Mark Scheme (Results)

Summer 2025

Pearson Edexcel International GCSE
In Physics (4PH1) Paper 1P

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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) (i)	(average) speed = distance (travelled) / time (taken);	allow standard symbols and rearrangements e.g. s = vt allow d, D, s, S for distance allow s, S, v, V for speed	1
(ii)	substitution; rearrangement; evaluation; e.g. 2.8 = distance / 3.5 distance = 2.8 × 3.5 OR distance = speed × time (distance =) 9.8 (m)		3
(b) (i)	horizontal arrow drawn acting to the left;	label not needed for the mark but reject contradictory arrows ignore starting position and length of arrow	1
(ii)	speed / velocity will decrease;	allow puck slows down, decelerates ignore kinetic energy / KE decreases	2
	(resultant) force is in the opposite direction to the velocity;	allow "it" for force allow alternatives to velocity e.g. speed, motion, travel etc.	

Total for Question 1 = 7 marks

Question number	Answer	Notes	Marks
2 (a) (i)	one mark for each correct row;;; 	Object X	Object Y	Orbital path			
		A	B	C	D
the Earth	the Moon	✓			
the Sun	a comet		✓		
the Sun	the Earth	✓					reject mark for row if more than one tick shown allow alternative symbols instead of ticks	3
(ii)	gravity;	allow gravitational (force/pull/attraction) ignore weight, centripetal, g, G reject gravitational field strength, gravitational potential, GPE	1
(b) (i)	(the) Milky Way (galaxy);		1
(ii)	idea that colour depends on temperature; Antares / red is coolest; full (surface) temperature order given; e.g. in order of coolest to hottest • Antares, Capella, Sirius B, Vega • red, yellow, white, blue-white	allow idea that colour is how hot/cold the star is also scores MP1 allow Vega / blue-white / blue is hottest allow RA	3
(iii)	supernova; neutron star; black hole;	−1 if order of stages is incorrect or incorrect stages named allow pulsar for neutron star allow idea that Antares becomes black hole **or** neutron star	3
(iv)	idea that evolution depends on <u>mass</u>; relative to the Sun;	idea that it depends on the solar mass(es) of Vega = 2 marks	2

Total for Question 2 = 13 marks

Question number			Answer	Notes	Marks
3	(a)	(i)	components are connected in series; voltages must add up to 6(.0)V;	ignore voltmeter is in parallel (with the resistor) allow voltages must add up to battery voltage allow 6(.0) − 3.9 = 2.1	2
		(ii)	correct substitution into V = I × R; rearrangement; evaluation; e.g. 2.1 = current × 290 current = 2.1 / 290 (current =) 0.0072 (A)	 allow ecf from incorrect voltage allow ecf from incorrect voltage 0.0206…, 0.0134… (A) scores 2 marks allow 0.007, 0.00724… (A)	3
		(iii)	same answer as (ii);	expect 0.0072 (A) allow if rounded differently to (ii) but still consistent	1
		(iv)	correct substitution into V = I × R; rearrangement; evaluation; e.g. 3.9 = 0.0072 × R R = 3.9 / 0.0072 (R =) 540 (Ω)	allow ecf from current in (ii) or (iii) allow dimensionally correct rearrangement using incorrect voltage for this mark only e.g. R = 2.1 / 0.0072 allow 557, 542, 541.6…, 539, 538.5… (Ω)	3
	(b)	(i)	thermistor/circuit resistance decreases (as temperature increases); current increases; resistance of resistor is fixed/does not change AND V=IR (so voltmeter reading increases);	 allow idea of less voltage **across thermistor** allow idea that battery/total voltage is fixed/6V AND this is shared between thermistor and resistor (so voltmeter reading increases)	3

(ii)	any three from: MP1. place thermistor (and thermometer) into beaker of water; MP2. idea of varying temperature of water / thermistor; MP3. measure reading on voltmeter (at different temperatures); MP4. plot graph of voltmeter reading against temperature; MP5. idea of using graph to read off temperature at different voltmeter readings;	ignore methods involving adding bulbs to circuit etc. can be awarded from diagram allow idea of measuring current or **calculating** resistance (at different temperatures) allow current / resistance for voltmeter reading allow current / resistance for voltmeter reading	3

