



Mark Scheme (Results)

Summer 2026

Pearson Edexcel International GCSE in Physics

4PH1/2P

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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)	balance; timer/stopwatch/stopclock;	accept (weighing) scales, weighing scale reject unqualified 'scale' ignore irrelevant apparatus	2
(b) (i)	A (28 °C) B cannot be the correct answer because it is the lowest temperature on the graph and would need the temperature at 80 seconds to be 60 (°C) C cannot be the correct answer because it is the difference between the highest and lowest temperatures on the graph and would need the temperature at 80 seconds to be 72 (°C) D cannot be the correct answer because it is the highest temperature on the graph and would need the temperature at 80 seconds to be 102 (°C)		1
(ii)	MP1 substitution into given formula;		2

(iii)	<p>MP2 correct evaluation; i.e. energy transferred = $12 \times 3.9 \times 80$; energy transferred = 3700 (J)</p> <p>MP1 substitution of the material's mass, the candidate's answer to (i) for the temperature change and the candidate's answer to (ii) for the energy into given equation;</p> <p>MP2 rearrangement;</p> <p>MP3 correct evaluation using candidate's answer for (i) as the temperature change and candidate's answer for (ii) as the energy;</p> <p>i.e. energy transferred = mass $\times$ SHC $\times$ temp change $3744 = 0.29 \times c \times 28$ $c = 3744 \div (0.29 \times 28)$ $c = 460 \text{ (J/kg } ^\circ\text{C)}$</p>	<p>correct answer with no working scores full marks</p> <p>unrounded answer is 3744 (J)</p> <p>rearrangement and substitution can be in either order</p> <p>correct unrounded answer using 3744 (J) is 461 (J/kg $^\circ\text{C}$)</p> <p>correct unrounded answer using 3700 (J) is 455 (J/kg $^\circ\text{C}$)</p> <p>correct answer with no working scores full marks NB - answers that may score full marks due to incorrect answers to (i) with ECF are: 430, 425, 310, 300, 180</p>	3
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Total for question 1: 8 marks

Question number	Answer	Notes	Marks
2 (a) (i)	MP1 substitution in to given equation; MP2 correct evaluation of moment; MP3 unit: Nm ; e.g. moment = force $\times$ distance moment = 3200×4.8 moment = 15 000 (Nm)	accept standard form throughout (a) accept Ncm if appropriate to candidate's value i.e. 1 536 000 Ncm correct answer with no working scores full marks	3
(ii)	MP1 candidate's answer to (a)(i); MP2 clockwise;	unrounded answer is 15 360 (Nm) ignore unit allow 15 000 regardless of (i) accept CW accept clockwise arrow reject anti-clockwise reject ACW reject counter-clockwise reject anti-clockwise arrow reject CCW ignore any other direction	2
(b)	MP1 idea that moment (about a named point) clockwise = moment (about named point) anticlockwise; MP2 idea that from point A, total moment clockwise increases as person walks; MP3 so moment and hence force at B must also increase (to stay in equilibrium); MP4 idea that when person gets on, force A increases and force B does not;	ignore movement of beam accept idea that from point B, total moment anti-clockwise decreases as person walks accept idea that force A decreases so force B must increase accept idea that force A increases more than force B when person gets on	4

Total for question 2: 9 marks

Question number	Answer	Notes	Marks
3 (a)	<p>MP1 reference to a coil;</p> <p>MP2 reference to (iron) core;</p> <p>MP3 reference to a (d.c) current;</p>	<p>all marks can be scored from a suitably annotated diagram</p> <p>accept solenoid</p> <p>ignore 'bar magnet' for core</p> <p>allow reference to d.c. power supply or battery</p> <p>reject reference to an a.c. current for this mark only</p>	3
(b) (i)	<p>MP1 (bar and electromagnet attract) so nearest pole to electromagnet is a S pole /eq ;</p> <p>MP2 right hand end of bar is (therefore) a N pole;</p>	<p>reject 'charges' for 'poles'</p> <p>allow "opposite poles attract"</p> <p>allow "unlike" for "opposite"</p> <p>'S' on diagram is insufficient evidence for MP1</p> <p>'N' on diagram is sufficient evidence for MP2</p>	2
(ii)	<p>MP1 at least four field lines drawn with no field lines crossing;</p> <p>MP2 at least one field line loops from one pole to the other on the electromagnet;</p> <p>MP3 at least one field line going between N pole of electromagnet and S pole of bar;</p> <p>MP4 at least one field line with a correct arrow and no contradictory arrow heads;</p>	<p>condone starting from same point on bar or magnet</p> <p>ignore lines that do not touch pole(s) of electro magnet</p> <p>ignore lines that do not touch pole(s) of electro magnet</p> <p>ignore lines without arrows</p> <p>NB - no requirement for symmetry</p>	4

