



Mark Scheme (Results)

November 2021

Pearson Edexcel International GCSE

In Physics (4PH1) Paper 2P

Question number	Answer	Notes	Marks												
1 (a)	<table><thead><tr><th>Observation</th><th>Supports the Big Bang theory</th></tr></thead><tbody><tr><td>Black holes are formed from extremely massive stars</td><td></td></tr><tr><td>Cosmic microwave background radiation is seen in all directions</td><td>✓</td></tr><tr><td>Cosmic rays from space are detected at the Earth's surface</td><td></td></tr><tr><td>Each galaxy contains billions of stars</td><td></td></tr><tr><td>Most galaxies show a red-shift in the light detected from them</td><td>✓</td></tr></tbody></table> 1 mark for each correct tick; -1 for each additional tick if more than two ticks seen 5 ticks scores zero	Observation	Supports the Big Bang theory	Black holes are formed from extremely massive stars		Cosmic microwave background radiation is seen in all directions	✓	Cosmic rays from space are detected at the Earth's surface		Each galaxy contains billions of stars		Most galaxies show a red-shift in the light detected from them	✓		2
Observation	Supports the Big Bang theory														
Black holes are formed from extremely massive stars															
Cosmic microwave background radiation is seen in all directions	✓														
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Each galaxy contains billions of stars															
Most galaxies show a red-shift in the light detected from them	✓														
(b)	B (decreases, increases); A is incorrect because a red giant is more powerful than a main sequence star C is incorrect because a red giant is cooler and more powerful than a main sequence star D is incorrect because a red giant is cooler than a main sequence star		1												
(c)	the brightness/luminosity (of an object); idea of a standard distance;	allow 10 parsecs/32(.6) light years condone incorrect distance	2												

Total for Question 1 = 5 marks

Question number	Answer	Notes	Marks
3 (a)	(some) bonds (between particles) are broken or weakened; particles begin to move around or slide over each other;	award either or both marks if clear from diagram accept idea of reduction in intermolecular forces reject MP2 if there is a reference to the speed of particles or KE changing during melting	2
(b) (i)	any two from: MP1. energy is transferred to air/particles (by heating); MP2. idea that particles move faster; MP3. temperature (in K) is (directly) proportional to KE of particles;	accept molecules for particles accept particles gain KE	2
(ii)	particles hit (flask) walls more frequently; particles hit (flask) walls with more force / harder;		2
(iii)	136 (kPa);	allow answers in the range 135-137 (kPa)	1
(iv)	substitution; rearrangement; evaluation; e.g. $136 / 400 = p_2 / 230$ $(p_2 =) (136 \times 230) / 400$ $(p_2 =) 78 \text{ (kPa)}$	allow ecf from (b)(iii) e.g. 86 (kPa) for (iii) gives 79 (kPa) for (iv) substitution and rearrangement in either order allow 78.2... accept extrapolation back to $T = 230$ for 2 marks accept value between 79 and 77 by this method accept calculation using graph (i.e. extrapolation numerically/algebraically) back to 230 for 2 marks accept value between 79 and 77 by this method	3

Total for question 3 = 10 marks

Question number	Answer	Notes	Marks
4 (a) (i)	mass number = 3; atomic number = 1;		2
(ii)	idea that a (further) neutron is required (for further fission reactions); (but) no neutrons produced (in the fission process);		2
(b)	fission is the splitting of a <u>nucleus</u> ; fusion is the joining of two <u>nuclei</u> ;	allow “breaking down”, “dividing” for splitting allow “fusing”, “combining” for joining	2

Total for Question 4 = 6 marks

Question number	Answer	Notes	Marks
5	(a) (i) position of the mass hanger;	allow distance of mass hanger/eq reject unqualified "distance"	1
	(ii) any two from: MP1. weight or mass of metre rule MP2. weight or mass of mass hanger; MP3. positions of newton meter(s);	ignore "same equipment"	2
	(iii) any one from: - take repeats and find mean; - extend the range of the results; - measure more intermediate positions; - repeat to {identify/remove} anomalies; - plot a graph to spot anomalies;		1
	(b) (i) all data plotted to within half a small square;		1
	(ii) straight line passing through all points;	allow straight line with points evenly distributed either side if plotting error in (i)	1
	(iii) any four from: MP1. as position of mass hanger increases, reading on newton meter A decreases; MP2. as position of mass hanger increases, reading on newton meter B increases; MP3. relationship(s) are linear; MP4. idea that newton meter readings are the same when the position is 50cm; MP5. idea that the sum of the newton meter readings is constant;	accept "as A decreases, B increases" for MP1 & MP2 ignore references to proportionality	4
(c)	any three from: MP1. idea that clockwise moment equals anti-clockwise moment; MP2. distance of mass hanger from newton meter B decreases; MP3. (therefore) anti-clockwise moment of mass hanger weight (about B) decreases; MP4. clockwise moment (of newton meter A reading) decreases (thereby decreasing reading);	allow idea that moments must balance allow distance from newton meter A increases	3

