edexcel

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

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

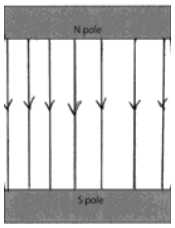
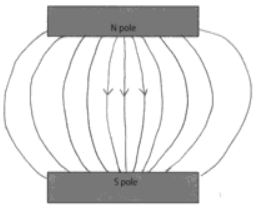
Total 4 marks

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

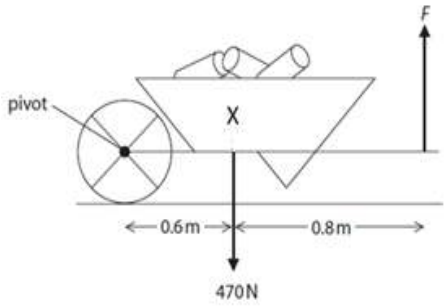
Question number	Answer	Notes	Marks
3 (a)	MP1. pitch is <u>frequency</u>;	allow 'it' for pitch ignore references to amplitude, wavelength	2
	MP2. any one of: • whether sound/note sounds high or low; • high sound has high frequency ORA;	 allow vibrates more often / with shorter time period 'high pitch 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

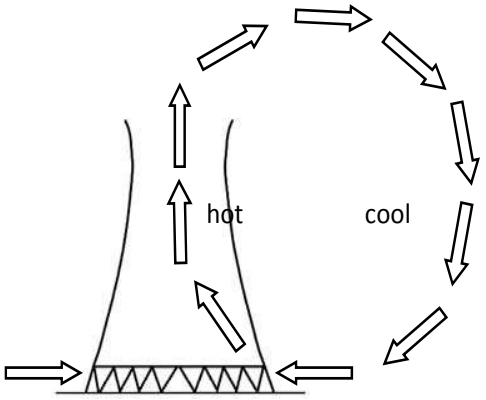
Total 10 marks

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