



Mark Scheme (Results)

Summer 2019

Pearson Edexcel International GCSE in
Physics (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)	(number of protons =) 31; (number of neutrons =) 36;		2
(b)	gamma has a high penetrating ability; gamma can be detected outside the body;	allow gamma can pass through / out of the body	2
(c)	gallium-68 has a different number of neutrons; difference in number of neutrons is 1;	allow RA reject if gallium-68 described as having less neutrons "gallium-68 has 1 more neutron"/RA gets both marks	2

Total for question 1 = 6 marks

Question number	Answer	Notes	Marks
2 (a)	absorbed; transmitted;		2
(b)	x-rays are ionising / x-rays can cause cell damage; idea that dentist would have greater dose (due to taking more x-rays);	allow x-rays causing cancer / cell mutation ignore unqualified "x-rays are harmful" allow exposure for dose allow "dentist does this every day" / eq	2
(c) (i)	(wave) speed = frequency \times wavelength;	allow rearrangements and standard symbols e.g. $v = f \times \lambda$ condone s for speed	1
(ii)	substitution; rearrangement; evaluation; e.g. $3.0 \times 10^8 = 3.5 \times 10^{16} \times \text{wavelength}$ (wavelength =) $3.0 \times 10^8 / 3.5 \times 10^{16}$ (wavelength =) 8.6×10^{-9} (m)	seen in either order -1 for POT error allow 9×10^{-9} , 0.000000008571... condone 8.5×10^{-9} , 8×10^{-9}	3
(d)	any one similarity from: don't need a medium to travel; both are transverse waves; both travel at the same speed (in vacuo); both transfer energy / information; any one difference from: radio waves have longer wavelength; radio waves have smaller frequency; x-rays are ionising / harmful but radio are not;	ignore they are both electromagnetic waves allow can travel through vacuum / space ignore uses of waves allow RA allow RA	2

Total for question 2 = 10 marks

Question number	Answer	Notes	Marks
3 (a) (i)	(average) speed = distance (moved) / time (taken);	allow rearrangements and use of standard symbols e.g. $v = s/t$ condone $s = d/t$	1
(ii)	use of one correct pair of readings from the graph; substitution of a correct distance and time into formula; evaluation; matching unit; e.g. total distance = 700 (km), total time = 60 (mins) (speed =) $400 / 30$ (speed =) 13 km/minute	seen anywhere in working must be consistent with units used in substitution 400 000 / 1800 222 m/s 0.222 km/s gains 4 marks 800 km/hour gains 4 marks 12 km/minute gains 2 marks only 194 m/s gains 2 marks only	4
(b)	pressure increases; air molecules move faster / gain KE; molecules collide more often with aeroplane;	allow temperature proportional to KE allow idea that air becomes more dense at lower height / RA ignore molecules colliding with each other allow molecules colliding with aeroplane with more force / harder	3

Total for question 3 = 8 marks

Question number	Answer	Notes	Marks																
4 (a)	<p>one mark for each correct row;;; </p> <table border="1"> <thead> <tr> <th>Energy store in magnet B</th> <th>Increases</th> <th>Decreases</th> <th>Stays the same</th> </tr> </thead> <tbody> <tr> <td>gravitational</td> <td></td> <td>✓</td> <td></td> </tr> <tr> <td>magnetic</td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td>kinetic</td> <td></td> <td></td> <td>✓</td> </tr> </tbody> </table>	Energy store in magnet B	Increases	Decreases	Stays the same	gravitational		✓		magnetic	✓			kinetic			✓		3
Energy store in magnet B	Increases	Decreases	Stays the same																
gravitational		✓																	
magnetic	✓																		
kinetic			✓																
(b)	<p>downward arrow labelled “weight”;</p> <p>arrow same length as upward force arrow;</p>	<p>ignore gravity allow gravitational force, gravitational pull ignore arrows associated with magnet A judge by eye</p>	2																
(c)	<p>any five from:</p> <p>MP1. caliper (to measure distance);</p> <p>MP2. balance (to check mass is 10g);</p> <p>MP3. use of set square to ensure vertical distance;</p> <p>MP4. independent variable identified as the mass added;</p> <p>MP5. dependent variable identified as the distance;</p> <p>MP6. repeat readings and find mean (average);</p> <p>MP7. plot graph of results;</p> <p>MP8. (identify and) remove / ignore anomalies;</p>	<p>allow any marking point if clear from diagram allow ruler, measuring tape allow scales</p>	5																
(d)	<p>any three from:</p> <p>MP1. idea of magnet C providing a downward force on magnet B;</p> <p>MP2. idea that total downward force on magnet B is greater (than before);</p> <p>MP3. (creating) resultant downward force on magnet B;</p> <p>MP4. idea that (upward) force of magnet A on magnet B increases (when B moves down the shaft);</p> <p>MP5. (because) idea that decreased distance gives stronger magnetic field (between A and B);</p>	<p>ignore any references to magnets having different strengths allow “B is repelled by C” / eq</p> <p>allow idea that total downward force greater than upward force allow A repels B more strongly</p>	3 Exp																

