	(1)

Question Number	Answer	Acceptable answers	Mark
4(c)	<ul style="list-style-type: none"> A difference in f or λ (however described) (1) <p>This difference correctly qualified by one of</p> <ul style="list-style-type: none"> Relationship to each other (1) Relationship to audible sound (1) Frequency or wavelength data (1) 	<p>Accept pitch for frequency</p> <p>IS has longer λ than audible (1)</p> <p>US > 20kHz (1)</p> <p>IS has lower f (than US) (2 marks)</p> <p>information shown on a labelled sketch of the sound spectrum</p>	(2)

Question Number	Answer	Acceptable answers	Mark
4(d)	<p>An explanation linking the following points</p> <ul style="list-style-type: none"> corks as plates / water as mantle (1) water heated (underneath) (1) convection currents mentioned(1) 	<p>labels on diagram</p> <p>corks as crust / water as magma /lava</p> <p>reference to heat in the Earth</p> <p>arrow on diagram</p>	(3)

Question Number	Answer	Acceptable answers	Mark
4(e)	<p>An evaluation linking the following points</p> <ul style="list-style-type: none"> • (a) statement about either distance travelled or arrival times of any two waves (1) • (b) statement comparing any pair of S-P times (1) • correct comparison between (a) and (b) leading to a conclusion (1) 	<p>quantitative or qualitative</p> <p>quantitative or qualitative</p> <p>quantitative</p> <p>e.g. #1</p> <p>station M is twice as far as station L, the S-P time is double, suggestion is OK. 3 marks</p> <p>e.g. #2</p> <p>station N is (about) $3\frac{1}{2}$ times as far as station L, but S-P time is $3\frac{1}{3}$ times, so maybe not. 3 marks</p>	(3)

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Question Number	Answer	Acceptable answers	Mark
5(a)(i)	<p>A description including three of the following points</p> <ul style="list-style-type: none"> • {gravitational (potential) energy / GPE} of gas and dust (1) • (GPE) changes to kinetic energy (1) • (ke) changes to thermal/heat/light (1) • (hot enough to release) nuclear energy (1) 	<p>Accept description of the process</p> <p>{gas and dust / it / nebula} pulled together by gravity</p> <p>(particles) move faster</p> <p>core becomes hot</p> <p>(hot enough for) nuclear fusion/reaction</p> <p>accept description shown as chain gpe → ke → thermal → nuclear</p>	(3)

Question Number	Answer	Acceptable answers	Mark
5(a)(ii)	<p>A description including the following points</p> <ul style="list-style-type: none"> • reference to stars of different sizes (1) • {Sun/small/medium} becoming {white / black} dwarf (1) • more massive becoming a neutron star / black hole (1) 	<p>Sun and more massive/bigger star</p> <p>red giant / planetary nebula</p> <p>(red) supergiant / supernova</p>	(3)

Question Number		Indicative content	Mark
QWC	*5(b)	<p>A discussion linking some of the following points</p> <p>red shift</p> <ul style="list-style-type: none"> • linked to movement • both theories have expanding Universe • redshift support both <p>CMB</p> <ul style="list-style-type: none"> • linked to ageing Universe • Big Bang ageing , SS not • CMB supports Big Bang only • because only Big Bang has single origin 	(6)
Level	0	no rewardable material	
1	1-2	<ul style="list-style-type: none"> • a limited discussion stating both pieces of evidence or limited detail about either red shift or CMB e.g. change in wavelength /red shift shows galaxies / stars moving away • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy 	
2	3-4	<ul style="list-style-type: none"> • a simple discussion including both pieces of evidence and simple detail about either red shift or CMB e.g. a change in wavelength shows galaxies / stars moving away • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy 	
3	5 - 6	<ul style="list-style-type: none"> • a detailed discussion describing both pieces of evidence and drawing a conclusion e.g. a change in wavelength shows galaxies / stars moving away and CMB shows Universe has been changing with time and redshift supports both theories, CMB supports only Big Bang because Steady State has constant Universe • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors 	

Question Number	Answer	Acceptable answers	Mark
6(a)	alternating current can take positive and negative values RA (1)	a.c. above and below zero /the line a.c. goes one way and then the other RA	(1)

Question Number	Answer	Acceptable answers	Mark
6(b)(i)	substitution: (1) $\frac{55}{V} = \frac{200}{3000}$ transposition: (1) $V = \frac{3000}{200} \times 55$ evaluation / comment: (1) 825(V) / which is about 800 (V)	Allow substitution and transposition in either order if clear $\frac{55}{825} = \frac{200}{3000}$ scores 3 $\frac{55}{800} = \frac{200}{3000}$ scores 1 Correct comparison of ratios scores 3 (15 and 14.5, 0.067 and 0.069)	(3)

Question Number	Answer	Acceptable answers	Mark
6(b)(ii)	<ul style="list-style-type: none"> power input = power output (1) $I = 0.033$ (A) (1) 	power input = 55×0.5 (W) power input = 27.5 (W) $I = 0.034$ (A) Give full marks for correct answer no working	(2)

Question Number	Indicative content	Mark
QWC	<p>*6(c)</p> <p>An explanation linking some of the following points</p> <p>Basic ideas</p> <ul style="list-style-type: none"> • transmission lines have resistance • the current warms the transmission wires • energy is wasted as heat • transformers change voltage and/or current • R increase the voltage / RA for S • R decrease the current / RA for S <p>Linked ideas</p> <ul style="list-style-type: none"> • the long transmission lines have high resistance • power depends on both current and voltage • power = current \times voltage ($P = I \times V$) • at high voltage, the same power needs less current • correct mention of turns ratio related to voltage change • a smaller current in a wire produces less heat • high voltage transmission saves more energy than is lost in the transformers 	(6)
Level	0	no rewardable material
1	1-2	<ul style="list-style-type: none"> • a limited explanation including some relevant details e.g. R steps up the voltage, S steps it down • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy
2	3-4	<ul style="list-style-type: none"> • a simple explanation relating operation of transformers to heat loss in transmission lines and/or transformers e.g. R steps up the voltage so that less heat is lost in transmission lines or high voltage transmission saves more energy than is lost in the transformers • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy
3	5 - 6	<ul style="list-style-type: none"> • a detailed explanation relating operation of transformers to current and energy losses in transmission lines and/or transformers e.g. R steps up the voltage so that, for the same power, I is less meaning less heat is lost in transmission lines • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors

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