Total for question 3: 9 marks

Question number	Answer	Notes	Marks
4 (a)	<p>any FOUR from</p> <p>EITHER</p> <p>MP1 nuclear store of fuel to thermal store of moderator / eq; MP2 the transfer for this is (by) radiation / eq;</p> <p>MP3 thermal store of moderator to thermal store of coolant / eq; MP4 the transfer for this is (by) heating / eq;</p> <p>MP5 thermal store of coolant to kinetic store of turbine / eq; MP6 the transfer for this is mechanical(ly);</p> <p>MP7 kinetic store of turbine to electrostatic store of generator; MP8 the transfer for this is mechanical(ly) or electrical(ly);</p> <p>OR</p> <p>MP1 nuclear energy of fuel (transfers) to thermal energy of moderator;</p> <p>MP2 thermal energy of moderator (transfers) to thermal energy of coolant;</p> <p>MP3 thermal energy of coolant (transfers) to kinetic energy of turbine;</p> <p>MP4 kinetic energy of turbine (transfers) to kinetic energy of generator;</p> <p>MP5 kinetic energy of generator (transfers) to electrical energy of generator;</p>	<p>allow 'water' for 'coolant' throughout reject 'mechanical' as an energy store throughout</p> <p>allow nuclear store of fuel to thermal store of coolant</p> <p>allow nuclear energy of fuel transfers to thermal energy of coolant</p>	4
(b)	<p>any TWO from</p> <p>MP1 gamma are more penetrating (than alpha or beta);</p> <p>MP2 idea that some gamma or some radiation can still penetrate out of the concrete / eq;</p> <p>MP3 idea that exposure time needs to be monitored or be limited;</p>	<p>ignore references to alpha radiation or beta radiation</p> <p>ignore references to leaks or cracks /eq</p> <p>condone 'highly' for 'more' penetrating</p>	2

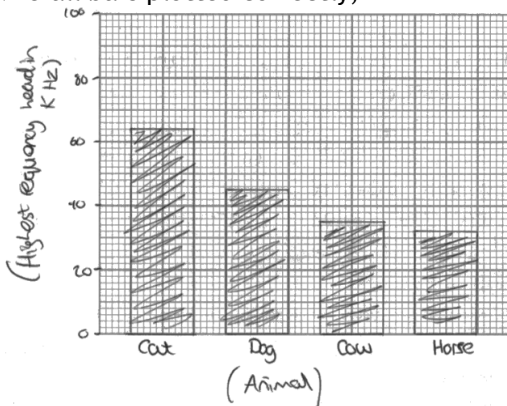
	MP4 idea that increased exposure or increased dose will cause or increase the likelihood of cancer;	accept (cell) mutations or damage to (cell) DNA or damage to tissue	
(i)	$\text{efficiency} = \frac{\text{useful energy output}}{\text{total energy output}} \times 100\%$	accept missing 100% accept 'total energy input' for denominator ignore reference to power for energy	1
(c) (ii)	<p>MP1 substitution into or rearrangement of given formula ($P = W/t$);</p> <p>MP2 substitution into efficiency formula;</p> <p>MP3 correct evaluation;</p> <p>i.e.</p> <p>total energy output = power $\times$ time total energy output = $2.4 \times 10^{10} \times 3600$ efficiency = $(3.2 \times 10^{13}) \div (2.4 \times 10^{10} \times 3600)$ efficiency = 37(%)</p>	<p>allow value of energy seen as sufficient evidence of substitution e.g. total energy output is 8.64×10^{13} (J)</p> <p>unrounded correct answer is 37.037...%</p> <p>answers of 37 to any other power of ten scores 2 marks</p>	3

