»Pearson

Mark Scheme (Results)

November 2025

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)		idea of loss of electrons;	allow "negative charge" for electrons	1
	(b)	(i)	0.57 (N);	ignore sign	1
		(ii)	substitution; evaluation; correct answer = 2.4 N cm e.g. moment = force × distance moment = 0.57 × 4.2 moment = 2.394 (N cm)	correct answer scores 2 marks allow 2.39, 2.394 (N cm) condone 2, 2.3 (Ncm) allow for 2 marks 0.024 Nm, 0.0239 Nm, 0.2394 Nm if candidate has made unit clear or 1 mark if unit is incorrect/not clear	2
		(iii)	candidate's answer from (ii);	allow rounded or unrounded ignore sign	1
		(iv)	arrow going downwards;	by eye ignore length of arrow ignore label	1

Total for question 1: 6 marks

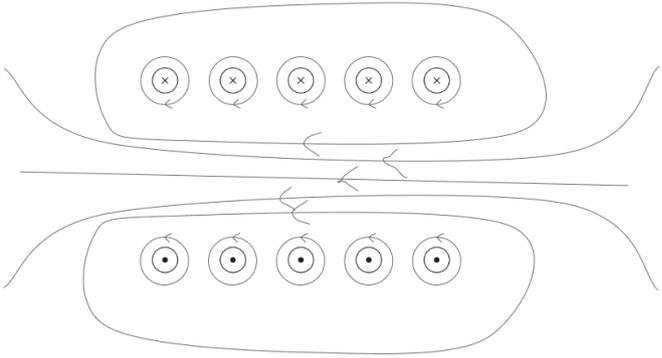| Question Number			Answer	Notes	Marks
2	(a)	(i)	idea that gravitational field strength and diameter are both continuous variables;	allow 'the data','this data' etc for both variables allow RA i.e. 'not discrete' or 'not discontinuous' or 'not categoric'	1
		(ii)	data from a single row selected; constant calculated; constant for a second row calculated; valid conclusion consistent with comparison of (at least) two constant values;	allow values next to table ignore POT ignore SF unrounded values for the constant are: 1656200000 1652400000 1675800000 1670400000	4
	(b)		**C (mass)** *A does not affect gravitational field strength* *B does not affect gravitational field strength* *D does not affect gravitational field strength*		1

Total for question 2: 6 marks

Question Number			Answer	Notes	Marks
3	(a)	(i)	momentum = mass × velocity;	p = m × v	1
		(ii)	substitution; correct evaluation; e.g. 120 000 = 14 000 × v v = 120 000 ÷ 14 000 = 8.57 momentum = 8.6 (m/s) to 2 s.f.	accept any answer that rounds to 8.6 (m/s)	2
		(iii)	initial momentum – final momentum; substitution into given formula; correct evaluation; correct answer: 9.3 (s) e.g. change in momentum = 120 000 – 63 000 (kg m/s) change in momentum = 57 000 (kg m/s) time = change in momentum ÷ force time = 57 000 ÷ 6100 time = 9.3 (s)	accept any answer that rounds to 9.3 (s) accept any answer that rounds to 20 (s) for 1 mark accept any answer that rounds to 10 (s) for 1 mark	3
	(b)		 transferred mechanically; the KE store of the turbine increases; some energy is transferred to the thermal store of the surroundings/turbine;	ignore references to electrical energy, sound energy reject mechanical energy allow '...to the KE store of the turbine' reject mechanical energy alternate: MP1 'KE of water transfers to KE of turbine' MP2 idea that not all of the KE of water goes to KE of turbine i.e. most of the KE of the water goes to the KE of the turbine'	3

		MP3 reference to **some** (of the KE of water) is lost as heat or thermal energy to the surroundings NB marks can only be scored either from the original or alternate, not from both		
(c)	Any two from: coal; gas; oil; petrol; diesel; kerosene; uranium; plutonium; nuclear; fossil fuels;	ignore power, station, power station, energy	2

Total for question 3: 11 marks

Question Number	Answer	Notes	Marks
4 (a)	MP1 measure the **period**; MP2 (determine frequency by using) f = 1/T; PLUS any THREE from: MP3 use of a mic(rophone); MP4 reference to a steady trace/eq; MP5(by) counting the squares (for at least one wave); MP6 (and) multiplying number of squares by the time base/eq; MP7 for two or more waves and averaging;	allow MPs from (labelled) diagram allow 'time for one wave / cycle' or 'time between two consecutive peaks/troughs' for period allow reasonable alternatives for measure e.g. determine, calculate allow idea of adjustment to a set number of waves e.g. find time for multiple waves and dividing by number of waves unqualified 'repeat and average' does not score MP	5
(b) (i)	attempt at measuring average period; one period = 5.6 squares; period = 5.6 squares × 0.5 = 2.8 ms;	allow 5.4-5.8 allow ECF on number of squares	3
(ii)	candidate uses answer to (i), in seconds, in given formula and evaluated correctly; e.g. period = 0.0028 seconds frequency = 1/T = 1/0.0028 frequency = 360 (Hz) to 2sf	accept correct rounded or unrounded figure e.g. 357, 357.1 etc	1