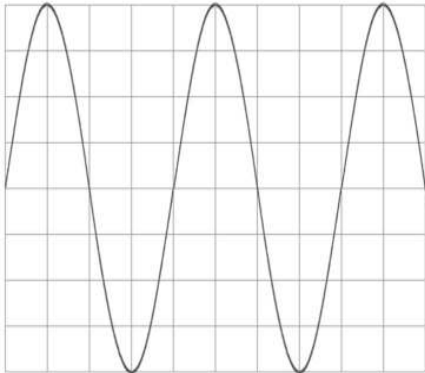
Total for Question 5 = 13 marks

Question number	Answer	Notes	Marks
6 (a)	(i) (soft) iron;		1
	(ii) pass a current in the coil / eq;	condone reference to 'electricity'	1
(b)	(i) $N_p/N_s = V_p/V_s$;	allow any correct rearrangement allow "i(nput) and o(utput)" or "1 and 2" for "p(rietary) and s(econdary)" allow correct word equation ignore 'P' for 'N' condone 'T', 't' or 'n' for 'N' condone 'coils' for 'turns'	1
	(ii) substitution; rearrangement; evaluation to 2s.f. or more; e.g. $1500/280 = 115/V_s$ ($V_s =$) $115 \times 280 / 1500$ ($V_s =$) 21 (V)	allow 21.4666...(V)	3
	(iii) use of transformer power formula; substitution OR rearrangement; evaluation; e.g. input power = output power OR $V_p I_p = V_s I_s$ $115 \times 1.2 = 20 \times I_s$ OR $I_s = V_p I_p / V_s$ ($I_s =$) 6.9 (A)	allow use of 20, 21, 21.5 etc. for output voltage allow use of turns ratio i.e. step-down voltage means step-up current allow 7 (A) allow range of 6.4-6.9	3
	(iv) any two from: MP1. increase input voltage/current; MP2. decrease number of turns on secondary coil; MP3. increase number of turns on primary coil;	condone "decrease number of secondary coils" condone "increase number of primary coils"	2

Total for Question 6 = 11 marks

Question number	Answer	Notes	Marks
7 (a)	paint particles are positively charged; paint particles repel/like charges repel; producing a thin / even coat of paint;	ignore statements relating to paint as a whole being attracted to the object allow idea of particles being given same charge condone particles being negatively charged Allow idea that paint particles are attracted to the electrons in the (metal) object allow idea that paint finish is improved allow idea that paint reaches parts that would otherwise be difficult	3
(b)	any three from: MP1. object becomes charged when paint particles land on it; MP2. (without earthing) further paint particles would be repelled by the object as they have the same charge; MP3. earthing discharges object; MP4. electrons transferred between Earth and object; MP5. (earthing means) paint continues to reach object/ giving thicker coat/give even coverage;	allow 'neutralises object' or 'object becomes neutral'	3

Total for question 7 = 6 marks

Question number	Answer	Notes	Marks
8 (a)	(i) microphone;		1
	(ii) measure number of squares for a number of complete cycles / waves and find average number of squares for one cycle; multiply number of squares for one cycle by the time base / eq;	condone 'find number of squares for one cycle' accept 'period' for 'cycle' condone use of 'wavelength' for 'period' or 'cycle' ignore reference to $T = 1/f$	2
(b)	(i) evaluation of time period of wave; substitution into $f = 1 \div T$; evaluation of frequency; conclusion consistent with frequency value; e.g. time period = $4 \times 10^{-5} \text{ s}$ $f = 1 \div 4 \times 10^{-5}$ $f = 25\,000 \text{ (Hz)}$ (therefore) sound cannot be heard (since frequency is greater than 20 000 Hz)	reject if candidate uses y-axis allow ecf if frequency is incorrect conclusion must be consistent with candidate's frequency value to be awarded the mark	4
	(ii) wave has amplitude of 4 squares; wave has time period of 4 squares; e.g. 		2

Total for Question 8 = 9 marks