Pearson Edexcel

Mark Scheme (Results)

Summer 2018

Pearson Edexcel GCSE
In Combined Science (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

*there will be situations where an AO1 question will include elements of recall of knowledge directly from the specification (up to a maximum of 15%). These will be identified by an asterisk in the mark scheme.

Question Number:	Answer	Mark
1(a)(i)	a power station	(1) AO 1 1

Question Number:	Answer	Mark
1(a)(ii)	the national grid	(1) AO 1 1

Question Number:	Answer	Mark
1(a)(iii)	heat loss is reduced	(1) AO 1 1

Question Number:	Answer	Mark
1(b)	D transformers have primary and secondary coils. **The only correct answer is D** ***A*** *is not correct because transformers can step-up and step-down voltages* ***B*** *is not correct because transformers can step-up and step-down voltages* ***C*** *is not correct because transformers only work with alternating current*	(1) AO 1 1

Question Number:	Answer	Additional Guidance	Mark
1(c)	substitution (1) $(I_s) = \frac{230 \times 0.02}{5.0}$ evaluation (1) 0.9(A)	 accept 0.92 (A) award full marks for the correct answer without working	(2) AO 2 1

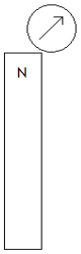
(Total for Question 1 = 6 marks)

Question Number:	Answer	Mark
2(a)	B | small | large **The only correct answer is B** ***A*** *is not correct because the current is small* ***C*** *is not correct because the distance from the wire is large* ***D*** *is not correct because the distance from the wire is large*	**(1)** AO 1 1

Question Number:	Answer	Mark
2(b)	B iron **The only correct answer is B** ***A*** *is not correct as copper is non-magnetic* ***C*** *is not correct as plastic is non-magnetic* ***D*** *is incorrect, as steel is only suitable for a permanent magnet*	**(1)** AO 1 1

Question Number:	Answer	Additional guidance	Mark
2(c)	a description to include: remove the magnet (from the paper clips)(1) paperclips no longer attracted to each other (1)	 accept no longer magnetic	**(2)** AO 3 1a AO 3 1b

Question Number:	Answer	Additional guidance	Mark
2(d)	a description to include: use a compass (1) always points in the same direction / will point north (1)	 accept reasonable alternatives such as suspended magnet needles on cork in water	**(2)** AO 3 2a

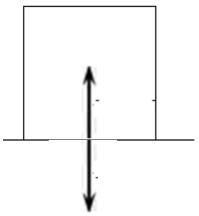
Question Number:	Answer	Additional guidance	Mark
2(e)(i)		N must be at the end of the bar, not at the end of the compass needle	**(1)** AO 3 3a

Question Number:	Answer	Additional guidance	Mark
2(e)(ii)	any two developments from: use a compass in various positions / more compasses (1) plot more points/mark direction of compass(point)/ join the dots (1) sprinkle/add iron filings (1) give more than one (magnetic field) line (1)	marks can be taken from text or diagram allow 'around' 'on', 'near' the magnet etc series of dots / several compasses end to end	**(2)** AO 3 3a

(Total for Question 2 = 9 marks)

Question Number:	Answer	Mark
3(a)(i)	C gravitational **The only correct answer is C** ***A*** *is not correct as the moon does not touch the Earth* ***B*** *is not correct as the Earth does not carry a charge* ***D*** *is not correct as the Earth has a magnetic field but it does not extend far enough to have any effect on the moon*	**(1)** AO 2 1

Question Number:	Answer	Mark
3(a)(ii)	C energy **The only correct answer is C** ***A*** *is not correct as velocity is a vector quantity* ***B*** *is not correct as momentum is a vector quantity* ***D*** *is not correct as acceleration is a vector quantity*	**(1)** AO 1 1

Question Number:	Answer	Additional guidance	Mark
3(b)	 arrowed line vertically downwards (anywhere) (1) same length as vertical arrow upwards (1)	more than one line drawn 1 mark maximum judge by eye	**(2)** AO 1 1

