



Mark Scheme (Results)

Summer 2025

Pearson Edexcel International GCSE
In Physics (4WPH2) Unit 2P

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Summer 2025

Question Paper Log Number P81581RA

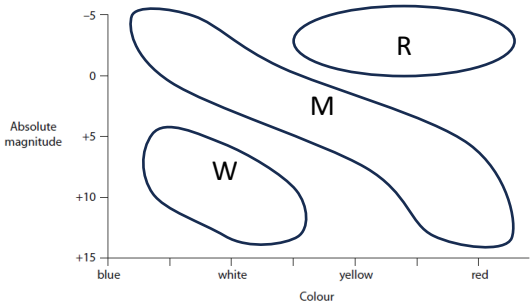
Publications Code 4WPH2_1P_2506_MS

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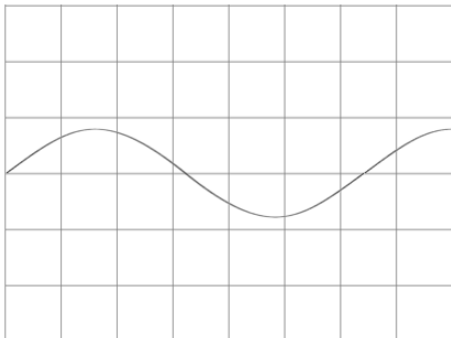
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General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

Question number	Answer	Notes	Marks
1 (a)	two stages in correct sequence; all four correct boxes; e.g. nebula main sequence star red supergiant supernova neutron star		2
(b)	(i) W in correct location;	accept any letter or part-letter inside given shape reject multiple letters	1
	(ii) M in correct location;		1
	(iii) R in correct location;		1
			
(c)	colour;	accept luminosity / brightness / stage in life cycle / specified colour change	1

Total for question 1: 6 marks

Question number	Answer	Notes	Marks										
2 (a)	1 mark for each correctly ticked row;; <table><tr><th>Statement</th><th>Correct (✓)</th></tr><tr><td>sound waves are longitudinal</td><td>✓</td></tr><tr><td>sound waves can travel through a vacuum</td><td></td></tr><tr><td>sound waves are part of the electromagnetic spectrum</td><td></td></tr><tr><td>sound waves can be reflected and refracted</td><td>✓</td></tr></table>	Statement	Correct (✓)	sound waves are longitudinal	✓	sound waves can travel through a vacuum		sound waves are part of the electromagnetic spectrum		sound waves can be reflected and refracted	✓	if more than two ticks then -1 for each incorrect tick	2
Statement	Correct (✓)												
sound waves are longitudinal	✓												
sound waves can travel through a vacuum													
sound waves are part of the electromagnetic spectrum													
sound waves can be reflected and refracted	✓												
(b) (i)	microphone;		1										
(ii)	adjust the {oscilloscope / settings} to give at least one complete cycle/wave (on the screen); measure the number of squares for a number of complete cycles/waves; multiply the number of squares by the {time base / x-gain / x scale} to obtain the period;	ignore references to wavelength, amplitude, finding number of waves passing a point	3										
(iii)	trace has lower amplitude throughout; trace has larger time period throughout; e.g. 		2										

(c)	substitution; rearrangement; evaluation; rounding; e.g. $324 = 496 \times \lambda$ $(\lambda =) 324 \div 496$ $(\lambda =) 0.6532\dots$ $(\lambda =) 0.653$		4
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Total for question 2: 12 marks

Question number	Answer	Notes	Marks
3 (a) (i)	$n = \sin(i) \div \sin(r);$	allow rearrangement allow words or symbols	1
(ii)	substitution; rearrangement; evaluation of $\sin(r);$ evaluation of $r;$ e.g. $1.52 = \sin(18) \div \sin(r)$ $\sin r = \sin(18) \div 1.52$ $\sin r = 0.203\dots$ $(r = \sin^{-1}(0.234\dots) =) 12 \text{ (degree)}$	accept 11.73...	4
(b) (i)	total internal; reflection;	accept TIR for one mark max	2
(ii)	substitution; evaluation; e.g. $(c =) \sin^{-1}(1 \div 1.52)$ $(c =) 41.1 \text{ (degree)}$	accept 41.14... correctly rounded	2
(iii)	any one from: optical fibres; endoscopes; (high-speed) internet connections;	accept other correct uses, e.g. car rain detectors, periscopes	1

Total for question 3: 10 marks

Question number	Answer	Notes	Marks
4 (a)	C - speed in a vacuum <i>A is not the answer as energy is not the same for all electromagnetic waves</i> <i>B is not the answer as frequency is not the same for all electromagnetic waves</i> <i>D is not the answer as wavelength is not the same for all electromagnetic waves</i>		1
(b)	B - infrared <i>A is not the answer as these are not detected by night vision equipment</i> <i>C is not the answer as these are not detected by night vision equipment</i> <i>D is not the answer as these are not detected by night vision equipment</i>		1
(c)	substitution; evaluation; e.g. $T = \frac{1}{9.85 \times 10^4}$ (T =) 1.02×10^{-5} (s)	accept $\frac{1}{T} = 9.85 \times 10^4$ accept 0.000 010 152 (s)	2
(d)	 in a longitudinal wave, {vibrations / oscillations} are parallel to the direction of transfer of energy; in a transverse wave, {vibrations / oscillations} are {perpendicular / at right angles / at 90° } to the direction of transfer of energy;	accept “direction (of travel) of the wave”, or “direction of propagation” for “direction of transfer of energy” throughout accept longitudinal waves are parallel to the direction of transfer of energy and transverse waves are perpendicular to direction of transfer of energy for 1 mark condone statements comparing different properties of transverse and longitudinal waves	2

