Mark Scheme (Results)

Summer 2018

Pearson Edexcel GCSE

In Combined Science (1SC0) Paper 1PF

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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)	**B** 1.0 m/s **The only correct answer is B** *A 0.1 m/s is incorrect, being 1 metre every 10s, insect crawling pace* *C 10 m/s is incorrect, being an Olympic sprinter's pace, much too fast for 'walking'* *D 100 m/s is incorrect, being a very fast sport's car's pace*	**(1)** AO 1 1

Question Number	Answer	Mark
1(b)	weight / force (accept circle around weight if not contradicted on answer line)	**(1)** AO 1 2

Question Number	Answer	Additional guidance	Mark
1(c)	substitution (1) (F =) 0.10 x 2.0 evaluation (1) 0.2(0) unit (1) N	 100 x 2 (using 0.10kg = 100g) reject 0.10 x 2.0^2 and the follow up evaluation (equation given should be used) correct answer without working gets 2 marks allow 1 mark total for 2 with any other power of ten, so that includes 200 for example separate unit mark newtons / Newtons accept lowercase 'n' for the abbreviated unit accept kg ms^{-2} accept 200 g ms^{-2} for 3 marks	**(3)** AO 2 1

Question Number	Answer	Additional guidance	Mark
1(d)	• direction (1) • size (1)	answers only acceptable in given order or magnitude	**(2)** AO 2 1

(Total for Question 1 = 7 marks)

Question Number	Answer	Additional guidance	Mark
2(a)(i)	recall speed = $\frac{\text{distance}}{\text{time}}$	accept any correct rearrangement or use of s, d and t may use v for speed and x for distance ignore use of triangles	**(1)** AO 1 1

Question Number	Answer	Additional guidance	Mark
2(a)(ii)	substitution (1) (speed) = $\frac{220}{0.7(0)}$ evaluation (1) 310 (m/s)	allow ecf from part (i) for this mark only allow any numbers that round to 310 e.g. 314 award full marks for the correct answer without working	**(2)** AO 2 1

Question Number	Answer	Additional guidance	Mark
2(b)	an explanation linking: • measure across more than one (wavelength) (1) • divide by the number of wavelengths (1)	use a more accurate device (finer divisions) use a camera / picture/strobe(light) (so the waves are not moving) count the number of wavelengths must be talking about **measuring**, NOT changing the wavelength etc.	**(2)** AO 3 3b

Question Number	Answer	Additional guidance	Mark
2(c)	a description to include: • longitudinal – (vibrations) parallel to (direction of travel) (1) • transverse – (vibrations) at right angles to (direction of travel) (1) • (connection between) direction of travel with (direction of) vibrations (1)	back and forth (oscillations)/ compressions or rarefactions up and down (oscillations)	**(3)** AO 1 1

(Total for Question 2 = 8 marks)

Question Number	Answer	Additional guidance	Mark
3(a)(i)	kinetic (1)	**only** (adding another incorrect alternative negates)	**(1)** AO 2 1

Question Number	Answer	Additional guidance	Mark
3(a)(ii)	any one of increase the speed (of spinning) (1) increase the mass / weight (of the flywheel) (1)	 accept (idea of) faster ignore make it bigger	**(1)** AO 2 1

Question Number	Answer	Additional guidance	Mark
3(b)(i)	substitution (1) (ΔGPE =) 65 x 10 x 200 evaluation (1) 1.3 x 10^5 / 130 000 (J)	 allow substitution mark with 65000 (g) allow 1 mark for answers that round to 1.3 with any other power of ten do not allow 13000 award full marks for the correct answer without working	**(2)** AO 2 1

Question Number	Answer	Additional guidance	Mark
3(b)(ii)	substitution (1) (KE) ½×65×36(^{2}) squaring (1) 36^2 (=1296) (completing) evaluation (1) 42 120 / 4.2(1) x 10^4 (J)	 using 36 → 1170 (J) OR 36x2 → 2340 (J) scores 2 marks (apply power of ten error as well if occurring e.g. 117000 (J) gets 1 mark) award full marks for the correct answer without working allow 2 marks for answers that round to 4.2 with any other power of ten omitting ½ gives 84240(J) scores 2 marks	**(3)** AO 2 1

Question Number	Answer	Additional guidance	Mark
3(c)	a description to include 3 points from: • measure a distance (at the bottom) / use mark(er)s (certain distance apart) (1) • starting timer (at first mark(er)) (1) • stopping timer (at 2nd mark(er)) OR measures a time (interval) (1) • (use speed) = distance/time (1)	use a light gate (or equivalent sensors idea) not over whole slope for this mark point use of video / (speed) camera /interrupts the light beam accept any time measured for this mp including data logger OR timer / stopwatch	**(3)** AO 2 2

(Total for Question 3 = 10 marks)

Question Number	Answer	Additional guidance	Mark
4(a)	any two sources from: • oil • (natural) gas • coal • nuclear/uranium	accept petrol /diesel for oil accept fossil fuel(s) for any of the first three i.e. fossil fuel and oil or coal or gas scores 1 mark but fossil fuel and nuclear scores 2 marks	**(2)** AO 1 1

Question Number	Answer	Additional guidance	Mark
4(b)(i)	bioenergy	biofuel / biomass	**(1)** AO 3 1b

