

Mark Scheme (Results)

Summer 2022

Pearson Edexcel GCSE
In Combined Science Physics
(1SC0) Paper 2PF

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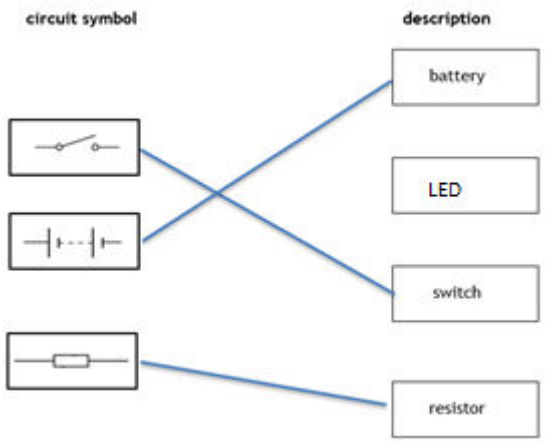
General Marking Guidance

- 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.

Mark schemes have been developed so that the rubrics of each mark scheme reflects the characteristics of the skills within the AO being targeted and the requirements of the command word. So for example the command word 'Explain' requires an identification of a point and then reasoning/justification of the point.
Explain questions can be asked across all AOs. The distinction comes whether the identification is via a judgment made to reach a conclusion, or, making a point through application of knowledge to reason/justify the point made through application of understanding. It is the combination and linkage of the marking points that is needed to gain full marks.
When marking questions with a 'describe' or 'explain' command word, the detailed marking guidance below should be consulted to ensure consistency of marking.

Assessment Objective		**Command Word**	
Strand	**Element**	**Describe**	**Explain**
AO1*		An answer that combines the marking points to provide a logical description	An explanation that links identification of a point with reasoning/justification(s) as required
AO2		An answer that combines the marking points to provide a logical description, showing application of knowledge and understanding	An explanation that links identification of a point (by applying knowledge) with reasoning/justification (application of understanding)
AO3	1a and 1b	An answer that combines points of interpretation/evaluation to provide a logical description	
AO3	2a and 2b		An explanation that combines identification via a judgment to reach a conclusion via justification/reasoning
AO3	3a	An answer that combines the marking points to provide a logical description of the plan/method/experiment	
AO3	3b		An explanation that combines identifying an improvement of the experimental procedure with a linked justification/reasoning

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Question number	Answer	Additional guidance	Mark
1 (a)		1 mark for each correct line. more than one line to or from any box loses the mark for that symbol.	**(3)** **AO1**

Question number	Answer	Additional guidance	Mark
1 (b)(i)	**B** electrons A C and D are incorrect because they do not move through a conductor to create an electric current.		**(1)** **AO1**

Question number	Answer	Additional guidance	Mark
1 (b)(ii)	substitution (1) (charge =) 0.21 x 300 evaluation (1) (charge =) 63 unit (1) coulombs	 award full marks for the correct answer without working independent mark C(oulombs) c As	**(3)** **AO2** **AO1**

Total 7 marks

Question number	Answer	Additional guidance	Mark
2 (a)(i)	(soft) iron (1)	allow (in this context) nickel (alloys) cobalt steel	**(1)** **AO1**

Question number	Answer	Additional guidance	Mark
2 (a)(ii)	would be magnetised (when switch is closed) (1) would be demagnetised when switch is open (1)	(is) magnetic (is) electromagnetic induced magnetism magnetism can be switched off accept for either mark not permanent magnet **or** temporary magnet	**(2)** **AO1**

Question number	Answer	Additional guidance	Mark
2 (b)(i)	the <u>Earth/world/planet</u> has a magnetic field / core(1)	<u>Earth/world/planet</u> has a north (and south) pole	**(1)** **AO3**

Question number	Answer	Additional guidance	Mark
2(b)(ii)	direction (of the field) has changed / rotated (1) (strength of the) field has **increased** (1)	(from 0 to) 36° from N to NE field is stronger (changed by) 16.52 (μT) numbers have increased (from 46.67 to 63.19)	**(2)** **AO3**

Question number	Answer	Additional guidance	Mark
2 (b)(iii)	a description including **three** from use of equipment to measure distance (1) ruler / tape measure obtain a measurement (1) measure / record strength of the field (at a certain point) change the conditions (1) move the phone / magnet (to a different location) process the results (1) e.g. • draw a diagram • make a table • compare results/values • see when (field) stays constant	measure the distance between phone and magnet rotate the phone/magnet	**(3)** **A03**

Total 9 marks

Question number	Answer	Additional guidance	Mark
3 (a) (i)	B live and neutral A , C and D are incorrect because the terms positive and negative are not used in the context of wires in a mains cable.		**(1)** **AO1**