Total for question 4: 10 marks

Question number	Answer	Notes	Marks
5 (a)	<p>MP1 idea of transfer of (negative) charge;</p> <p>MP2 one balloon has lost negative charge and the other has gained negative charge / eq;</p> <p>MP3 clear indication that <u>electron(s)</u> are the negative charge involved;</p>	<p>reject reference to transfer of positive charge e.g. protons, positive electrons</p> <p>MP2 also scores MP1</p> <p>‘one balloon has lost electrons and the other has gained electrons’ scores all three marks</p> <p>‘one balloon has transferred electrons to the other (balloon)’ scores all three marks</p>	3
(b)	<p>MP1 x- and y-data from a point on curve selected;</p> <p>MP2 constant for that data point evaluated and seen;</p> <p>MP3 constant for a second data point evaluated and seen;</p> <p>MP4 valid conclusion consistent with candidate’s constant(s) or data;</p>	<p>ignore POT</p> <p>allow use of constant to calculate force for a second distance or distance for a second force</p>	4

Total for question 5: 7 marks

Question number	Answer	Notes	Marks
6 (a)	<p>B (20 Hz to 20 000 Hz);</p> <p><i>A is not the correct answer because the lower limit is too low</i></p> <p><i>C is not the correct answer because the upper limit is too high</i></p> <p><i>D is not the correct answer because the lower limit is too high and the upper limit is too low</i></p>		1
(b) (i)	<p>any TWO from:</p> <p>MP1 adjust settings until a steady trace / eq;</p> <p>MP2 idea adjust settings until (at least) one cycle visible;</p> <p>MP3 count squares for period / eq;</p> <p>MP4 idea of multiplying number of squares (for one period) by time base / eq;</p>	<p>allow 'take a photo', 'screenshot' or 'freezing screen'</p> <p>condone 'wavelength' for 'period'</p> <p>allow description e.g. measure between two peaks</p> <p>allow idea counting squares for multiple cycles and finding mean or finding average</p> <p>common alternatives to 'time base' are 'time per square', 'time per division'. 'time scale'</p>	2
(ii)	<p>MP1 period represented by between 5.25 and 5.85 squares;</p> <p>MP2 correct conversion of candidate's number of squares to a time;</p> <p>MP3 frequency evaluated correctly from candidate's value for period using given formula;</p> <p>i.e.</p> <p>period = 5.6 squares</p> <p>period = 5.6×10^{-5} seconds</p> <p>frequency = $1 \div (5.6 \times 10^{-5})$</p> <p>frequency = 18 000 (Hz) to 2 sf</p>	<p>ignore use of timebase or use of y-scale for MP1 and MP2</p> <p>allow values rounded to 2 or more sf</p> <p>accept standard form throughout</p> <p>Note periods that round to between 5.25 and 5.85 squares gives frequencies from 19048 to 17094 Hz respectively</p>	3

(c)	(i)	<table><tr><th>Animal</th><th>Highest frequency heard in kHz</th></tr><tr><td>cat</td><td>64</td></tr><tr><td>dog</td><td>45</td></tr><tr><td>cow</td><td>35</td></tr><tr><td>horse</td><td>32</td></tr></table> <p>MP1 suitable frequency scale that covers half of the grid with consistent increments;</p> <p>MP2 labelled axes including units on frequency axis;</p> <p>MP3 all bars plotted correctly;</p> 	Animal	Highest frequency heard in kHz	cat	64	dog	45	cow	35	horse	32	<p>accept swapped axes throughout ignore widths of bars ignore separation of bars</p> <p>reject 15 or 16 per 10 little squares</p> <p>reject non-linear scale for MP1 and MP3</p> <p>allow false origin i.e. frequency-axis starting with non-zero value</p> <p>accept any frequency axis label that correctly indicates frequency and unit i.e. f/kHz, f(Hz) and labels 20000,40000 etc, f in kilohertz</p> <p>ignore any category labels other than cat,dog,cow,horse e.g. 'animal', 'species' or left blank</p> <p>i.e. within half a small square</p>	3
	Animal	Highest frequency heard in kHz												
cat	64													
dog	45													
cow	35													
horse	32													
(ii)	<p>MP1 idea that data is categoric;</p> <p>MP2 idea that no intention of finding a pattern or trend / eq;</p>	<p>allow 'not continuous', 'discontinuous', 'discrete'</p> <p>e.g. references to no lines of best fit needed or required</p>	2											