Question Number	Answer	Additional guidance	Mark
4(b)(ii)	largest area / fraction / percentage (idea)	**must be referring to the chart**, not just repeating 4bi stem- can't have greatest/ largest amount by itself	**(1)** AO 3 1b

Question Number	Answer	Additional guidance	Mark
4(b)(iii)	wind		**(1)** AO 3 1b

Question Number	Answer	Additional guidance	Mark
4(c)	discussion to involve two points each giving change and effect (max 4 marks) some examples: change: biomass-solar-geothermal (fraction) increases (1) effect: e.g. reduces greenhouse gas / CO_2 emissions (1) change: 'wind' (fraction) increases (1) effect: e.g. visual/noise pollution arguments (1) change: 'natural gas' (fraction) increases (1) effect: e.g. contributes to global warming (1) change: 'uranium' (fraction) decreases (1) effect: e.g. less radioactive waste (1)	ignore vague responses such as 'environmentally friendly', less pollution etc. candidates may give positive or negative effects for this change (and for oil) allow decreases (with a correct accompanying effect for 2 marks) accept conserves non- renewables but not just 'more renewable'	**(4)** AO 3 2a AO 3 2b

Question Number	Answer	Additional guidance	Mark
4(d)	an explanation linking use of lubrication / oil (1) to reduce friction (between parts) (1)		**(2)** AO 2 1

(Total for Question 4 = 11 marks)

Question Number	Answer	Mark
5(a)(i)	**D** refraction **The only correct answer is D** *A 'deflection' is an incorrect distracting description* *B 'incidence' is incorrect, that would be angle X* *C 'reflection' is incorrect, no reflection being shown in the diagram*	**(1)** AO 1 1

Question Number	Answer	Additional guidance	Mark
5(a)(ii)	any pair of coordinates selected from the line (1) in range → 0.6(0) to 0.7(0) (1)	e.g. 20 and (13 or 14) or 10 and (6 or 7) ignore any units given award full marks for a correct answer without working	**(2)** AO 2 1

Question Number	Answer	Additional guidance	Mark
5(a)(iii)	an explanation linking: repeat (1) different angles / more values of X (1) for larger angles / values of X (1)	 allow 'more measurements' / 'repeat experiment' / collect more data > 20°	**(3)** AO 3 3a

Question Number	Answer	Additional guidance	Mark
5(b)	substitution (1) $\frac{3.0 (\times 10^{8})}{5.8 (\times 10^{-7})}$ evaluation (1) 5.2×10^{14} unit (1) Hz	 answers that round to 5.2×10^{14} award 2 marks for a correct answer without working allow 1 mark for answers that round to 5.2 to any power of ten independent mark accept hz or s^{-1} or per sec(ond) or hertz accept kHz, MHz etc with correct power (10^{11} kHz, 10^{8} MHz)	**(3)** AO 2 1

Question Number	Answer	Mark
5(c)(i)	red **or** orange	**(1)** AO 1 1

Question Number	Answer	Additional guidance	Mark
5(c)(ii)	green **or** blue **or** indigo **or** violet		**(1)** AO 1 1

(Total for Question 5 = 11 marks)

Question Number	Answer	Additional guidance	Mark
6(a)	a description to include: 1. put rock(s) in front of/near tube (1) 2. measure (count rate) separately for the two different rocks (1) 3. measure each count for the same time period (1) 4. keep source-detector distance the same for both rocks (1) 5. take (into account)/measure background count (1) 6. repeat readings and take average(s) (1)	not 'in' tube keep rocks apart	**(4)** AO 2 2

Question Number	Answer	Additional guidance	Mark
6(b)	• point after first half-life - 6, 40 (1) • point after second half-life - 12, 20 (1) • point after third half-life - 18, 10 (1)	within 1 small square by eye smooth curve starting at 80, with a decreasing gradient passing through one correct half-life point scores 2 marks smooth curve starting at 80, with a decreasing gradient passing through two correct half-life points scores 3 marks **if no other mark scored** smooth curve showing decreasing gradient but not going through any correct points scores 1 mark	**(3)** AO 3 1a

Question Number	Answer	Mark
6(c)	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. **AO3 Strand 2a and 2b (6 marks)** • shows some idea that the data can support arguments about alpha, beta and gamma radiation being present • argues that there is some evidence that alpha might be emitted (count rate going down with paper interposed) • argues that there is a lot of evidence that beta parti-cles are emitted (count rate goes down a lot when the aluminium is inserted) • argues that there might be some gamma getting through (lead stopping everything apart from gamma) OR that with the lead present the count rate has gone down to a level consistent with background, so no gamma was present a level 3 answer will use data effectively	**(6)** AO 1 1

Level	Mark	Descriptor
	0	• No rewardable material.
Level 1	1-2	• Deconstructs scientific information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. • Judgements are supported by limited evidence. (AO3)
Level 2	3-4	• Deconstructs scientific information and provides some logical connections between scientific concepts. An imbalanced argument that synthesises mostly relevant understanding, but not entirely coherently. • Judgements are supported by evidence occasionally. (AO3)
Level 3	5-6	• Deconstructs scientific information and provide logical connections between scientific concepts throughout. A balanced, well-developed argument that synthesises relevant understanding coherently. • Judgements are supported by evidence throughout. (AO3)

(Total for Question 6 = 13 marks)

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