Total for Question 3 = 15 marks

Question number	Answer	Notes	Marks
4 (a)	(kinetic/thermal/heat) <u>energy</u>;	condone nuclear <u>energy</u> condone <u>energy</u> as gamma waves ignore heat, radiation	1
(b)	**A (absorb excess neutrons);** *B is incorrect because neutrons cannot be created* *C is incorrect because fusion does not occur in a fission reactor* *D is incorrect because neutrons cannot be split*		1
(c)	**C (slow down neutrons);** *A is incorrect because this would not affect the rate of fission* *B is incorrect because this would not affect the rate of fission* *D is incorrect because faster neutrons would reduce the rate of fission*		1
(d) (i)	idea (that radiation can) remove electrons from atoms/molecules;	condone idea (that radiation) turns atoms/molecules into (positive) ions ignore references to *α, β, γ* reject if reference given to gaining electrons	1
(ii)	idea that it is not possible to know when nuclei will decay;	allow idea that decay is unpredictable / has no pattern ignore spontaneous	1
(iii)	idea that radiation (emitted in the reactor) is harmful; shielding absorbs radiation; idea that amount of radiation reaching people/workers is less/zero;	allow named harmful effect e.g. cell damage, cancer etc. allow shielding blocks radiation allow shielding prevents radiation escaping ignore protect people	3

Total for Question 4 = 8 marks

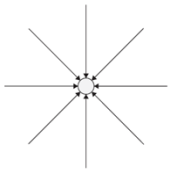
Question number	Answer	Notes	Marks
5	any six from: MP1. current/coil has magnetic field; MP2. interaction between (magnetic) fields; MP3. (produces a) force on coil; MP4. brushes allow (sliding) contact between split ring/commutator/coil and wires; MP5. split ring/commutator reverses the direction of the current (in the coil); MP6. (which) reverses the direction of the force on (each side of) the coil; MP7. current/force is reversed every half turn (when coil is vertical);	 allow coil becomes an electromagnet allow current/coil has electromagnetic field allow (magnetic) fields overlap ignore cutting of field ignore current interacting with field allow idea that brushes allow the coil to spin without tangling (connecting) wires allow idea that brushes prevent circuit being broken / allow a current to always flow allow idea of swapping negative and positive charges / terminals	6

Total for Question 5 = 6 marks

Question number	Answer	Notes	Marks
6 (a)	idea that reaction time is an issue / eq;	allow student (A) starts/stops stopwatch early/late allow student (B) starts running early/late ignore human error, comments relating to time for sound to travel	1
(b) (i)	selection of GPE = mgh; substitution; evaluation to more than 2s.f.; e.g. GPE = mgh GPE = 67 × 10 × 24 × 0.19 GPE = 3055.2 (J)	condone omitting factor of 24 for this mark only allow use of g = 9.8, 9.81 ignore POT errors from not converting cm to m allow 3055, 3060, 3100, 2994, 2997.1… (J)	3
(ii)	evaluation of mean; rounded to 3s.f.; e.g. mean time = (4.28 + 4.95 + 4.65) / 3 = 4.626… mean time = 4.63 (s)	 independent mark	2
(iii)	substitution into P = E/t; evaluation; e.g. power = 3055.2 / 4.63 power = 660 (W)	allow ecf from (i) and (ii) allow 646 – 671 (W)	2
(c)	any four from: MP1. not enough data points to make a valid conclusion; MP2. idea of testing a greater range of masses; MP3. idea of testing masses in between values; MP4. idea that there is a general (weak) positive correlation;	ignore students are correct / incorrect allow idea that more students/readings are needed allow power increases with mass for the first two data points	4