Total for question 6: 11 marks

Question number	Answer	Notes	Marks												
7 (a)	<p>any THREE from:</p> <p>MP1 redshift increases with distance (from Earth);</p> <p>MP2 <u>galaxies</u> are getting further away from each other / eq ;</p> <p>MP3 implies universal expansion / eq;</p> <p>MP4 expansion implies universe was at the same point in the past / eq;</p>	<p>ignore references to CMBR</p> <p>allow speed (of galaxy) increases with distance</p> <p>ignore ‘galaxies are getting further away from Earth’</p> <p>ignore ‘galaxies are expanding’</p>	3												
(b)	<p>any FOUR from:</p> <p>MP1 change in wavelength for any line shown;</p> <p>MP2 correct calculation of speed of star using given formula;</p> <p>MP3 comparison of calculated star speed with 3 000 000 m/s or comparison with 1% of speed of light seen;</p> <p>MP4 reference to the wavelength getting shorter;</p> <p>MP5 (which is) inconsistent with recession or moving away / eq;</p> <p>MP6 idea that this direction of wavelength shift can’t be responsible for the star’s colour;</p>	<p>accept standard form throughout</p> <p>reject use of wavelength of light from star instead of reference wavelength in denominator of formula for MP2</p> <p>allow ECF on calculated speed</p> <p>reference to blue shift;</p> <p>allow expression that moving away would cause an increase in wavelength</p> <p>ignore unqualified statements of agreement or disagreement</p> <table><tr><td>line</td><td>$\Delta\lambda$ (nm)</td><td>speed (millions of m/s)</td></tr><tr><td>1</td><td>4</td><td>2.93</td></tr><tr><td>2</td><td>4</td><td>2.76</td></tr><tr><td>3</td><td>5</td><td>3.09</td></tr></table>	line	$\Delta\lambda$ (nm)	speed (millions of m/s)	1	4	2.93	2	4	2.76	3	5	3.09	4
line	$\Delta\lambda$ (nm)	speed (millions of m/s)													
1	4	2.93													
2	4	2.76													
3	5	3.09													

		<table><tr><td>4</td><td>7</td><td>3.20</td></tr></table>	4	7	3.20	
4	7	3.20				

Total for question 7: 7 marks

Question number	Answer	Notes	Marks
8 (a) (i)	D (towards the observer); <i>A cannot be correct as the pattern would be rotated 180 degrees clockwise;</i> <i>B cannot be correct as the pattern would be rotated out of the page;</i> <i>C cannot be correct as the pattern would be rotated out of the page;</i>		1
(ii)	any TWO from: MP1 wave(front)s are closer together /eq ; MP2 linking of shorter wavelength to equation $v=f \times \lambda$; MP3 idea that speed of sound is constant;	ignore references to area behind the car ignore references to wavelengths getting larger behind the car e.g. wave(front)s compressed, 'more bunched up', 'shorter wavelength' allow wave speed is constant	2
(b)	any TWO from: MP1 ISS and spacecraft are not moving relative to each other / eq; MP2 so must be travelling at the same speed; MP3 (so) waves from one source come from a source that's not moving compared to the observer;	condone 'distance between ISS and spacecraft is constant' condone reference to any type of wave	2
(c)	MP1 correct momentum of spacecraft before collision; MP2 idea of conservation of momentum /eq ; MP3 correct total mass of spacecraft and ISS;	12000×0.18 or 2160 (kg m/s) seen allow momentum of spacecraft and ISS after collision is the same as momentum of spacecraft before collision however ressed $12\ 000 + 420\ 000$ or 432 000 (kg) seen;	4

	<p>MP4 evaluation of initial momentum $\div$ total mass of combined object;</p> <p>i.e. momentum of spacecraft = 12000×0.18 therefore momentum of combined object = 2160 kg m/s</p> <p>total mass of combined object = $420\,000 + 12\,000$ therefore upwards velocity of combined object = $2160 \div 432\,000 = 0.005 \text{ m/s}$</p>	<p>penalise POT -1 only once, on candidate's answer for velocity</p> <p>0.0051... scores 3 marks</p> <p>0.005 rounded from 0.0051... scores 3 marks</p> <p>0.005 without any working scores 4 marks</p> <p>accept standard form throughout</p>	
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Total for question 8: 9 marks