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Mark Scheme (Results)

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Pearson Edexcel International GCSE In Physics (4PH1) Paper 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.

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Question number			Answer	Notes	Marks
1	(a)	(i)	particles with larger spaces between them; particles in less regular structure;	max space in body or surface one of particles from diagram on left.	2
		(ii)	particles {slide/move/flow} past each other;	ignore 'more freely'	1
	(b)	(i)	safety goggles/gauntlets/gloves/not splashing/eq;		1
		(ii)	balance;	condone 'scales' ignore 'meter(s)'	1
		(iii)	74 (g);		1
		(iv)	density = mass/volume;	allow any accepted letters for density, mass or volume allow d, ρ for density	1
		(v)	substitution; evaluation; matching unit; correct answer: 0.84 g/cm^3 e.g. density = mass / volume density = 74/88 density = 0.84 g/cm^3 to 2 sf	ECF for incorrect mass allow 0.8409090…	3
	(c)		(particles) far apart / much further apart; particles move with (much) higher speed / have higher <u>kinetic</u> energy; move (more) randomly;	allow KE for kinetic energy	3

Total for Question 1 = 13 marks

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Question number	Answer	Notes	Marks
2 (a)	plate loses negatively charged particles; (loses) electrons;	reject response that infers positive electrons 'plate loses electrons' scores 2 marks.	2
(b) (i)	plate and ball have same (sign) charge; (so there is a) repulsive force on the ball (from that plate);	 accept 'attractive force from other plate'/ 'like charges repel'/ 'plate X is negative and opposite charges attract' for 2 marks	2
(ii)	metal is a conductor;	allow 'it conducts'	1
(c) (i)	charge (transferred) = current x time;	allow standard symbols and rearrangements e.g. I = Q / t reject C or c for current	1
(ii)	substitution and rearrangement; evaluation; correct answer: 1.1 x 10^{-5} (A) e.g. charge = current x time current = charge / time = 5.1 x 10^{-6} / 0.45 current = 1.1(3) x 10^{-5} A	 allow factor of 2 either way i.e. {2.2 / 0.55} x 10^{-5} POT error scores -1	2
(iii)	any ONE of: • larger charge transfer (per trip); • ball gains more kinetic energy; • more trips per second;	 ignore 'V=IR' argument	1
(iv)	ammeter;		1

Total for Question 2 = 10 marks

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Question number	Answer	Notes	Marks
3 (a)	centre of gravity;	allow centre of mass	1
(b) (i)	C (230 N); A is not correct as this is the mass of the bin; B is not correct as this has the incorrect unit for force; D is not correct as the mass has been converted to grams before being multiplied by *g*.		1
(ii)	(in equilibrium) sum of clockwise moments = sum of anticlockwise moments;	condone 'clockwise moment = anticlockwise moment'	1
(iii)	calculation of moment of weight or expression for moment of F; equating moments; rearrangement for F; correct evaluation of F; e.g. moment of F = 0.98 x F moment of weight = 230 x 0.37 230 x 0.37 = 0.98 x F F = 230 x 0.37 / 0.98 F = 87 (N)	ignore POT for this MP allow 86.8, 86.84, 86.83…	4
(iv)	Magnitude=candidate's answer for (iii); direction: down(wards);	expect 87 N	2

Total for Question 3 = 9 marks

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Question number	Answer	Notes	Marks
4 (a)	any FOUR from: advantages: MP1 no carbon (dioxide) emissions; MP2 no contribution to { global warming / greenhouse effect / acid rain }; MP3 is renewable; MP4 low maintenance/no moving parts; disadvantages: MP5 needs a favourable climate; MP6 needs long days /doesn't work at night; MP7 needs a lot of space; MP8 cannot respond to rapid changes in demand;	ignore unnamed 'greenhouse gases'	4
(b)	d.c. travels in one direction only; a.c. changes direction **frequently/continuously;**		2