Question Number:	Answer	Additional guidance	Mark
3(c)(i)	An explanation linking: wheel rubs on axle (as it rotates) OR friction (between the wheel and the axle) (1) causes heating/transfer of (thermal) energy/ work being done (1)	 allow generates heat	**(2)** AO 1 1

Question Number:	Answer	Additional guidance	Mark
3(c)(ii)	any one from: lubrication/oil (1) (ball) bearings / ball-race (1) go slower (1)	 anything that lubricates – grease etc.	**(1)** AO 1 1

Question Number:	Answer	Mark
3(d)(i)	efficiency = **useful** (energy transferred by the device) (x100) total (energy supplied to the device)	**(1)** AO 1 1

Question Number:	Answer	Additional guidance	Mark
3(d)(ii)	determine useful energy (1) 7500 -3200 = 4300		**(1)** AO 2 1

Question Number:	Answer	Additional guidance	Mark
3(d)(iii)	substitution (1) efficiency = $\frac{4300}{7500}$ evaluation (1) 0.57	 allow ECF from (i) and/ or (ii) for 1 mark maximum accept 57(.33)(%), 0.6, 60(%) award full marks for the correct answer without working	**(2)** AO 2 1

(Total for Question 3 = 11 marks)

Question Number:	Answer	Mark
4(a)	D diode **The only correct answer is D** ***A*** *is not correct as for a thermistor, current would increase with potential difference from the origin* ***B*** *is not correct as current against p.d for a resistor gives a straight line from the origin* ***C*** *is not correct as current against p.d for a resistor gives a straight line from the origin*	**(1)** AO 1 1

Question Number:	Answer	Additional guidance	Mark
4(b)(i)	substitution (1) (P)= 0.12 x 0.24 evaluation (1) 0.029 (W)	 accept 0.03 (W), 0.0288(W) 0.028 (W) power of ten error is awarded 1 mark award full marks for the correct answer without working	**(2)** AO 2 1

Question Number:	Answer	Additional guidance	Mark
4(b)(ii)	chooses /uses (1) E= V x I x t evaluation (1) 1.4 (J)	E =0.3 x0.13 x35 accept an answer that rounds to 1.4 (J) e.g. 1.365(J) a maximum of 1 mark is awarded in the case of a power of ten error award full marks for the correct answer without working	**(2)** AO 2 1

Question Number:	Answer	Additional guidance	Mark
4(b)(iii)	substitution (1) (Q)=0.13 x 35 evaluation (1) 4.6 (C)	 accept an answer that rounds to 4.6 e.g. 4.55 or in this context allow 4.5 power of ten error is awarded 1 mark award full marks for the correct answer without working	**(2)** AO 2 1

Question Number:	Answer	Additional guidance	Mark
4(c)	a comment that makes reference to any three of the following points: • idea that the current increases with the p.d. /voltage (1) • until (current) reaches a constant value (1) • the current is not directly proportional to p.d. (1) • uses idea that the values do not go up in equal steps / does not show doubling	 (staying) at 0.13(A)	**(3)** AO 3 2a AO 3 2b

(Total for Question 4 = 10 marks)

Question number:	Answer	Additional guidance	Mark
5(a)(i)			**(4)** AO 1 2
	(measurement of) the mass of water (1)	accept volume / weight of water ignore amount	
	(measurement of) the temperature (rise/change) (1)	accept (take) thermometer reading	
	(measurement of) the energy supplied / from heater (1)	accept (take) reading of the joulemeter ignore 'change in thermal energy' (from equation)	
	detail of any of the above (1)	e.g. measure temp at the start and end or measure mass of empty cup or start and end readings on the meter	

Question Number:	Answer	Additional guidance	Mark
5(a)(ii)	any two improvements from: add lid /cover (1) add lagging / insulation (1) add a stirrer (1) use a more sensitive thermometer (1) ensure heater fully submerged (1)	both marks can be scored in one answer space ignore repeating readings ignore increase voltage / power / energy ignore use of clamp to hold thermometer / heater accept use better insulator or better insulated / thicker cup accept use calorimeter ignore use glass beaker unless cup is inside it ignore different type of cup accept use digital / electric thermometer / data logger	**(2)** AO 3 3b

