Mark Scheme (Results)

Summer 2024

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

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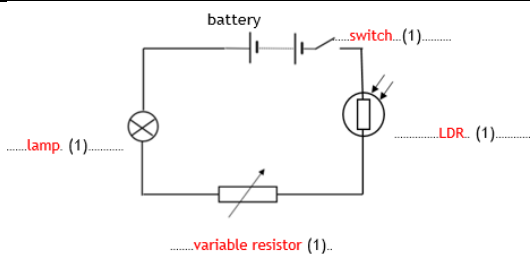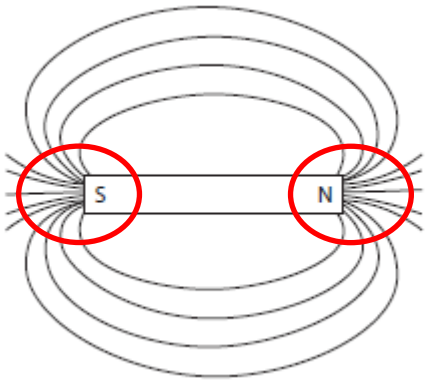
General Marking Guidance

- 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.

Question	Answer	Additional guidance	Mark
1(a)		**accept** lines drawn from the words in the box to the spaces **accept** bulb for lamp	**(4)** **AO1.1**
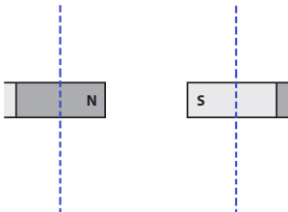
Question	Answer	Additional guidance	Mark
1(b)	substitution (1) (current =) 1.2 4(.0) evaluation (1) (current =) 0.3(0) (A)	award full marks for the correct answer without working	**(2)** **AO2.2**

(Total for question 1 = 6 marks)

Question	Answer	Additional guidance	Mark
2(a)(i)	arrow(s) going from N to S on any field line (1)	any contradictory arrow loses the mark	**(1) AO1.1**

Question	Answer	Additional guidance	Mark
2(a)(ii)	**X** drawn close to N or S (1)	any X drawn outside either ellipse loses the mark - judge by eye	**(1) AO1.1**

Question	Answer	Additional guidance	Mark
2(a)(iii)	**one** reason from: where the (field) lines are close(st) (to each other) (1) close to the pole(s) (1)	accept where there are most lines ignore close to the magnet	**(1) AO1.1**

Question	Answer	Additional guidance	Mark
2(b)(i)	at least 1 straight line between the N and S (1) at least 1 curved line between N and S (1)	 ignore lines that start or end outside the region identified do not accept any contradictory lines within the region ignore any arrows	**(2)** **AO2.2**

Question	Answer	Additional guidance	Mark
2(b)(ii)	(it would) move towards the other magnet (1)	idea of attraction/joining together	**(1)** **AO3.3**

Question	Answer	Mark
2(c)(i)	**B** iron *A,C and D are not magnetic materials*	**(1)** **AO1.1**

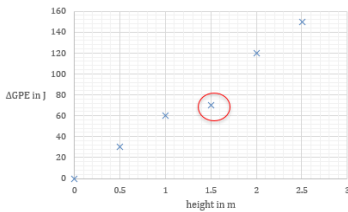| Question	Answer	Additional guidance	Mark
2(c)(ii)	A description to include: method (1) put magnet near paper clips outcome (1) (picks up/attracts) more paper clips OR (has the) longest chain OR (picks up/attracts from a) greater distance	method can be included with the outcome in one sentence for two marks e.g. see which magnet attracts the most paper clips	**(2)** **AO1.2**

(Total for question 2 = 9 marks)

Question	Answer	Additional guidance	Mark
3(a)(i)	substitution (1) (work done =) 1200 × 8(.0) evaluation (1) (work done =) 9600 unit (1) J	 award 2 marks for the correct answer without working independent mark accept j OR joule(s) OR N m ignore n m (lower case n) accept 9.6 kJ (kilojoules) for three marks	(3) AO2.1