	MP5. idea that one of the data points could be anomalous; MP6. if first data point considered anomalous then there is a (weak) negative correlation; MP7. idea that final three data points suggest that power could be independent of mass; MP8. person with greatest mass does not have the greatest power;	allow any named data point allow power decreases with increasing mass ignoring the first data point allow final three data points have approximately same power allow statement that 69kg person has the greatest power	

Total for Question 6 = 12 marks

Question number	Answer	Notes	Marks
7 (a) (i)	**D; (**  **)** *A is incorrect because the pressure is not equal around the bubble* *B is incorrect because the pressure above the bubble is greater than below the bubble* *C is incorrect because the pressure to the right of the bubble is greater than to the left of the bubble*		1
(ii)	pressure decreases as bubbles get nearer to the surface; (because) less (weight of) water above the bubble; with one from: volume is inversely proportional to pressure; OR forces outside bubble decrease (as pressure decreases), which leads to bubble expanding;	allow RA allow less pressure at smaller depth allow RA allow use of $p=\rho gh$ to justify why pressure decreases as height decreases allow pressure × volume = constant OR $p_1V_1 = p_2V_2$ condone as pressure decreases volume increases	3
(b)	idea that board of nails increases the area that force is being applied; pressure is less with board; (for a given force) pressure is inversely proportional to area; OR idea that force on each nail is less when using board of nails; pressure is less with board; (for a given area) pressure is proportional to force;	allow p = F/A allow p = F/A	3

Total for Question 7 = 7 marks

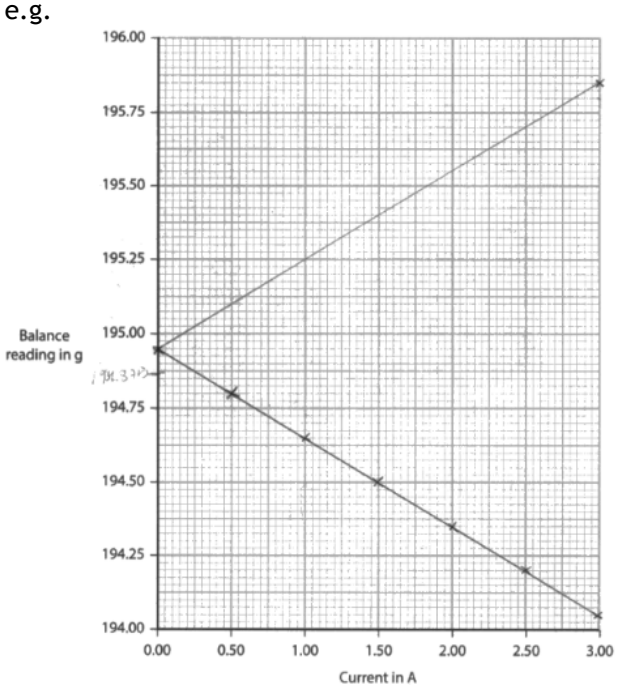
Question number			Answer	Notes	Marks
8	(a)		oscillations / vibrations; perpendicular to direction of wave/travel/energy;	 allow 90 degrees, right angles for perpendicular	2
	(b)	(i)	measurement of 0.9-1.1 cm; use of scale factor to give 1.8-2.2 (cm);	 allow 2 (cm) allow ecf if clear that scale factor is being used	2
		(ii)	conversion of cm to m; substitution into $v = f \times \lambda$; evaluation; e.g. 2.0 cm = 0.020 m v = 15 × 0.020 (wave speed =) 0.30 (m/s)	allow ÷100 seen anywhere allow ecf from (i) not converting cm to m scores 2 marks max. allow 0.27 to 0.33 (m/s) allow 0.3 (m/s)	3
	(c)		frequency is greater (at point X); {wavefronts / peaks / crests} closer together; wavelength decreases; **wave speed** does not change;	 allow wavefronts more bunched up/compressed ignore wave is compressed ignore speed of dipper	4

