

Mark Scheme (Results)

November 2012

GCSE Physics
5PH1H/01

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Question Number	Answer	Acceptable answers	Mark
1(a)	<p>use radiation</p> <p>type of</p> <p>3 correct = 3 marks 2 correct = 2 mark 1 correct = 1 mark</p>	Two lines from a use negates that use	(3)

Question Number	Answer	Acceptable answers	Mark
1(b)	<p>An explanation including :</p> <ul style="list-style-type: none"> • (all e-m waves) have same speed (1) • in {space/vacuum} (1) 	(from equation) same speed and same distance = same time 3×10^8 m/s / speed of light	(2)

Question Number	Answer	Acceptable answers	Mark
1(c)	C		(1)

Question Number	Answer	Acceptable answers	Mark
1(d)	<p>substitution ie ($v =$) $1.5 \times 10^{17} \times 2 \times 10^{-9}$ (1)</p> <p>evaluation ie ($v =$) 3×10^8 m/s (1)</p>	<p>[Remember that equations, including $v = f\lambda$ are given on page 2. Please do not credit]</p> <p>Give full marks for correct answer, no working $3 \times$ any other power of 10 = 1 mark</p>	(2)

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

Question Number	Answer	Acceptable answers	Mark
2(a)(ii)	<p>An explanation linking the following:</p> <ul style="list-style-type: none"> • {energy / heat / radiation} is lost (1) • (heat lost) = heat gained / absorbed (1) • rate (of heat loss) = rate (of heat gained) (1) 	<p>given out /output for 'is lost'</p> <p>power lost = power gained = 3</p> <p>description of dynamic equilibrium = 3</p> <p>Ignore references to boiling water</p>	(3)

Question Number	Answer	Acceptable answers	Mark
2(b)(i)	D		(1)

Question Number	Answer	Acceptable answers	Mark
2(b)(ii)	<p>substitution (1)</p> <p>5 000 000 / 21 700</p> <p>evaluation (1)</p> <p>230 W</p>	<p>Ignore powers of 10 until evaluation</p> <p>230.4 W</p> <p>Give full marks for correct answer, no working</p> <p>2.3 x any other power of 10 = 1 mark</p>	(2)

Question Number	Answer	Acceptable answers	Mark
2(b)(iii)	<p>substitution (1)</p> <p>5 x 100 / 25</p> <p>evaluation (1)</p> <p>20(%)</p>	<p>0.2, 1/5</p> <p>Give full marks for correct answer, no working</p> <p>2 x any other power of 10 = 1 mark</p> <p>e.g. 200, 1/500</p>	(2)

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

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

Question Number	Answer	Acceptable answers	Mark
3(b)	A description including: <ul style="list-style-type: none"> measuring the {distance / space} (1) between lens and {paper / image} (1) 	Ignore moving paper or lens Ignore mention of focal point	(2)

Question Number	Answer	Acceptable answers	Mark
3(c)	An explanation linking any two of the following <ul style="list-style-type: none"> moon(s) (1) (appear to) orbit Jupiter (not Earth) (1) (therefore) not everything orbits the Earth (1) 	ignore planets/stars/objects Idea of movement near Jupiter 'geocentric theory is wrong' (1) ignore: {orbits the Sun / does not orbit the Earth} ignore: Heliocentric is correct ignore: Earth not centre of Universe ignore: retrograde motion	(2)

Question Number	Answer	Acceptable answers	Mark
3(d)	rearrangement (1) ie $f_e = f_o / M$ substitution (1) ie ($f_e =$) $110 / 40$ evaluation (1) ie ($f_e =$) 2.8(cm)	rearrangement and substitution in either order appropriate substitution after <u>writing</u> incorrect rearrangement [e.g. $M/f_o = 40/110 = 1$ mark only] 2.75(cm) Give full marks for correct answer, no working	(3)

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

Question Number	Answer	Acceptable answers	Mark
4(a)(ii)	Any continuous line which has a section above and below the time axis without going (deliberately) back in time	Fractions of a cycle that meet the criteria Ignore anything appearing after the arrow on the time axis	(1)

Question Number	Answer	Acceptable answers	Mark
4(b)	substitution (1) $2400/200 = 230/V_s$ transposition (1) $(V_s =) 230 \times 200/2400$ Evaluation (1) $(V_s =) 19 (V)$	substitution and transposition in either order $230/12 = 2$ marks (s&t) $200/10.43 = 2$ marks (s&t) 19.2 (V) 19.17 (V) Give full marks for correct answer, no working $1.9 \times \text{any other power of } 10 = 2$	(3)

Question Number	Answer	Acceptable answers	Mark
4(c)(i)	An explanation linking any three of the following <ul style="list-style-type: none"> • <u>step-up transformer</u>(s) (1) • increase voltages (1) • (this) reduces the current (1) • (which) reduces the {<u>heat / thermal</u>} {energy / power} losses (1) 	Assume 'they' refers to transformers 'steps up the voltage' scores second MP only Reject for MP2 and MP3: 'increases voltage <u>and</u> current.' but beware: 'increases voltage and current decreases' = 2 marks ignore unqualified energy losses Allow reverse arguments for last two points, e.g. high current wastes more heat energy = 2 marks Ignore references to efficiency ignore step-down statements except where they contradict	(3)

Question Number	Answer	Acceptable answers	Mark
4(c)(ii)	<p>An explanation linking two of the following</p> <ul style="list-style-type: none"> • {kite / string} touching the power line (1) • {movement of charge / current} (1) • (electricity) {to earth / through the kite-flyer} (1) • giving (the kite-flyer) an <u>electric</u> shock (1) 	<p>anything which implies contact for touching eg 'caught up in'</p> <p>spark ignore energy ignore electricity</p> <p>to ground needs idea of 'through' not 'into' the person ignore 'completing the circuit'</p> <p>electrocution stopping heart</p>	(2)