Total for question 4 = 13 marks

Question number	Answer	Notes	Marks
5 (a)	(nuclear) <u>fusion</u> ;		1
(b)	Sun becomes a red giant; (then) a white dwarf;	allow planetary nebula reject mention of supernova, neutron star or black hole for this mark	2
(c) (i)	(mass =) 5×10^{29} (kg);	allow 5.3×10^{29} , 5.2×10^{29} , 5.25×10^{29} (kg)	1
(ii)	evaluation of time; answer to 1 significant figure; e.g. (time = $5.25 \times 10^{29} / 9 \times 10^{19}$ =) 5.8×10^9 (years) (time =) 6×10^9 (years)	allow ecf from (c)(i) allow 5.56×10^9 (years) allow 6 000 000 000, 6 billion years	2

Total for question 5 = 6 marks

Question number	Answer	Notes	Marks
6 (a)	D - mechanically; A is incorrect because this energy transfer is wasted B is incorrect because this energy transfer is wasted C is incorrect because there is no electrical circuit between the engine and wheels		1
(b) (i)	conversion of minutes to seconds OR kW to W; dimensionally correct substitution into $P = W / t$; (rearrangement leading to) correct evaluation; e.g. 900 seconds OR 47000 W $47000 = W / 900$ (useful output energy =) 42 000 000 (J)	seen anywhere allow 42 300 000 (J) 42300 (J), 705000 (J) gains 2 marks 705 (J), 710 (J) gains 1 mark	3
(ii)	efficiency = useful (energy) output / total (energy) output;	allow rearrangements allow total (energy) input ignore $\times 100(\%)$ added to formula	1
(iii)	substitution; evaluation; e.g. (efficiency =) $42000000 / 2.0 \times 10^8$ (efficiency =) 0.21 OR 21%	allow ecf from (b)(i) allow decimal or % answers allow 0.2115, 21.15%	2
(c)	any four from: MP1. as power increases, maximum speed increases; MP2. use of data to justify MP1; MP3. (generally) as mass increases, maximum speed increases; MP4. use of data to justify MP3; MP5. (generally) as power increases, mass increases; MP6. use of data to justify MP5; MP7. data for Car R does not fit either of these trends; MP8. any other relevant use of data e.g. power to mass ratios;	allow reverse arguments condone use of energy for power DOP DOP condone use of energy for power DOP allow idea that car R is an anomaly	4

Total for question 6 = 11 marks

Question number	Answer	Notes	Marks
7 (a)	correct voltmeter symbol drawn in parallel with any component; component is the resistor, X;		2
(b)	use of $V = I \times R$; calculation of total R; sum of resistances = total R; evaluation of resistance of X; e.g. $9.0 = 0.012 \times R_T$ $R_T = 750 \text{ } (\Omega)$ $750 = R_X + 250$ $(R_X =) 500 \text{ } (\Omega)$	seen anywhere correct calculation of voltage of 250Ω resistor evaluation of voltage of X e.g. $V_{250} = 0.012 \times 250$ $V_{250} = 3.0 \text{ } (V)$ $V_X = (9.0 - 3.0) = 6.0 \text{ } (V)$ $(R_X =) 500 \text{ } (\Omega)$	4

Total for question 7 = 6 marks