Total for Question 4 = 6 marks

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Question number	Answer	Notes	Marks
5 (a)	use/substitution of distance = average speed x time; total distance travelled = 2 x distance to plane; evaluation of distance to at least 2s.f.; e.g. total distance = $1.9 \times 10^{-3} \times 3.0 \times 10^{5}$ total distance = 570 km = 2 x distance to plane distance to plane = 570/2 = 285 (km)	reject use of $v=f\lambda$ allow idea that time required is half of total time.	3
(b)	substitution into given equation $\Delta\lambda/\lambda = v/c$; rearrangement; evaluation; e.g. $1.1 \times 10^{-6} / 1.2 = v/3 \times 10^{8}$ $v = 3 \times 10^{8} \times 1.1 \times 10^{-6} / 1.2$ v = 280 (m/s)	 -1 POT error allow ecf from wrong change in wavelength condone premature rounding allow 275 (m/s)	3

Total for Question 5 = 6 marks

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Question number	Answer	Notes	Marks
6 (a) (i)	reference to reflection or absorption; white is a good reflector/poor absorber;	ignore reference to emission	2
(ii)	any TWO from: air is a (good) insulator / poor conductor; reduction in convection; idea that trapped air cannot circulate;		2
(b)	substitution into given equation (energy = mcΔθ); rearrangement; evaluation of temperature change; evaluation of final temperature; e.g. 210 000 = 4.5 x 4200 x ΔT ΔT = 210 000/(4.5 x 4200) ΔT = 11 (°C) final temperature = 46 (°C)	ecf incorrect temp change accept 35(°C) for 3 marks if supported with working that shows evidence of a temperature change of 11×10^{-3} (°C)	4

Total for Question 6 = 8 marks

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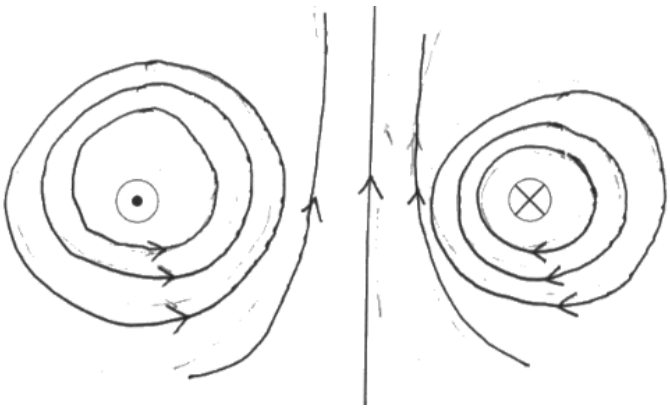
Question number	Answer	Notes	Marks
7 (a)	EITHER plotting compass; multiple compasses or repeated use of single compass; joining up of dots/idea of compasses forming continuous line(s); OR iron filings; sprinkled; card tapped;	all marks can be awarded for a correctly labelled diagram	3
(b)	one field line passing through middle from top to bottom; circular/elliptical field lines around wires; field line spacing increasing further from wires; arrows correct direction; 		4
(c) (i)	A; B is not right as the force cannot be generated by the LHR. C and D are not right as the force cannot be parallel to the magnetic field.		1
(ii)	current (in one wire) and field (from other wire) both reversed; the two effects cancel (so no change);	DOP allow relevant reference to (F)LHR	2

Total for Question 7 = 9 marks

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Question number	Answer	Notes	Marks
8 (a)	step-down;		1
(b)	$\frac{\text{input (primary) voltage}}{\text{output (secondary) voltage}} = \frac{\text{primary turns}}{\text{secondary turns}}$;	allow V for voltage, n or N or t or T for turns, allow subscripts 'i' and 'o' or 'p' and 's' or '1' and '2'	1
(c) (i)	substitution into correct turns ratio equation; rearrangement to find V_s; substitution into $V_pI_p=V_sI_s$; rearrangement to give I_s; evaluation; e.g. $230/V_s = 16/4$ $V_s = 230 / 4 = 57.5$ (V) $230 \times 11 = 57.5 \times I_s$ $I_s = 230 \times 11 / 57.5$ $I_s = 44$ (A)	ecf from incorrect V_s	5
(ii)	D; A, B and C are all rated below the nominal current of the input coil, so would all 'blow' instantly.		1

Total for Question 8 = 8 marks

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