Total for question 4: 9 marks

Question Number			Answer	Notes	Marks
5	(a)	(i)	(at least) one field line (which does not cross) and is consistent with the correct field line pattern;	e.g. see diagram for non-exhaustive examples of acceptable field lines apply list principle reject field lines that start/finish on a wire	2
			arrow head on at least one field line that is consistent with current direction in solenoid;		
		(ii)	clear indication from the candidate which end is north consistent with their field line and no further than two wires 'in'.	however ressed (but including "N" or "North") accept ECF from (i)	1
	(b)	(i)	Np / Ns = Vp/Vs	any correct rearrangment. Allow word equation Allow "T", "turns" for N. Allow clear yet different annotation from primary and secondary i.e. p and s, 1 and 2, A and B etc.	1
		(ii)	substitution; rearrangement; correct evaluation;	NB substitution into an incorrectly arranged formula scores zero.	3
			e.g. $180/345 = V_p/230$ $V_p = 230 \times 180 / 345$		

	V_p = 120 V			
(iii)	step up (transformer);			1
(iv)	alternating (current)/a.c.;			1

Total for question 5: 9 marks

Question Number	Answer	Notes	Marks
6 (a)	substitution into given equation;	allow $\Delta\lambda$ for change in wavelength	3
	rearrangement to find wavelength;	POT error –1 here on either $\Delta\lambda$ or λ evidence of $\Delta\lambda$ of 29 nm scores first 2 marks	
	correct evaluation;		
	e.g. $(\lambda - 506)/506 = 1.7 \times 10^4 / 3.0 \times 10^5$ $\lambda = 506 \times (1.7 \times 10^4 / 3.0 \times 10^5) + 506$ $\lambda = 534.7$ (nm)	accept any value that rounds to 530 (nm) accept any value that rounds to 29nm (change in wavelength) as final answer for 2 marks accept any value that rounds to 480 nm (subtraction of change in wavelength) for 2 marks wrong change in wavelength added to 506 nm gives 1 mark	
(b)	Any TWO from: the universe is expanding / eq;	i.e. galaxies are moving away from each other;	2
	idea that (recession) velocity increases with **distance**/eq;	i.e. 'galaxies' velocities (away from Earth)' for 'recession velocity'	
	explicit statement that galaxy C is moving faster than galaxy B (from Earth);	e.g. C is twice as fast as B	
	double the distance (from Earth) will give double the speed;	allow higher order thinking e.g. distance and velocity proportional	
	idea that galaxy C is moving four times faster than galaxy A and galaxy B is moving two times faster than galaxy A;		
(c)	Any TWO from: MP1 idea that wavelength of CMB has increased over time (as the universe has expanded);	accept RA	2
	MP2 Universe was (significantly) hotter in the past/eq;		

	MP3 temperature is inversely proportional to wavelength (of CMB)		

Total for question 6: 7 marks

Question Number			Answer	Notes	Marks
7	(a)	(i)	(stop)watch / (stop)clock / timer/chronometer;	ignore 'light gate' apply list principle	1
		(ii)	**B (temperature of block);** A and D cannot be correct as they are control variables here C cannot be correct as it is the independent variable here		1
	(b)		temperature change of 405 degrees; substitution into given formula or correct re-arrangement with mass as subject; correct evaluation; e.g. temperature change = 450 – 45 = 405 degrees energy supplied = mass × 910 × 405 mass = 440 000 / (910 × 405) mass = 1.2 (kg) (to 2sf)	allow (450 – 45) seen mark independently 1.1938.... (kg) allow any answer that rounds to 1.2 (kg) for 3 marks any POT error in otherwise correct answer scores 2 marks substitution of 450, 45 or 495 for the temperature change into the correct equation with correct SHC and energy change scores 1 mark only	3
	(c)		idea of high speed; idea of randomness;	ignore 'freely'	2
	(d)		MP1 temperature rises at a different rate/eq; MP2 melting point would be different/eq;	accept annotation of graph for either mark allow idea that 'flat part would be at a different temp' allow higher order idea that 'flat part would be a different length'	2

Total for question 7: 9 marks

Question Number	Answer	Notes	Marks
8 (a)	Any THREE from MP1 neutron **absorbed** by (uranium) <u>nucleus</u> MP2 (uranium) nucleus becomes unstable MP3 nucleus splits producing two (smaller/daughter) nuclei **and** (some) neutrons MP4 neutrons absorbed by **other** (uranium) **nuclei**	condone 'undergoes fission' for 'splits' condone named isotopes e.g. krypton and barium	3
(b)	fusion: joining of nuclei/eq; radioactive decay: idea of (spontaneous) release of particle(s) **from the nucleus**;	condone 'fusing' accept any named particle e.g. alpha/helium nucleus, beta/electron, gamma, neutron ignore reference to 'splitting' accept higher order idea of a decrease in instability/increase in stability	2
(c)	0; (for the neutron) 3; (for the hydrogen)		2
(d)	Any TWO from: <u>nuclei</u> are both positive so (electrostatically) repel; high temperature means high KE or high speed; (high temperature and/or high pressure means) nuclei can get close enough to fuse;	ORA for MP2 and MP3 allow idea of high(er) probability of fusion allow particles for nuclei for this MP only	2
(e) (i)	**C (half-life)** *A is not the half-life* *B is not the half-life* *D is not the half-life*		1 3

(ii)	original activity halved at least once;	however ressed e.g. 60 ÷ 12 = 5	
	60 years corresponds to 5 half lives;		
	correct evaluation;		
	e.g. 72->36->18->9->4.5->2.25 (kBq)	accept 2.2 or 2.3 (kBq)	
		36 (kBq) scores 1 mark only	
		accept any correct activity from another incorrect number of halvings for 2 marks	
		e.g. 18, 9, 4.5, 1.125 etc	

Total for question 8: 13 marks