Question Number:	Answer	Additional guidance	Mark
5(b)	100 (°C) (1)	accept any answer between and including 95 and 102 (possibility that it is not pure water and possibility of heat loss prevents reaching boiling point)	**(1)** AO 2 1

Question Number:	Answer	Additional guidance	Mark
5(c)	substitution (1) (Q =) $\frac{380 \times 3.34\ (\times 10^5)}{(1000)}$ evaluation (1) 1.27×10^5 (J)	 127 kJ 126920 (J) accept answers that round to 1.27×10^5 e.g. 1.2692×10^5 accept 130 kJ or 1.3×10^5 (J) POT error max. 1 mark award full marks for correct answer without working	**(2)** AO 2 1

Question Number:	Answer	Additional guidance	Mark
5(d)	recall and substitution (1) (density ρ)=$\frac{380}{410}$ evaluation (1) 0.93 (g/cm^3)	 allow substitution of a mass / a volume accept any value that rounds to 0.9 allow truncated 0.92 (g/cm^3) only accept 1(g/cm^3) if working shown. award full marks for correct answer without working	**(2)** AO 2 1

(Total for Question 5 = 11 marks)

Question Number:	Answer	Additional guidance	Mark
6(a)	substitution (1) (KE =) ½ x 68 x 12^2 evaluation (1) 4900 (J)	 ½ x 68000 x 12^2 scores 1 mark accept values that round to 4900(J) e.g. 4896(J) award full marks for correct answer without working	**(2)** AO 2 1

Question Number:	Answer	Additional guidance	Mark
6(b)	a description to include: kinetic energy (store) (of cyclist and /or bicycle) decreases / is transferred into(1) thermal energy (store) (of brakes / surroundings) increases (1)	 KE for kinetic energy allow heat for thermal allow brakes get hotter ignore sound energy accept kinetic (energy) to heat (energy) for 2 marks in this context	**(2)** AO 1 1

Question Number:	Answer	Additional guidance	Mark
6(c)	recall and substitution (1) 1600 = force x 28 rearrangement (1) (force) = $\frac{1600}{28}$ evaluation (1) 57 (N)	substitution and rearrangement in either order accept f, F or ? for force accept values that round down to 57 e.g. 57.14 award full marks for correct answer without working award 1 mark for answers of 44800 or 0.0175 **and** a correct expression relating work, force and distance	**(3)** AO 2 1

Question Number:	Answer	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 (example) 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. Indicative content • Description of an experiment which will allow work done over a given time to be measured. • E.g. running upstairs, step-ups, lifting weights • Apparatus to be used, weighing scales, known weights ruler, stop clock • Measurements to be made • E.g. weight of person/weights lifted, vertical distance moved, time taken. • Calculation of work done for each student using work done =force x distance moved in direction of force • Calculation of power for each student using power=work done/time taken Comparison of powers by lifting same weights, in a constant time and comparing the distance moved	**(6)** AO 2 2

Level	Mark	Descriptor
	0	• No awardable content
Level 1	1–2	• The plan attempts to link and apply knowledge and understanding of scientific enquiry, techniques and procedures, flawed or simplistic connections made between elements in the context of the question. (AO2) • Analyses the scientific information but understanding and connections are flawed. An incomplete plan that provides limited synthesis of understanding. (AO3)
Level 2	3–4	• The plan is mostly supported through linkage and application of knowledge and understanding of scientific enquiry, techniques and procedures, some logical connections made between elements in the context of the question. (AO2) • Analyses the scientific information and provides some logical connections between scientific enquiry, techniques and procedures. A partially completed plan that synthesises mostly relevant understanding, but not entirely coherently. (AO3)
Level 3	5–6	• The plan is supported throughout by linkage and application of knowledge and understanding of scientific enquiry, techniques and procedures, logical connections made between elements in the context of the question. (AO2) • Analyses the scientific information and provide logical connections between scientific concepts throughout. A well-developed plan that synthesises relevant understanding coherently. (AO3)

(Total for Question 6 = 13 marks)

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