Total for Question 8 = 11 marks

Question number	Answer	Notes	Marks
9 (a)	Geiger-Muller tube;	allow GM tube, Geiger-Muller (detector), GM (detector), Geiger counter	1
(b)	any two from: MP1. increase distance from source; MP2. idea of minimising time of exposure; MP3. not pointing source at teacher/people; MP4. handle source with tongs / wear gloves; MP5. idea of shielding between teacher and source;	 allow stay 2m away, don't stand too close allow keeping source in metal box (when not in use) allow idea of not touching with bare hands ignore lead vest / coat	2
(c) (i)	recognition that 140s is 2 half-lives; correct final evaluation; e.g. (140 / 70 =) 2 half-lives (840 ÷ 2 ÷ 2 =) 210 (counts per second)		2
(ii)	correct use of 5%; evaluation; unit; e.g. activity = 840 / 0.05 (activity =) 16 800 becquerels	 1680, 168 scores this mark as a POT error independent mark allow Bq condone bq, BQ	3

Total for Question 9 = 8 marks

Question number	Answer	Notes	Marks
10 (a)	any two from: idea that current causes a heating effect; reduce risk of burns; maintain a constant resistance for the rod;	ignore comments relating to electric shock allow rod/wire/power supply might get hot, prevents overheating of the rod/wire/power supply ignore risk of fire	2
(b)	evaluation of change in mass; conversion of g to kg; substitution into W = mg; evaluation of force; e.g. $\Delta m = 194.95 - 193.80 = 1.15$ (g) $\Delta m = 0.00115$ (kg) force = 0.00115 × 10 (force =) 0.0115 (N)	 allow ecf from incorrect/no unit conversion allow use of g = 9.8, 9.81 ignore any minus signs allow 0.01127, 0.0112815 (N)	4
(c) (i)	all points plotted correctly to within ½ small square; **Current in A** / **Balance reading in g** 0.00 / 194.95 0.50 / 194.80 1.00 / 194.65 1.50 / 194.50 2.00 / 194.35 2.50 / 194.20 3.00 / 194.05		1
(ii)	continuous straight line of best fit;	allow ecf from incorrect plotting in (i) reject if clearly drawn dot to dot	1
(iii)	straight line drawn of positive gradient; line starts at same mass reading for zero current as previous line; line ends at 195.85 g when current is 3.00 A;	 to within +/− 1 small square	3

	e.g.  		

Total for Question 10 = 11 marks

Question number			Answer	Notes	Marks
11	(a)	(i)	energy (transferred) per unit charge (passed);	allow V = E/Q only if all terms defined allow work done for energy transferred allow coulomb for unit charge ignore joules per coulomb (equivalent to the volt)	1
		(ii)	substitution into $E = Q \times V$; rearrangement; evaluation to at least 2s.f.; e.g. $1.0 \times 10^{-16} = 1.6 \times 10^{-19} \times V$ $V = 1.0 \times 10^{-16} / 1.6 \times 10^{-19}$ $V = 625$ (V)		3
		(iii)	substitution into $KE = ½ \times m \times v^2$; rearrangement for v^2; rearrangement for v; evaluation; e.g. $1.0 \times 10^{-16} = 0.5 \times 9.1 \times 10^{-31} \times v^2$ $v^2 = 2 \times 1.0 \times 10^{-16} / 9.1 \times 10^{-31}$ $v = \sqrt{[2 \times 1.0 \times 10^{-16} / 9.1 \times 10^{-31}]}$ $v = 1.5 \times 10^7$ (m/s)	allow standard form or decimal $2.1978\ldots \times 10^{14}$ (m/s) scores 3 marks ... allow $1.48\ldots \times 10^7$, 14 824 986.33 (m/s)	4
	(b)	(i)	idea that humans can't see ultraviolet; fluorescent coating emits/produces **visible** light;	allow idea that coating produces light that humans can see	2
		(ii)	any two from: MP1. idea that mercury/ultraviolet would escape from the tube; MP2. UV is ionising (radiation); MP3. named harmful effect of UV; MP4. idea that mercury (vapour) is poisonous/toxic/harmful;	 e.g. skin cancer, damage/mutation to skin cells, skin burns, damage to eyes, blindness	2

Total for Question 11 = 12 marks

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