Total for question 4: 6 marks

Question number	Answer	Notes	Marks
6 (a)	any five from MP1 - idea of placing the GM detector and counter a distance from a radioactive source; MP2 - idea of placing each material between the source and the detector; MP3 - take the reading on the detector after a specific time has passed; MP4 - repeat count reading with different material MP5 - use the same distance from source for each material / source; MP6 - use the same time for each material / source; MP7 - idea of measuring / recording background count rate; MP8 - idea of subtracting effect of background radiation;	accept MP1 and MP2 from a labelled diagram	5
(b) (i)	idea that the count decreases when a piece of paper is placed in front of the radioactive source;	accept a comparison of the numbers e.g. the count rate goes down by 260	1
(ii)	idea that the count is the same when a piece of paper is placed in front of the source as when aluminium is placed in front of the source;	accept idea of not changing when aluminium is added, or "it's the same (as paper) with aluminium"	1
(iii)	idea that some radiation is detected after passing through aluminium;	accept "there were 508 counts of gamma radiation"	1

Total for question 6: 8 marks

Question number	Answer	Notes	Marks
7 (a)	one fission produces neutrons ; which go on to cause further fission(s);	marks can be awarded from a labelled diagram	2
(b)	each fission produces more than one neutron / neutrons; idea that this then causes more than one further fission;	accept any integer bigger than 1 for “more than one” in both cases marks can be awarded from a labelled diagram	2
(c)	any six from: MP1 - control rods absorb neutron(s); MP2 - preventing them from causing fission; MP3 - (therefore) decreasing the rate of fission; MP4 - moderator reduces the speed of neutron(s); MP5 - meaning they can be more easily absorbed by nuclei; MP6 - (therefore) increasing the rate of fission; MP7 - changing the position of the control rods allows the rate to be kept constant;	marks can be awarded from a labelled diagram allow slows down neutron(s) / reduces the kinetic energy of neutrons if no other marks scored, allow identification that both the moderator and the control rods affect the rate of fission for one mark	6

(d)	any two from: MP1 - fusion requires high temperatures and/or pressures; MP2 - to overcome the repulsion (between nuclei); MP3 - fusion cannot be run on a commercial scale; MP4 - fusion cannot be sustained over long time periods; MP5 - fusion needs a large amount of (initial) energy/power;	ignore ideas of cost	2
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Total for question 7: 12 marks

Question number	Answer	Notes	Marks
8 (a)	any two from: (field lines are visual representations of magnetic fields that show) the strength (of a magnetic field); the direction (of a magnetic field); the shape (of a magnetic field);		2
(b) (i)	magnets move away from each other; (because) like poles repel;	if no other marks scored, award 1 mark for "it/they/magnet(s) repel(s)" reject "same charges (repel)" for MP2	2
(ii)	the nail becomes an induced magnet; the nail is attracted to the magnet;	allow "it" in relation to the nail accept magnetised reject charges attract	2
(c) (i)	there is a current in the wire;	accept there is a p.d./voltage across the wire condone there is an emf across the wire	1
(ii)	at least one circular field line around wire; circles closer to wire are closer together than circles further away;	four or more field lines needed for this mark ignore arrows	2
(d)	particle A does not experience a force; because it is moving parallel to the magnetic field;	ORA DOP	2

Total for question 8: 11 marks

Question number	Answer	Notes	Marks
9 (a)	D - m ³ <i>A it is not the answer as this is the unit of energy</i> <i>B it is not the answer as this is the unit of temperature</i> <i>C it is not the answer as this is the unit of area</i>		1
(b) (i)	appropriate y-axis scale; <		

(iv)	any two from: idea that data is extrapolated; small number of data points; line of best fit is approximate; cannot be sure trend continues below 0 °C;	accept no data below 0 °C / no measurement at 0 Pa / measurement at 0 Pa is impossible accept small range of data points accept needs more data points / needs a larger range accept “gas might liquify”	2
(c)	particles are not moving / stationary; they have no {kinetic / thermal} energy;	accept have zero speed	2

Total for question 9: 10 marks

Question number	Answer	Notes	Marks
10 (a)	cosmic microwave background radiation; red-shift of galaxies ;	allow CMBR condone one missing word or one missing letter from the acronym accept cosmological red-shift accept quasars for galaxies	2
(b)	substitution into $\frac{\lambda - \lambda_0}{\lambda_0} = \frac{v}{c}$; rearrangement; evaluation of λ ; evaluation of λ to 5s.f.; e.g. $\frac{\lambda - 4.3405 \times 10^{-7}}{4.3405 \times 10^{-7}} = \frac{1.44 \times 10^5}{3.00 \times 10^8}$ $\lambda = (0.0048 \times 4.3405 \times 10^{-7}) + 4.3405 \times 10^{-7}$ $\lambda = 4.34258344 \times 10^{-7} \text{ (m)}$ $\lambda = 4.3426 \times 10^{-7} \text{ (m)}$	take evaluation of the change in wavelength as evidence of MP1 and MP2 regardless of PoT NB correct change in wavelength is $2.0834... \times 10^{-10} \text{ (m)}$ accept any value that would round to $4.3426 \times 10^{-7} \text{ (m)}$ mark independently	4
(c)	the two galaxies are moving at different speeds; because the universe is expanding;	allow the more distant galaxy is moving faster ORA	2

Total for question 10: 8 marks

