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Mark Scheme (Results)

Summer 2016

Pearson Edexcel International GCSE in Physics (4PH0) Paper 2P

Pearson Edexcel Level 1/Level 2 Certificate in Physics (KPH0) 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.

Question number	Answer	Notes	Marks
1 (a)	A – alpha particle;		1
(b)	A – alpha particle;		1
(c)	B – 50 cm;		1
(d)	D - the proton number increases by 1;		1

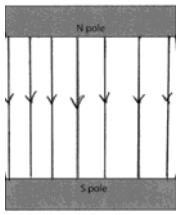
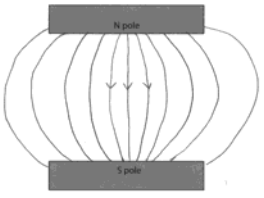
Total 4 marks

Question number	Answer	Notes	Marks
2 (a)	B - light;		1
(b) (i)	(signal has) two values;	accept • on or off • 0 and 9 • 0 and 1 • 1 and 9 • two signal strengths/states • binary • it is a square wave(form) ignore • all at 9 • up and down • true and false	1
(ii)	any two of:	ignore references to analogue signals	2
	MP1. (idea of) increasing the bit rate / sending more bits in the same time;	allow more bits / pulses per second condone increase frequency	
	MP2. (idea of) an **additional** level / strength;	allow a named **extra** level e.g. 'use 4.5 as well'	
	MP3. (idea of) increased bandwidth / range of transmission frequencies;	allow wider bandwidth ignore 'broadband'	
	MP4. (idea of) multiplexing;	allow use more than one channel condone add extra signals	
	MP5. (idea of) quantisation (algorithm);	allow compression of data	

Total 4 marks

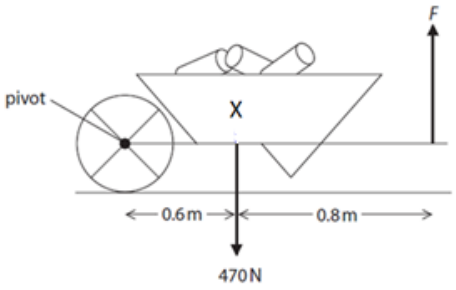
Question number	Answer	Notes	Marks
3 (a)	MP1. pitch is <u>frequency</u>;	allow 'it' for pitch ignore references to amplitude, wavelength	2
	MP2. any one of: • whether sound/note sounds high or low; • high sound has high frequency ORA;	allow vibrates more often / with shorter time period 'high pitch has high frequency' ORA gains 2 marks	
(b) (i)	ruler / measuring tape; oscilloscope / mobile phone app / data logger / (guitar) tuner;	ignore microphone frequency meter frequency gauge frequency counter	2
(ii)	dependent – frequency / pitch; independent – length (of pipe);		2
(c)	any three of: MP1. repeat AND average the readings; MP2. (measure a) larger range of values; MP3. (measure some) intermediate values;	accept 'measure more values' for 1 mark if NEITHER MP2 nor MP3 awarded	3
	MP4. improved precision of a named variable / instrument;	e.g. 'use a cm ruler', 'measure frequency in mHz' etc. ignore references to accuracy	
	MP5. control a named variable (e.g. temperature); MP6. plot a graph of frequency and length; MP7. deal with anomalies;	allow 'blow with controlled apparatus' allow 'plot a graph of the results' allow 'identify anomalies'	

Total 9 marks

Question number	Answer	Notes	Marks
4 (a) (i)	arrows on two or more {lines from N to S and/or clockwise on loops around wire};	accept arrows beside lines showing correct directions reject contradicting arrows (i.e. one correct and one incorrect)	1
(ii)	horizontal arrow (by eye); pointing to the left;	accept • arrow not passing through wire • unlabelled arrow if clear DOP	2
(b)	EITHER: **Uniform field drawn** MP1. single straight line drawn perpendicular to and between poles; MP2. additional straight lines drawn either side that are parallel and evenly spaced (by eye); OR **Non-uniform field drawn** MP1. central straight line(s) drawn perpendicular to and between poles; MP2. correctly curved lines drawn either side of the centre and drawn symmetrically (by eye);	Lines can start/end at faces or edges of poles   ignore all arrows on lines	2

(c)	MP1. place compass around magnet and note / mark its direction; MP2. place compass in **new position** and note / mark its direction again; MP3. directions linked together to find a field line / pattern;	ignore references to iron filings award marks if clear in diagram if contradiction between words and diagram, go by the diagram allow use of additional compass(es)	3