Question number	Answer	Additional guidance	Mark
3 (a)(ii)	a description that incudes any **two** from melts (1) if there is a fault (1) breaks the circuit (1) stops current (1) safety (1)	 blows / breaks if current too large prevents overheating / fire if no other marks scored allow 1 mark for identifying the fuse.	**(2)** **AO1**

Question number	Answer	Additional guidance	Mark
3 (b)	conversion of time (1) 1 x 60 (s) substitution (1) (I =) $\frac{9000}{230 \text{ (x 60)}}$ evaluation (1) (I =) 0.65 (A)	 any value that rounds to 0.65; e.g. 0.65217 0.7 0.6 award full marks for the correct answer without working allow 2 marks for answer of 39(.130)	**(3)** **AO2**

Question number	Answer	Additional guidance	Mark
3 (c) (i)	An explanation linking energy has been dissipated /wasted / lost (1) as thermal energy (1)	 energy has been transferred mechanically useful energy is less than total energy supplied identifies difference of 600(J) heat to the surroundings ignore sound accept (some) energy has been transferred to thermal store for 2 marks	**(2)** **AO3**

Question number	Answer	Additional guidance	Mark
3 (c)(ii)	substitution (1) (efficiency =) $\frac{8400}{9000}$ evaluation (1) (efficiency =) 0.93	 0.9 93(%) allow values that round to 0.93 or 93(%) award full marks for the correct answer without working	**(2)** **AO2**

Total 10 marks

Question number	Answer	Additional guidance	Mark
4 (a)	B A, C and D are incorrect because these do not measure the vertical change in height above the earth's surface.		**(1)** **AO1**

Question number	Answer	Additional guidance	Mark
4 (b)(i)	joule(s)	J j Nm newton metre(s) kg m^2 s^{-2} kg m^2/s^2 Ignore SI prefixes do not accept nm	**(1)** **AO1**

Question number	Answer	Additional guidance	Mark
4 (b)(ii)	selection of and substitution into E = F x d (1) 1960 = weight x 4.0 rearrangement and evaluation (1) (weight =) 490 (N)	accept P x t = F x d 436 x 4.5 = weight x 4.0 490.5 or 491 award full marks for the correct answer without working 530 scores 1 mark (used data to calculate median value)	**(2)** **AO2**

Question number	Answer	Additional guidance	Mark
4 (b)(iii)	selection of and substitution into P = E÷t (1) 425 = 2040 ÷ t rearrangement and evaluation (1) (time =) 4.8 (s)	 0.208 scores 1 mark 867000 scores 1 mark award full marks for the correct answer without working	**(2)** **AO2**

Question number	Answer	Additional guidance	Mark
4 (b)(iv)	values for power selected and added (1) $\frac{440 + 436 + 425}{(3)}$ evaluation (1) 434 (W)	 $\frac{1301}{(3)}$ accept values that round to 434 e.g. 433.667 accept 436 (median average) for 2 marks 1301 scores 1 mark 1017(.666) scores 1 mark award full marks for the correct answer without working	**(2)** **AO2**

Question number	Answer	Additional guidance	Mark
4 (c)	estimate of weight (1) measure (actual) weight (1)	ignore reaction time use scales ignore repeating measurements	**(2)** **A03**

Total 10 marks

Question number	Answer	Additional guidance	Mark
5 (a)(i)	Substitution and evaluation (1) 15 (Ω)		**(1)** **AO2**

Question number	Answer	Additional guidance	Mark
5 (a)(ii)	select / recall (1) (power =) V x I or (power =) I^2 x R or (power =) $\frac{V^2}{R}$ substitution and evaluation (1) (power =) 1.4 (W)	 (power =) 4.5 x 0.3 0.3^2 x 15 $\frac{4.5^2}{15}$ allow 1.3(5) (W) award full marks for the correct answer without working	**(2)** **AO2**

Question number	Answer	Additional guidance	Mark
5 (b)	an explanation linking any **three** from: lamp in second circuit is dimmer (than lamp in first circuit) (1) current in second circuit is less (than in first circuit) (1) potential difference / voltage across each lamp (in second circuit is) less / shared (1) idea that power of each lamp (in second circuit) is less / shared (1) the (total) resistance of the second circuit is more (than in first circuit) (1)	accept reverse arguments throughout	**(3)** **AO1**

Question number	Answer	Additional guidance	Mark
5 (c)	a diagram of a circuit including **all** of the following: power supply / cell(s) / battery, identifiable resistance wire an ammeter a voltmeter (1) plus any **two** from ammeter in series (1) voltmeter in parallel (1) indication of tapping off / using 50cm of resistance wire (1)	accept symbols accept ohmmeter with resistance wire only ignore lamp(s) / additional resistors allow ohmmeter (across wire) instead of ammeter and voltmeter for 1 mark e.g. (crocodile) clips	**(3)** **AO2**

