Mark Scheme (Results)

November 2021

Pearson Edexcel International GCSE

In Physics (Single Award) (4SS0) Paper 1P

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)	B (gravitational); A is incorrect because any fuel burned in this process would decrease the chemical store C is incorrect because the speed of the elevators is constant D is incorrect because magnets are not involved in raising the elevators		1
		(ii)	D (mechanically); A is incorrect because the motor and elevator are not in thermal contact B is incorrect because any transfer by radiation would not be useful C is incorrect because there is no electrical circuit between the motor and elevators		1
	(b)	(i)	D (the rate of energy transferred); A is incorrect because it does not include the amount per unit time B is incorrect because it does not include the amount per unit time C is incorrect because it refers to charge, not energy		1
		(ii)	D (2200 W); A is incorrect because this is the correct conversion for mW B is incorrect because this is the correct conversion for cW C is incorrect because this involves multiplying by 100, not 1000		1
		(iii)	C (3600 s); A is incorrect because this is the number of hours in one day B is incorrect because this is the number of seconds in one minute D is incorrect because this is the number of seconds in one day		1

Total for question 1 = 5 marks

Question number	Answer	Notes	Marks
2 (a) (i)	acceleration = **change in** velocity / time (taken);	allow standard symbols and rearrangements e.g. a = v-u / t allow Δv reject a = v / t	1
(ii)	substitution; rearrangement; evaluation; e.g. 1.6 = 22-14 / t t = 22-14 / 1.6 (t =) 5.0 (s)	 allow 5 (s)	3
(iii)	(unbalanced) force = mass × acceleration;	allow standard symbols and rearrangements e.g. F = m × a	1
(iv)	substitution; evaluation; evaluation correctly rounded to 2s.f.; e.g. F = 1200 × 1.6 (F =) 1920 (N) (F =) 1900 (N)	 mark independently	3
(b)	idea that the car slows down; due to friction / air resistance / drag;	allow idea that car becomes stationary ignore "motion decreases"	2

Total for question 2 = 10 marks

Question number			Answer	Notes	Marks
3	(a)		both symbols for voltmeter and ammeter drawn correctly; ammeter drawn in series with resistor; voltmeter drawn in parallel with resistor;	allow if drawn in parallel with cell	3
	(b)	(i)	power = current × voltage;	allow standard symbols and rearrangements e.g. P = I × V ignore C, c for current	1
		(ii)	substitution; evaluation; e.g. P = 0.00191 × 9.00 (P =) 0.0172 (W)	allow sub in A or mA -1 for POT error 17, 17.2, 17.19 = 1 mark allow 0.017, 0.01719 (W)	2
	(c)		a current that only has one direction / eq;	allow current that flows in same direction	1
	(d)		current would decrease; (because) resistance of circuit is greater than before;	allow current is now half / 0.955 (mA) / 0.000955 (A) allow resistance is double	2

Total for question 3 = 9 marks

Question number	Answer	Notes	Marks
4 (a)	sensible linear scales; axes labelled with units; all points plotted correctly within ½ a small square;	e.g. occupy >50% of the grid and not multiples of 3 etc. check 3rd and 6th point <table><tr><th>Wind speed in m/s</th><th>Wavelength of waves on the surface of the sea in m</th></tr><tr><td>0</td><td>0</td></tr><tr><td>5</td><td>12</td></tr><tr><td>10</td><td>49</td></tr><tr><td>15</td><td>110</td></tr><tr><td>20</td><td>196</td></tr><tr><td>25</td><td>306</td></tr><tr><td>30</td><td>441</td></tr><tr><td>35</td><td>600</td></tr></table>	3
(b)	smooth curve that passes through all data points;	allow if within ½ a small square of each data point allow ecf from plotting in (a)	1
(c)	idea that as wind speed increases the wavelength increases; idea of non-linear relationship;	ignore positive correlation "wavelength proportional to wind speed **squared**" scores both marks	2
(d)	350 m wavelength is achieved when wind speed is 26-27 m/s; ship is shorter than wavelength so is not likely to be damaged;	allow RA e.g. 29 m/s wind speed gives wavelength of 400-450 m DOP	2

Total for question 4 = 8 marks

Question number	Answer	Notes	Marks
5	any five from: MP1. electrical/electric current is a.c.; MP2. loudspeaker coil has a current / magnetic field; MP3. interaction between magnetic fields; MP4. causes a force to be exerted on speaker (cone); MP5. a.c. changes direction; MP6. magnetic field of coil changes direction; MP7. force on speaker (cone) changes direction; MP8. causes speaker (cone) to vibrate; MP9. making longitudinal wave;	allow 'interferes' for interacts ignore references to attraction / repulsion allow vibrates the air	5

Total for question 5 = 5 marks

Question number			Answer	Notes	Marks
6	(a)	(i)	22 (K);	allow 22.15	1
		(ii)	idea that this is absolute zero; speed / KE / pressure would be zero at this temperature;		2
	(b)		conversion of cm to m; evaluation of area; substitution into pressure = force / area rearrangement; evaluation of force; e.g. side length = 0.054 (m) area = (0.054^2 =) 0.0029 (m^2) 7500 = force / 0.0029 force = 7500 × 0.0029 (force =) 22 (N)	allow in cm^2 or m^2 allow ecf from incorrect area if clear from working allow 0.002916 (m^2) allow 21-22 (N) 405 (N) = 4 marks (not finding area) 218 700 (N) = 4 marks (not converting from cm) 40 500 (N) = 3 marks (not finding area or converting from cm)	5

Total for question 6 = 8 marks

Question number			Answer	Notes	Marks
7	(a)		beta;	allow electron(s) reject beta plus	1
	(b)	(i)	idea of allowing for background radiation;	mention of background radiation is sufficient for the mark	1
		(ii)	count rate;	allow count allow corrected count rate	1
	(c)	(i)	time taken; and either of for (radio)activity to halve; for half of the (radioactive) nuclei / atoms / isotope to decay;	allow "how long it takes" reject "half the time" allow count rate for activity ignore mass, substance	2
		(ii)	<u>curve</u> drawn starting at same point as existing curve; <u>curve</u> is consistently drawn below existing curve;		2

Total for question 7 = 7 marks

Question number	Answer	Notes	Marks
8 (a)	straight arrow drawn in line with the comet pointing from comet towards the star;	judge straightness by eye	1
(b)	use of weight = mass × g; substitution OR rearrangement; evaluation; unit; e.g. $W = m \times g$ $4.4 \times 10^9 = 2.2 \times 10^{14} \times g$ OR $g = W / m$ $(g =) 2.0 \times 10^{-5}$ N/kg	seen or implied allow m/s^2	4
(c)	any three from: MP1. distance of comet from star increases; MP2. gravitational field strength decreases; MP3. mass of comet remains constant; MP4. (therefore) gravitational force decreases; MP5. direction of force changes (because comet's direction changes);	allow comet gets further from star allow mass decreases if suitably qualified	3

Total for question 8 = 8 marks