

Mark Scheme (Results)

March 2012

GCSE Physics
5PH1H/01

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**5PH1H/01 Mark Scheme
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Question Number	Answer	Acceptable answers	Mark
1(a)	D		(1)

Question Number	Answer	Acceptable answers	Mark
1(b)	substitution (1) 0.5×6.0 evaluation (1) 3 unit (1) W / watts	give (2) for correct answer, no working 0.003 kW (3) 3 kW (2) J/s, VA Accept kW for unit with incorrect or no numerical answer	(3)

Question Number	Answer	Acceptable answers	Mark
1(c)(i)	150 (J)	200 – 50 (J) 200 minus 50 (J)	(1)

Question Number	Answer	Acceptable answers	Mark
1(c)(ii)	substitution (1) $50 \div 200$ (x 100%) evaluation (1) 25 (%)	0.25, 1/4 give (2) marks for correct answer, no working	(2)

Question Number	Answer	Acceptable answers	Mark
1(d)	(black) is a good { (thermal) emitter / radiator }	to keep the motor cool / eq ignore absorbing / conducting / insulating heat	(1)

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

Question Number	Answer	Acceptable answers	Mark
2(b)(i)	(sudden) decrease in speed	refraction / change direction	(1)

Question Number	Answer	Acceptable answers	Mark
2(b)(ii)	a description linking <ul style="list-style-type: none"> • the (speed) increases (1) with any one of <ul style="list-style-type: none"> • as depth increases (1) • linearly (1) • from 11.8 to 14 (km/s) (1) • by 2.2 	accelerates travels further into the mantle / material becomes more dense steadily / evenly from >11 and < 12 to >13 and <14 2 to 3	(2)

Question Number	Answer	Acceptable answers	Mark
2(b)(iii)	substitution (1) $12 = 5800 \div t$ transposition (1) $t = 5800 \div 12$ evaluation (1) 480 (s)	Substitution and transposition can be in either order 8 minutes A value which correctly rounds to 480 give full marks for correct answer, no working	(3)

Question Number	Answer	Acceptable answers	Mark
2(c)	<p>an explanation linking</p> <ul style="list-style-type: none"> • impossible to predict earthquakes (1) <p>with one of</p> <ul style="list-style-type: none"> • (because) no pattern to {results/forces} (1) • (because) not able to predict force needed to make block start sliding (1) • the movement of (tectonic) plates is similar to the movement of the block (over the rough surface) (1) 	<p>difficult to predict</p> <p>results {(very) different/not (very) close/not concordant}</p> <p>as force needed for plates to start sliding is unpredictable</p> <p>(ignore references to strength of earthquake)</p>	(2)

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

Question Number	Answer	Acceptable answers	Mark
3(b)(i)	a description including the following <ul style="list-style-type: none"> • direct current (the flow of charge) is only in one direction (1) • alternating current (the flow of charge periodically) {changes / reverses} {direction / eq} (1) 	d.c stays {positive/negative} only goes positive and negative	(2)

Question Number	Answer	Acceptable answers	Mark
3(b)(ii)	any one of the following <ul style="list-style-type: none"> • transformers only change alternating {voltages / currents} • transformers will not work with direct current 	It is {not alternating / direct} current	(1)

Question Number	Answer	Acceptable answers	Mark
3(c)	<p>An explanation linking any two of the following</p> <ul style="list-style-type: none"> • reduction of fossil fuels burnt (1) • less reliance on fossil fuels (1) • reduction of greenhouse gases / pollution/global warming (1) • increased use of renewable energy source (1) • less use of non-renewable energy source (1) • reduce need for additional power station building (1) • reduction of negative impact of specified type of power station (1) 	<p>conserving fossil fuel reserves</p> <p>reduction of correctly named pollutant / greenhouse gas</p> <p>solar energy is renewable</p> <p>fossil fuels are non-renewable</p>	(2)

Question Number	Answer	Acceptable answers	Mark
3(d)	<p>substitution (1) $800 \times 0.4 / 800 \times 40$</p> <p>evaluation of payment (1) $(£)320 / 32000$ (p)</p> <p>evaluation of payback time (1) 15 (years)</p>	<p>$4800 / 0.4 = 12000$ Kwh (to be sold)</p> <p>takes $12000 / 800$ years</p> <p>substitution and transposition can be in either order</p> <p>allow power of 10 error in 15 for (2)</p> <p>give full marks for correct answer, no working</p>	(3)

Question Number	Answer	Acceptable answers	Mark
4(a)(i)	refraction	refracting	(1)

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

Question Number	Answer	Acceptable answers	Mark
4(a)(iii)	<p>An explanation linking two of the following</p> <ul style="list-style-type: none"> • change in direction (1) • towards the normal (1) • (resulting from) decrease in speed (1) • (because) the left hand part of the wavefront {hits the boundary first / slows down first} (1) 	<p>bends</p> <p>Ignore away from normal</p> <p>change in speed (ignore increase in speed)</p>	(2)

Question Number	Answer	Acceptable answers	Mark
4(b)	<p>substitution (1) $25 = 120 \times f$</p> <p>transposition (1) $f = 25/120$</p> <p>evaluation (1) 0.21 (Hz)</p>	<p>substitution and transposition can be in any order</p> <p>0.2 0.20 0.208(3...)</p> <p>give (3) marks for correct answer, no working Allow (2) marks for 20.8 stated with no working</p>	(3)

Question Number	Answer	Acceptable answers	Mark
4(c)	<p>an explanation linking the following</p> <ul style="list-style-type: none"> • light waves are transverse waves / sound waves are longitudinal (1) • in transverse waves oscillations are at right angle to the direction of travel (1) • in longitudinal waves oscillations are parallel to the direction of travel (1) 	<p>Allow up and down (or side to side) movement of lamp as evidence that water waves are transverse</p> <p>up and down. Side to side. 90°</p> <p>labelled diagram correctly identifying both axes</p> <p>backwards and forwards, push and pull</p> <p>compressions and rarefractons</p>	(3)