Total 8 marks

Question number	Answer	Notes	Marks
5 (a) (i)	work done = force × distance (moved);	Accept correct symbols e.g. W = F x d W = F x s	1
(ii)	substitution; evaluation; e.g. (work =) 140 × 39 5500 (J)	 5460	2
(iii)	same answer as 5(a)(ii)	allow 'the same'	1
(b) (i)	X in line with the weight arrow and vertically between the tail of the arrow and the top of the wheelbarrow (not including the logs);  	judge alignment with weight arrow by eye	1
(ii)	moment = force × (perpendicular) distance (from pivot);	condone M = F x d M = F x s	1
(iii)	principle of moments (stated or implied); total distance hand to pivot calculated; substitution showing either correct moment (or both); final rearrangement and evaluation; e.g. (total) clockwise (moment) = (total) anticlockwise (moment) (distance) = 0.6 + 0.8 = 1.4 m 470 × 0.6 = F × 1.4 F = 470 × 0.6 / 1.4 = 200 (N)	 accept 1.4 or 0.6 + 0.8 seen in working accept 282 seen in working allow 201, 201.43 350, 352, 353, 352.5 gets 2 marks	4

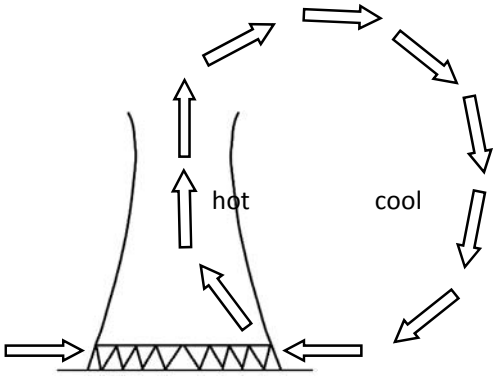
Total 10 marks

Question number	Answer	Notes	Marks
6 (a) (i)	momentum = mass x velocity;	words or correct symbols p = m x v reject M for momentum	1
(ii)	substitution; evaluation; e.g. (p =) 0.50 x 3.1 (p =) 1.6 (kg m/s)	ignore - signs allow 1.55 1 mark max for 1.5	2
(iii)	substitution into correct equation; evaluation; e.g. F = 1.55(- 0) ÷ 0.070 (F =) 22 (N)	no mark for equation as given in paper allow ECF from (ii) ignore - signs allow F in range 22-23 (N) inclusive allow method using F=ma.	2
(b)	any two of: MP1. (forces) equal; MP2. (forces) opposite OR up <u>and</u> down; MP3. mention of Newton's <u>third</u> law;	ignore references to balanced forces ‘every action has an equal and opposite reaction’ scores 2 marks	2
(c)	any two of: MP1. pressure is force / area; MP2. forces (on wood and hammer) are equal; MP3. smaller area of nail is in contact with wood / ORA;	 allow pressure is inversely proportional to area award if clear which end of the nail has the smaller area	2

Total 9 marks

Question number	Answer	Notes	Marks
7 (a)	idea of transfer of <u>electrons</u>; due to friction (between floor and shoes/wheels);	reject if positive electrons seen allow 'rubbing' for friction 'electrons are rubbed off' only scores 1 mark.	2
(b) (i)	charge = current × time;	words or correct symbols e.g. Q = I × t	1
(ii)	substitution and rearrangement; evaluation; unit; e.g. (I =) 0.0017 ÷ 0.075 (I =) 0.023 A	-1 for POT error A or mA mark independently 0.02, 0.0227 etc. condone 0.022, 0.0226 etc. 23 mA gets 3 marks	3
(c)	any three of: MP1. metal button is a conductor (to earth); MP2. idea of there being a voltage / p.d. between man and button/earth; MP3. idea of {discharge / movement / flow / transfer} of electrons; MP4. <u>current</u> in man's body;	allow 'metal conducts electricity' allow charge for electrons condone transfer of positive charge award 1 mark for idea that shock was from static electricity if no other mark awarded	3

Total 9 marks

Question number	Answer	Notes	Marks
8 (a)	any four of: MP1. (due to) convection; MP2. (heated) air expands OR molecules move apart; MP3. (heated) air becomes less dense; MP4. **hot** / **less dense** air rises; MP5. idea that air entering from outside is **cool(er)**; MP6. (above the cooling tower) air cools and {contracts / becomes more dense}; MP7. **cool** / **denser** air falls (outside the cooling tower); MP8. process (of convection) is repeated / continuous; e.g. (diagram for MP4, MP5, MP7 and MP8)  	allow particles for molecules reject 'molecules expand' reject 'molecules become less dense'	4
(b)	any three of: MP1. temperature <u>proportional</u> to (average kinetic) energy; MP2. idea that particles leave the surface / escape the liquid / turn into a gas; MP3. highest energy **particles** leave the liquid; MP4. idea that (average kinetic) energy of (remaining particles in) liquid is reduced;	 allow idea that gas **particles** have higher (average kinetic) energy / speed than particles in liquid; allow (average) speed of particles in liquid reduced	3
			Total 7 marks

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