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Mark Scheme (Results)

November 2011

GCSE Physics
5PH1H/01

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5PH1H/01 Mark Scheme
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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 • 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)	• 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 2 λ 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 • 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)	use glass box mirror / foil {angle to sun} / {warmer place}/lens use insulating box / wooden box / lagging Ignore answers to do with hosepipe	**(2)**

Question Number	Answer	Acceptable answers	Mark
2(b)(ii)	An explanation linking the following points • 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)	accept takes in for absorbs accept emits for radiates If no other marks given accept output = input or water boils for 1 mark	**(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 • wavelength / frequency (1) • are different (1) **OR** • 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 • 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)	• A difference in f or λ (however described) (1) This difference correctly qualified by one of • Relationship to each other (1) • Relationship to audible sound (1) • Frequency or wavelength data (1)	Accept pitch for frequency IS has longer λ than audible (1) US>20kHz (1) IS has lower f (than US) (2 marks) information shown on a labelled sketch of the sound spectrum	**(2)**

Question Number	Answer	Acceptable answers	Mark
4(d)	An explanation linking the following points • corks as plates / water as mantle (1) • water heated (underneath) (1) • convection currents mentioned(1)	labels on diagram corks as crust / water as magma /lava reference to heat in the Earth arrow on diagram	**(3)**

Question Number	Answer	Acceptable answers	Mark
4(e)	An evaluation linking the following points • (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)	quantitative or qualitative quantitative or qualitative quantitative e.g. #1 station M is twice as far as station L, the S-P time is double, suggestion is OK. 3 marks e.g. #2 station N is (about) 3½ times as far as station L, but S-P time is 3⅓ times, so maybe not. 3 marks	**(3)**

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Question Number	Answer	Acceptable answers	Mark
5(a)(i)	A description including **three** of the following points • {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)	Accept description of the process {gas and dust / it / nebula} pulled together by gravity (particles) move faster core becomes hot (hot enough for) nuclear fusion/reaction accept description shown as chain gpe → ke → thermal → nuclear	**(3)**

Question Number	Answer	Acceptable answers	Mark
5(a)(ii)	A description including the following points • reference to stars of different sizes (1) • {Sun/small/medium} becoming {white / black} dwarf (1) • more massive becoming a neutron star / black hole (1)	Sun and more massive/bigger star red giant / planetary nebula (red) supergiant / supernova	**(3)**

Question Number		Indicative content	Mark
QWC	***5(b)**	A discussion linking some of the following points red shift • linked to movement • both theories have expanding Universe • redshift support both CMB • 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**	• 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**	• 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**	• 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 $\frac{55}{\mathbf{825}} = \frac{200}{3000}$ scores 3 $\frac{55}{\mathbf{800}} = \frac{200}{3000}$ 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)	• power input = power output (1) • *I* = 0.033 (A) (1)	power input = 55 x 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	***6(c)**	An explanation linking some of the following points **Basic ideas** • 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 **Linked ideas** • the long transmission lines have high resistance • power depends on both current and voltage • power = current × 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**	• 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**	• 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**	• 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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