Question number	Answer	Additional guidance	Mark
5 (d)	d.c. - (current) in one direction only (1) a.c. - (current) changes direction (1)	one way both ways	**(2)** **AO1**

Total 11 marks

Question number	Answer	Mark
6 (a)	[x] **B** bigger than in water less than water A is incorrect because the density of steam is less than water. C is incorrect because the space between the particles increases. D is incorrect because the space between the particles increases and density of steam is less than water.	**(1)** **AO1**

Question number	Answer	Additional guidance	Mark
6 (b)	calculation of change in volume (1) (530 cm^3 – 490 cm^3) = 40 (cm^3)	measurement mark – using scale	**(4)** **AO2**
	substitution (1) $7.9 = \frac{mass}{40}$	allow use of incorrect volume	
	rearrangement and evaluation (1) (mass = 7.9 x 40) (mass =) 316 (g)	answers without working 316 scores 3 marks 0.316 kg scores 3 marks 316 to any other power of 10 scores 2 marks 4187 or 3871 scores 2 marks (incorrect volume)	
	evaluation to 2 sig fig (1) 320 (g)	any answer written to 2sf independent mark answers without working 320 scores 4 marks 320 to any other power of ten scores 3 marks 4200 scores 3 marks 3900 scores 3 marks	

Question number	Answer	Additional guidance	Mark
6 (c)	an explanation linking density of wood less (than that of water) (1) less (volume of) water displaced (than volume of wood) (1)	 allow wood floats / should be submerged allow wood absorbing water allow (idea of) incorrect volume reading allow (idea that) the volume cannot be measured this way	**(2)** **AO2**

Question number	Indicative content	Mark
***6(d)**	Answers will be credited according to candidate's deployment of knowledge and understanding of the material in relation to the qualities and skills outlined in the generic mark scheme. The indicative content below is not prescriptive and candidates are not required to include all the material which is indicated as relevant. Additional content included in the response must be scientific and relevant. Equipment • Thermometer • Measuring cylinder / balance • Power supply • Stirrer • Joule meter / ammeter / voltmeter • Stopwatch / clock Measurements • Mass / volume of water • Initial / final / change of temperature of water • Voltage / current / energy / power • Time (heated for) Detail • Lid/insulation to reduce energy loss • Ensure heater fully immersed / keep stirring the water • Use of equation $\Delta Q = m \times c \times \Delta\theta$ / calculation of input energy • Repeat and find average • Plot graph of temp change and time / energy Credit can be given for correctly labelled diagrams	**(6)** **AO1**

Level	Mark	Descriptor
	0	• No rewardable material.
Level 1	1-2	• Demonstrates elements of physics understanding, some of which is inaccurate. Understanding of scientific, enquiry, techniques and procedures lacks detail. (AO1) • Presents a description which is not logically ordered and with significant gaps. (AO1)
Level 2	3-4	• Demonstrates physics understanding, which is mostly relevant but may include some inaccuracies. Understanding of scientific ideas, enquiry, techniques and procedures is not fully detailed and/or developed. (AO1) • Presents a description of the procedure that has a structure which is mostly clear, coherent and logical with minor steps missing. (AO1)
Level 3	5-6	• Demonstrates accurate and relevant physics understanding throughout. Understanding of the scientific ideas, enquiry, techniques and procedures is detailed and fully developed. (AO1) • Presents a description that has a well-developed structure which is clear, coherent and logical. (AO1)

Level	Mark	Additional Guidance	General additional guidance – the decision within levels e.g. - At each level, as well as content, the scientific coherency of what is stated will help place the answer at the top, or the bottom, of that level.
	0	No rewardable material.	
Level 1	1–2	Additional guidance one measurement **or** two items of equipment **or** one piece of detail	Possible candidate responses measure the temperature of the water to start with **or** the student needs a power supply and a thermometer **or** insulated material around the beaker
Level 2	3–4	Additional guidance two items of equipment and at least one measurement **or** one piece of equipment and two measurements **or** two items of equipment and one piece of detail **or** one measurement and one piece of detail	Possible candidate responses The student needs a measuring cylinder to measure the volume of water. They also need a thermometer **Or** Measure the temperature rise of the water and use a balance to measure the mass **or** They need a power supply for the heater and a voltmeter. Keep the heater in the water. **or** Measure temperature rise of the water. Keep stirring the water all the time.
Level 3	5–6	Additional guidance two items of equipment and two measurements and one piece of detail.	Possible candidate responses The student needs a balance to find the mass of water. They also need a thermometer to measure the rise in temperature of the water. Then use the equation $\Delta Q = m \times c \times \Delta\theta$

Total 13 marks

Total for paper = 60 marks