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

Question Number	Answer	Acceptable answers	Mark
5(a)(ii)	<p>An explanation linking</p> <ul style="list-style-type: none"> • {X- rays are / ultrasound is not} dangerous (1) • (because X-rays) can {damage / harm} {tissue / DNA} OR mutate cells OR reverse argument for ultrasound (1) 	<p>X-rays are ionising / ultrasound is not ionising ignore penetration/penetrating ignore bald harm / harmful for MP1 Ignore reference to frequency and energy</p> <p>X-rays cause cancer ignore foetus / baby / body Ignore unqualified 'mutation'</p>	(2)

Question Number	Answer	Acceptable answers	Mark
5(b)(i)	30 000 Hz / hertz	30 kHz 0.03 MHz unit must be included	(1)

Question Number	Answer	Acceptable answers	Mark
5(b)(ii)	<p>A description including particles {<u>vibrate</u> / <u>oscillate</u>} (1)</p> <p>(move) in the {same direction as / parallel to the direction } the wave travels (1)</p>	<p>'they' refers to particles</p> <p>to and fro back and forth ignore all up and down and side to side references</p> <p>Both points could be shown on a clear diagram with arrows or labels (e.g. compressions and rarefactions)</p>	(2)

Question Number	Indicative Content	Mark
QWC	<p>*5(c)</p> <p>An explanation including some of the following points</p> <ul style="list-style-type: none"> • sonar is ultrasound • travels through water at the speed of sound (1500 m/s) • ultrasound signal generated in the ship • signal emitted from the bottom of the ship • signal travels down through the water • strikes shoal of fish • signal reflected by fish • reflected signal detected on the ship • time between emission and detection measured • either time halved and depth of fish calculated /or distance wave travelled calculated and halved to give depth of fish • calculation done using $x = v \times t$ • comparison of depths of fish and of seabed 	(6)
Level	0	No rewardable content
1	1 - 2	<ul style="list-style-type: none"> • a limited explanation e.g. A sonar wave (ultrasound pulse) goes down and is reflected. OR An ultrasound pulse is sent from the boat and timed. • 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 e.g. An ultrasound signal goes down through the water and is reflected AND the time taken is measured. • 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 e.g An ultrasound signal is emitted and reflected. The time is measured AND depth is found by halving (the total time or the total distance) AND linking to either the speed equation or the speed of the wave or the depth of fish compared to sea depth. • 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)	Any one of <ul style="list-style-type: none"> • radio • visible • microwave 	<ul style="list-style-type: none"> • infrared / IR • ultraviolet / UV 	(1)

Question Number	Answer	Acceptable answers	Mark
6(a)(ii)	Any one of <ul style="list-style-type: none"> • X-ray • gamma ray • far infrared 	<ul style="list-style-type: none"> • infrared / IR • ultraviolet / UV 	(1)

Question Number	Answer	Acceptable answers	Mark
6(b)(i)	N = 39 (A.U.) (1) P = 77 (A.U.) (1)	range 38 – 39 inclusive range 76-78 inclusive	(2)

Question Number	Answer	Acceptable answers	Mark
6(b)(ii)	An explanation linking <ul style="list-style-type: none"> • actual value for Neptune is {different from / lower than} predicted value (1) with one of these <ul style="list-style-type: none"> • (so) the rule does not work (for Neptune) (1) • the rule gives too high a value (1) • (so) Neptune might have been {captured / entered} from outside the original Solar System (1) 	actual value for Neptune put on to chart by cross or dot etc. (no need for label) (1) (Neptune) is an anomaly ignore references to age of Neptune	(2)

Question Number		Indicative Content	Mark
QWC	*6(c)	<p>A discussion including some of the following points</p> <ul style="list-style-type: none"> • Methods <ul style="list-style-type: none"> ○ space probes ○ soil experiments by landers ○ SETI ○ telescopes ○ robotic machines • Problems <ul style="list-style-type: none"> • expense / international collaboration needed • large distances involved <ul style="list-style-type: none"> ○ if problem difficult to correct ○ time to react to problem is long ○ time to respond to any communication would be long ○ complex technology <ul style="list-style-type: none"> ▪ for human visit ▪ for robot investigation ▪ fuel • recognition of alternative life-forms • pattern recognition <ul style="list-style-type: none"> ○ for SETI ○ communication if intelligent life-form • possibility of cross-contamination 	(6)
Level	0	No rewardable content	
1	1 – 2	<ul style="list-style-type: none"> • a limited discussion including EITHER two named problems, OR two named methods, OR a named problem + a named method e.g. It would be expensive and the distances are large OR Space probes and SETI can be used OR can listen for communications, life beyond Earth may not be water based. • 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 EITHER a problem with its associated method + some other named problem OR a detailed problem + one other named problem e.g. It is expensive to send a space probe to Mars; the distance to Mars very large OR It is difficult to search through the data from space because there is a huge amount of it. Also, any message would be hard to decode. • 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 including EITHER two problems with their associated method(s) + some other named problem OR two detailed problems + one other named problem OR a problem with its associated method + a detailed problem + one other named problem e.g. We can analyse radiowaves from space, but they take so long to arrive that the aliens that sent them could have already died out. It is very expensive to develop the technology needed to go to other planets. Also, we might not recognise alien life-forms there. OR It is difficult to search through the data from space because there is a huge amount of it. Radiowaves in space take a long time to arrive because the distances are so vast. It all costs a lot of money. OR It is very expensive to develop the technology needed to go to other planets. It is difficult to search through the data from space because there is a huge amount of it. Also, we might not recognise alien life-forms there.• 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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