Question	Answer	Additional guidance	Mark
3(a)(ii)	A description to include **two** from: kinetic (energy store) (1) (kinetic energy store is) transferred to thermal (energy store) (1) energy of the	ignore references to GPE KE accept heat for thermal thermal (energy store) increases accept arrow for 'transferred to'	(2) AO2.1

	surroundings increases (1) OR energy is dissipated (to surroundings) (1)	energy is transferred to the air/ground/surroundings	

Question	Answer	Mark
3(b)	**C** 900 N ***A, B and D*** *do not give the weight of the box.*	**(1)** **AO1.1**

Question	Answer	Additional guidance	Mark
3(c)(i)	circle around (1.5, 70) (1)		**(1)** **AO3.1**

Question	Answer	Additional guidance	Mark
3(c)(ii)	correct value of ΔGPE from the graph (1) 120 substitution (1) <u>(120)</u> 5	(power =) <u>their value of energy</u> 5 their energy value must be a number between 0 and 160	**(3)** **AO3.2**

	evaluation (1) 24 (W)	evaluation of <u>their value of energy</u> 5 award full marks for the correct answer without working	

(Total for question 3 = 10 marks)

Question	Answer	Additional guidance	Mark
4(a)(i)	30 (°C) (1)		**(1)** **AO3.1**

Question	Answer	Additional guidance	Mark
4(a)(ii)	substitution (1) $(c =) \dfrac{96\,000}{0.82 \times 30}$ evaluation (1) $(c =)$ 3900 (J/kg °C)	allow ECF from (a)(i) throughout allow values that round to 3900 e.g. 3902.4 (J/kg °C) award full marks for the correct answer without working	**(2)** **AO3.1**

Question	Answer	Additional guidance	Mark
4(b)(i)	substitution (1) $(P =) \dfrac{130\,000}{87}$ evaluation (1) $(P =)$ 1494 (W)	 award two marks for the correct answer without	**(3)** **AO2.1**

		working	
	value to 2sf (1) 1500 (W)	independent mark for **any** number to 2sf	
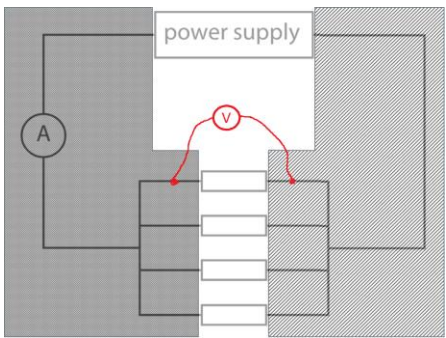
Question	Answer	Additional guidance	Mark
4(b)(ii)	substitution (1) (efficiency =) $\dfrac{96\,000}{130\,000}$ evaluation (1) (efficiency =) 0.74	 accept values that round to 0.74 e.g. 0.7385 accept 74 % for 2 marks allow 74 without % sign for 1 mark only allow 0.73 or 73% for 1 mark award full marks for the correct answer without working	**(2)** **AO2.1**

Question	Answer	Mark
4(c)(i)	**A** earth **B, C and D** *would not help to protect from shock*	**(1)** **AO1.1**

Question	Answer	Additional guidance	Mark
4(c)(ii)	an explanation linking **two** from: if the current is too large (1) (fuse) melts/breaks (1) switches off (current/circuit) (1)	ignore references to p.d./voltage current is greater than fuse value/size/rating blows stops current OR stops flow of charge	**(2)** **AO1.1**

(Total for question 4 = 11 marks)

Question	Answer	Mark
5(a)	**The only correct answer is B** *A, C* and *D* are not correct because they do not add up to the current entering the junction AND they do not equal the current coming from the battery	**(1)** **AO1.1**

Question	Answer	Additional guidance	Mark
5(b)(i)	voltmeter in parallel with resistors (1)	 one voltmeter connection in each shaded region	**(1)** **AO1.2**

Question	Answer	Additional guidance	Mark
5(b)(ii)	36(.4) (mA) (1)	allow 36 to 37 inclusive may be seen in table in Figure 12	**(1)** **AO3.2**