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

Question Number	Answer	Acceptable answers	Mark
5 (a) (ii)	an explanation linking the following <ul style="list-style-type: none"> • very little effect / not effective (1) • X-rays can easily penetrate sunglasses (1) 	would not protect eyes do not stop x-rays	(2)

Question Number	Answer	Acceptable answers	Mark
5(a)(iii)	cancer damage to cells damage to DNA damage to tissue damage to bones damage to skin damage to organs killing cells mutation mutating cells marks on skin sterilisation infertility re-arrangement of cell structure radiation poisoning	Ignore hair falling out	(1)

Question Number	Answer	Acceptable answers	Mark
5(a)(iv)	<p>A suggestion to include any two of the following</p> <ul style="list-style-type: none"> • took a long time for effects to become apparent (1) • it was new /scientific (1) • risks not properly understood (1) • it removed hair successfully (1) 	<p>did not realise the damage it was doing</p> <p>believed that it was harmless / believed the advertisement</p> <p>people wanted to look attractive</p>	(2)

Question Number	Indicative content	Mark
QWC	<p>*5(b)</p> <p>A discussion to include some of the following facts</p> <ul style="list-style-type: none"> • infrared frequency much lower than X-rays • X-rays very penetrating • X-rays potentially more dangerous to the operator • infrared can cause skin burns • laser is very concentrated • specialised clinics are controlled environments • safe operation depends on training • our knowledge of EM radiation is still not complete <p>The discussion makes some of the following links</p> <ul style="list-style-type: none"> • lower frequency of infrared makes it potentially less dangerous than X-rays • high penetration of X-rays makes it difficult provide adequate shielding • the concentration of energy by the infrared laser makes it more dangerous than otherwise • controlled environment of a clinic provides better safety and more thorough training • difficulty of ensuring proper maintenance /correct dosage if used domestically • lack of knowledge could mean there are long term effects still not known <p>The discussion makes some of the following conclusions</p> <ul style="list-style-type: none"> • easier shielding of infrared compared to X-rays means there is less risk to operators and /or patient • difficulty of ensuring proper control means it is not suitable for domestic use • lack of full understanding of long term effects means it is better to err on side of caution 	(6)
Level	0	No rewardable material
1	1-2	<ul style="list-style-type: none"> • the discussion gives at least two basic facts with no links OR a fact and a conclusion with no links e.g. Infrared can cause burns so it could be dangerous. • 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"> • the discussion gives a link (or comparison) between at least two facts for infrared and X-rays, eg. infrared has lower frequency than X rays so is less dangerous. We do not know enough about the dangers of infrared and it could still burn you • 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 which has at least two links or comparisons supporting a justified conclusion (about selling or dangers) eg. infrared has lower frequency than X rays so is potentially less dangerous but without proper training there is a danger of overexposure if people used it at home (therefore it should not be sold to the public) • 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)(i)	B		(1)

Question Number	Answer	Acceptable answers	Mark
6(a)(ii)	radio waves are not absorbed by the atmosphere	not affected by {light pollution / clouds}	(1)

Question Number	Answer	Acceptable answers	Mark
6(a)(iii)	<p>an explanation including two of the following</p> <ul style="list-style-type: none"> • 1 mm waves are in the microwave region (1) • which is (completely) absorbed by atmosphere (1) • space flight enabled telescopes to be put above atmosphere /in space (1) 	<p>they are microwaves</p> <p>cannot be (easily) detected on Earth</p> <p>we needed to go above atmosphere / into space</p>	(2)

Question Number	Answer	Acceptable answers	Mark
6(a)(iv)	<p>an explanation linking the following</p> <ul style="list-style-type: none"> • light might be shifted into infrared region (1) • (some) infrared is (strongly) absorbed by atmosphere (1) 		(2)

Question Number		Indicative content	Mark
QWC	*6(b)	<p>A description to include some of the following facts:</p> <ul style="list-style-type: none"> • observation of visible light led to discovery of red-shift. • galaxies are moving away from each other • CMBR detected in radio telescopes • space telescopes (such as COBE) gave more detail of CMBR • Big Bang and Steady State theories were proposed • distances to galaxies could be determined • Big Bang could explain red-shift • Steady State could explain red-shift <p>The description gives some of the following details:</p> <ul style="list-style-type: none"> • red-shift means lower frequency / longer wavelength • red-shift was greatest for the most distant galaxies • red-shift means universe is expanding • Big Bang / Steady State can explain an expanding universe • only Big Bang could explain CMBR • CMBR is residual radiation from the Big Bang <p>The description gives some of the following reasons for scientists beliefs</p> <ul style="list-style-type: none"> • observation of increasing red-shift with distance is a reason to believe in expanding universe 	(6)
Level	0	No rewardable material	
1	1-2	<ul style="list-style-type: none"> • a limited description of either red-shift or CMBR, e.g. light from galaxies was red-shifted OR Red-shift is evidence for Big bang. • 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 description giving full detail of either red-shift or CMBR OR some detail of both red-shift and CMBR, e.g. light was seen to be shifted towards a longer wavelength. This means that the galaxies are moving away from each other. • 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 description of how both red-shift and CMBR give supporting evidence for the Big Bang theory, e.g. light was seen to be shifted towards a longer wavelength. This means that the galaxies are moving away from each other so the Universe must be expanding. This is evidence for the Big Bang theory. Cosmic Background Radiation coming from all directions provides further evidence for the Big Bang. • 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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