Mark Scheme (Results)

Summer 2021

Pearson Edexcel International GCSE

In Science (Single Award) (4SS0) 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)	D; A is incorrect because it shows the amplitude B is incorrect because it shows half the wavelength C is incorrect because it shows double the amplitude		1
		(ii)	A; B is incorrect because it shows half the wavelength C is incorrect because it shows double the amplitude D is incorrect because it shows the wavelength		1
	(b)		correct lines showing all three properties linked to their definitions;; any one line correct; e.g.	reject line if property is linked to more than one definition	2
	(c)		D; A is incorrect because both waves transfer energy and can be reflected and refracted B is incorrect because both waves can be reflected and refracted C is incorrect because both waves transfer energy		1

Wave property .... **Definition**

frequency → the number of complete vibrations of the wave each second

period → the time taken for one complete vibration of the wave

wavefront → a line along which all waves are at the same stage of their vibration

Total for question 1 = 5 marks

Question number			Answer	Notes	Marks
2	(a)	(i)	work (done) = force × distance (moved);	allow rearrangements and standard symbols e.g. W = F × d allow E or W for work and d or s for distance	1
		(ii)	substitution; evaluation; unit; e.g. (W =) 8750 × 2.3 (W =) 20 000 joules / J	-1 if cm not converted to m 2 012 500 N cm scores full marks allow 20 125 condone N m	3
		(iii)	substitution into power formula; evaluation; e.g. (P =) 20 125 / 7.0 (P =) 2900 (W)	allow ecf from (ii) allow 2880, 2875, 2860, 2857.14…	2
	(b)	(i)	idea of reducing pressure on ground;	allow idea of preventing damage to the ground / stopping leg sinking into the ground	1
		(ii)	pressure = force / area;	allow rearrangements and standard symbols e.g. F = p × A	1
		(iii)	evaluation of area; substitution into pressure formula; rearrangement; evaluation; e.g. area = 0.50 × 0.50 OR area = 0.25 (m²) 148 000 = F / 0.25 (F =) 148 000 × 0.25 (F =) 37 000 (N)	allow ecf from incorrect area / use of 0.50 as area -1 for POT error 74 000, 37 gets 3 marks 74 gets 2 marks	4

Total for question 2 = 12 marks

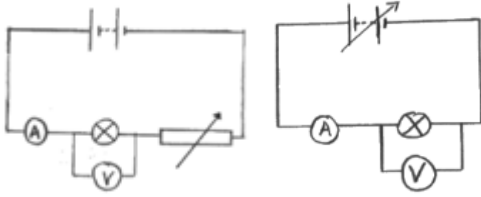| Question number			Answer	Notes	Marks
3	(a)		(independent =) surface; (dependent =) distance (travelled by block);	allow material allow 'how far the block moves' / EQ	2
	(b)	(i)	mean distance evaluated correctly; answer given to the nearest cm; e.g. (mean distance =) 25.3... (cm) scores 1 mark (mean distance =) 25 (cm) scores 2 marks	DOP	2
		(ii)	idea that there are repeat readings (which are consistent);		1
	(c)		idea that the data for the **surface** is not continuous;	allow discrete, categoric, discontinuous for not continuous	1

Total for question 3 = 6 marks

Question number			Answer	Notes	Marks
4	(a)	(i)	air resistance / drag;	allow friction ignore resistance, wind resistance	1
		(ii)	(unbalanced) force = mass × acceleration;	allow rearrangements and standard symbols e.g. a = F / m	1
		(iii)	substitution OR rearrangement; evaluation; e.g. 2900 = 1200 × a OR a = F / m (a =) 2.4 (m/s^2)	allow 2.42, 2.416… condone 2.41	2
	(b)	(i)	idea that condition of brakes has no effect on thinking distance; idea that the greater the speed, the greater the thinking distance;		2
		(ii)	distance = area under graph; attempt at evaluating area of triangular section; correct evaluation; e.g. distance = area under graph distance = ½ × 2.5 × 18 (distance =) 23 (m)	can be stated explicitly or implied from working allow even if there is a minor error in reading graph scales e.g. distance = ½ × 2.5 × 16 31.5 (m) scores 2 marks (working out entire area under line) allow 22.5 (m) 22 (m) scores 2 marks only	3

Total for question 4 = 9 marks

Question number	Answer	Notes	Marks
5 (a)	arrows drawn on sides WX and YZ one up, one down; arrow on WX down, arrow on YZ up;		2
(b)	any four from: MP1. magnetic field around the wire; MP2. interaction between this field and the field from the magnet; MP3. (produces) a force on wire / coil; MP4. forces on opposite sides of the coil are in opposite directions; MP5. coil starts to rotate;	allow magnetic field overlap also scores MP3 allow coil rotates / turns / spins	4
(c)	force (on wire/coil) increases; (therefore) rotation speed is greater;	allow stronger magnetic field around wire/coil allow coil spins faster	2

Total for question 5 = 8 marks

Question number	Answer	Notes	Marks
6 (a)	circuit with symbols for ammeter, voltmeter, lamp, any power supply all correct;	variable power supplies or variable number of cells can be shown using labelled standard symbols	4
	voltmeter in parallel with lamp;	allow if voltmeter in parallel with lamp and ammeter	
	ammeter in series with lamp;	if no lamp in circuit, allow ammeter drawn in series with power supply	
	correct means of varying voltage of lamp i.e. variable power supply/rheostat/potentiometer;	allow variable resistor in series with lamp	
	e.g.		
(b) (i)	smooth curve drawn within one small square of each data point;	curve must pass within one small square of point at (0,0)	1
(ii)	correct reading of current from graph;	allow ecf from line drawn in (i)	3
	use of R = V / I; evaluation of resistance;	allow ecf from incorrect current reading	
	e.g. current = 0.016 A R = 2.0 / 0.016 (R =) 130 (Ω)	allow 125 (Ω)	
(iii)	resistance increases (as voltage increases); with either; • (because) temperature (of filament) increases OR • (because) interactions between electrons and lattice increases	allow electrons collide with ions/atoms more	2

Total for question 6 = 10 marks

Question number			Answer	Notes	Marks
7	(a)		planet drawn with approximately circular orbit with Sun at its centre; comet drawn with elliptical orbit with Sun at one of its foci;	planet must be labelled comet must be labelled	2
	(b)	(i)	nebula / gas cloud;	allow protostar, dust cloud reject planetary nebula	1
		(ii)	colour will become red; (because) the (surface of) Sun will cool down;	allow orange allow 'Sun will become a red giant'	2
	(c)	(i)	any three from: MP1. beta is negatively charged <u>and</u> alpha is positively charged; MP2. beta has lower/less mass; MP3. beta has 1 charge but alpha has 2 charges; MP4. beta is an electron <u>and</u> alpha is 2 protons and 2 neutrons; MP5. beta is less ionising (with distance); MP6. beta has longer range; MP7. beta has higher penetration power;	allow they are oppositely charged allow RA allow beta has less charge allow alpha is helium nucleus allow RA allow RA allow RA	3
		(ii)	any two from: MP1. radioactive source has not been in contact with spacecraft; MP2. idea that spacecraft was not contaminated; MP3. idea that spacecraft has only been irradiated;	allow spacecraft does not contain any radioactive isotopes allow spacecraft has only been exposed to radiation	2

Total for question 7 = 10 marks