Question	Answer	Additional guidance	Mark
5(b)(iii)	substitution into $V = IR$ (1) $6(.00) = 9.1 (\times 10^{-3}) \times R$ rearrangement (1) (R =) $\dfrac{6(.00)}{9.1 (\times 10^{-3})}$ evaluation (1) 660 (Ω)	allow substitution and rearrangement in either order accept 18.2/2 or 27.3/3 or (36 to 37)/4 in place of 9.1 allow substitution of correct values into a visible, incorrectly rearranged algebraic equation for this mark only (R =) $\dfrac{V}{I}$ allow values that round to 660 e.g. 659.3 award full marks for the correct answer without working. value rounding to 660 to any other power of 10 scores 2 marks	**(3) AO2.1**

Question	Answer	Additional guidance	Mark
5(b)(iv)	an explanation linking: (total) resistance increases (1)		**(3) AO3.2**

	(because) current decreases (1)	fewer paths for the current	
	(and) voltage stays the same (1)	resistance calculations supporting increasing resistance	

Question	Answer	Additional guidance	Mark
5(c)	substitution (1) $P = 9.0 \times 230$ evaluation (1) 2100 (W)	allow values that round to 2100 (W) e.g. 2070 (W) award full marks for the correct answer without working	**(2)** **AO2.1**

(Total for question 5 = 11 marks)

Question	Answer	Additional guidance	Mark
6(a)		allow substitution and rearrangement in either order	**(3)** **AO2.1**
	substitution (1) $$8.96 = \frac{14.1}{V}$$	allow substitution of correct values into a visible, incorrectly rearranged algebraic equation for this mark only	
	rearrangement (1) $$(V =) \frac{14.1}{8.96}$$	$$(V =) \frac{m}{\rho}$$	
	evaluation (1) $(V =) 1.57 \ (cm^3)$	accept numbers that round to 1.57 allow 1.6 award full marks for the correct answer without working allow 1.6 or answers rounding to 1.57 to any other power of 10 scores 2 marks	

Question	Answer	Additional guidance	Mark
6(b)	an explanation linking: density of solid is greater (than density of liquid) (1)	solids are dens**er**	**(2)** **AO1.1**

| | (because) distance between particles in solid is less (than distance between particles in liquid) (1) | accept in solids, particles are clos**er**

accept in solids, there are **more** particles per unit volume / particles are **more** (tightly) packed | |

Question	Answer	Additional guidance	Mark
6(c)	substitution into $Q = m \times L$ (1)

$(Q =)$ 60 $(\times 10^{-3}) \times$ 2.26 $(\times 10^6)$

evaluation (1)

1.36×10^5 (J) |

136 000 (J)
135 600 (J)

accept numbers that round to 1.4×10^5 (J)

award full marks for the correct answer without working

any answer rounding to 1.4 to any other power of 10 scores 1 mark | **(2)**
AO2.1 |

Question	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. AO1 - ice melts at 0 °C - water boils at 100 °C 0 to 1 minute temperature of ice rising 1 to 7 minutes ice melting 1 to 7 minutes energy supplied is used to increase (potential) energy of ice particles 1 to 7 minutes energy supplied is used to break bonds (between ice particles) 7 to about 15 minutes temperature of water rising 7 to about 15 minutes energy supplied is used to increase (kinetic) energy of water particles - about 15 to 20 minutes water boiling - about 15 to 20 minutes energy supplied is used to break bonds (between water particles)	**(6)** **AO1.2**

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 limited description including isolated facts for any section	Possible candidate responses temperature of ice/solid increases OR ice melts OR water boils
Level 2	3–4	Additional guidance limited description relating knowledge and understanding to interpretation of graph in **one** section plus an isolated fact	Possible candidate responses temperature of ice/solid increases for 1 minute AND temperature of the water increases
Level 3	5–6	Additional guidance detailed description relating knowledge and understanding to interpretation of graph in **two** sections plus an isolated fact	Possible candidate responses temperature of ice/solid increases for 1 minute AND ice melting while 0 °C for 6 minutes AND water boils

(Total for question 6 = 13 marks)