Mark Scheme

(Results)

Summer 2019

Pearson Edexcel GCSE

In Combined Science (1SC0) Paper 1BF

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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

Question number	Answer	Additional guidance	Mark
1(a)(i)	An answer including: • (the root tip) contains {meristem / dividing} cells (1) • for growth (1)	reject meiosis	**(2)** AO1 1

Question number	Answer	Additional guidance	Mark
1(a)(ii)	An answer combining: • switch the lamp on • start with the lowest objective lens / look through the **eyepiece** lens (1) • use the (focusing) wheel to obtain a clear image (1)	accept adjust the mirror accept start with x4 / x10 objective lens	**(2)** AO1 2

Question	Answer	Additional guidance	Mark
1(a)(iii)	use a stain / named stain	accept dye / iodine	**(1)** AO3 3b

Question number	Answer	Mark
2(b)(i)	C anaphase **2bi The only correct answer is C** ***A*** *is not correct because the chromosomes are arranged differently in prophase* ***B*** *is not correct because the chromosomes are arranged differently in metaphase* ***D*** *is not correct because the chromosomes are arranged differently in telophase*	**(1)** AO1 1

Question	Answer	Additional guidance	Mark
1(b)(ii)	A description including: • spindle (fibres) (1) • are pulling the chromosomes (1) • to either side of the cell / poles (1)	accept chromatids	**(3)** AO1 1

(Total for Question 1 = 9 marks)

Question	Answer	Mark
2(a)(i)	C sexual intercourse **2ai The only correct answer is C** ***A*** *is not correct because insect vectors do not transmit Chlamydia* ***B*** *is not correct because Chlamydia is not transmitted by sneezing* ***D*** *is not correct because Chlamydia is not transmitted by contaminated food*	**(1)** **Comp** AO1 1

Question	Answer	Mark
2(a)(ii)	A bacterium **2aii The only correct answer is A** ***B*** *is not correct because Chlamydia is not caused by a fungus* ***C*** *is not correct because Chlamydia is not caused by a protist* ***D*** *is not correct because Chlamydia is not caused by a virus*	**(1)** AO1 1

Question	Answer	Mark
2(b)(i)	An answer that links the following: • number of cases increases (1) • and **then** decreases (1) • correct reference to data from graph (1)	**(2)** AO3 1a b

Question	Answer	Additional guidance	Mark
2(b)(ii)	graph reading 1 800 (1)		**(1)** AO1 1
2(b)(iii)	64 000 000 ÷ 100 000 = 640 (1) (640 x 1 800 =) 1 152 000 (cases)	award full marks for correct answer with no working allow ecf from 2bii	**(2)**

(Total for Question 2 = 7 marks)

Question	Answer	Additional guidance	Mark
3(a)(i)	An answer including: • reference to enzyme activity (1) • (the enzyme activity) increases from pH 5.8 to pH 8 (1) • optimum (activity) at pH 8 (1) • (enzyme activity) decreases between pH 8 and pH 9.8 (1)	accept a range of pH 5.6 to 6 for pH 5.8 accept activity peaks at pH 8 accept reference to range of pH 9.6 to 10 for pH9.8	**(4)** AO3 1a b

Question	Answer	Additional guidance	Mark
3(a)(ii)	(pH) 2	accept (pH) two / 2pH	**(1)** AO3 1a

Question	Answer	Mark
3(a)(iii)	Two from: • conditions in the stomach are pH 2 / acidic / low pH (1) • (The stomach secretes) hydrochloric acid (1)	**(2)** AO1

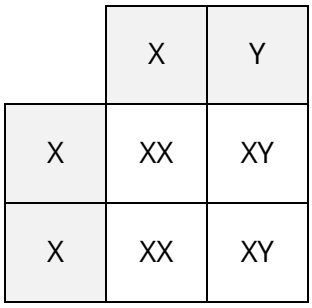
Question	Answer	Mark
3(b)	B denatured **3b The only correct answer is B** ***A*** *is not correct because the enzyme is not specific when it changes shape* ***C*** *is not correct because the enzyme is not digested when it changes shape* ***D*** *is not correct because the enzyme is not dead when it changes shape*	**(1)** AO1 (1)

Question	Answer	Mark
3(c)	amino acids	**(1)** AO1 1

(Total for Question 3 = 9 marks)

Question	Answer	Additional guidance	Mark
4(a)(i)	Any two from: • this karyogram contains pairs of chromosomes / 46 chromosomes (1) • gametes only have 23 chromosome / chromosomes are not in pairs (1) • because it has an X and a Y chromosome (1)	accept diploid accept haploid	**(2)** AO2 2.3

Question	Answer	Additional guidance	Mark
4(a)(ii)	male	accept boy / man accept other valid responses	**(1)** AO3 2a 2b

Question	Answer	Additional guidance	Mark
4(a)(iii)		1 mark for gametes 1 mark for correct offspring genotypes allow ecf for correct genotypes in Punnett square from incorrect male and female gametes	**(2)** AO2

Question	Answer	Additional guidance	Mark
4(a)(iv)	0.5 / 50% / ½ / 1 in 2	accept 2/4 / 2 in 4	**(1)** AO2

		50 : 50 is a ratio, not a probability and should score 0	

Question	Answer	Additional guidance	Mark
4(b)(i)	acrosome	Reject achromosome / chromosome / head	**(1)** AO1 (1)

Question	Answer	Mark
4(b)(ii)	Any three from: • (middle section) contains mitochondria (1) • so has **more** mitochondria (in middle piece of sperm B) (1) • (sperm B can) release more energy / has a faster rate of respiration (1) • (sperm B) swims faster / greater distance (1)	**(3)** AO2 1

Total for question 4 = 10 marks

Question	Answer	Mark
5(a)(i)	A each pair of bases is joined by hydrogen bonds **5ai The only correct answer is A** ***B*** *is not correct because phosphate groups are not joined by hydrogen bonds* ***C*** *is not correct because nucleotides consist of a sugar, a phosphor group and a base* ***D*** *is not correct because bases are not joined to phosphate molecules*	**(1)** AO1(1)

Question	Answer	Additional Guidance	Mark
5(a)(ii)	An answer that combines points of interpretation/evaluation to provide a logical description: • amount of C and G is equal/amount of A and T is equal • A pairs with T and C pairs with G		**(2)** AO3(1a+1b)

Question	Answer	Additional Guidance	Mark
5(b)	division 0.0062 ÷ 2 / 6.2 ÷ 2 (1) **OR** unit conversion 0.0031 x 1000 / 0.0062 x 1000 (1) 3.1 (picograms)	award full marks for correct answer with no working accept 6.2/ 0.0031 for 1 mark with no working	**(2)** AO2(1)

Question	Answer	Additional Guidance	Mark
5(c)(i)	to precipitate the DNA	accept so the DNA is visible / so the DNA is not soluble (in ethanol)	**(1)** AO1 (2)

Question	Answer	Additional Guidance	Mark
5(c)(ii)	Any two from: • mass of fruit (1) • volume of buffer (1) • crushing method /crushing time / crushed evenly (1) • volume of ethanol (1) • temperature (1) • pH /same buffer solution (1)	accept amount of fruit / number of fruit cells /size of fruit ignore amount of buffer accept idea of incubation time ignore amount of ethanol accept fully filtered (1) accept same concentration of ethanol (1)	**(2)** A02 (2)

Question	Answer	Additional Guidance	Mark
5(c)(iii)	Any one from: • to obtain more data (1) • to identify anomalies (1) • see if the results are {the same / reliable/correct} (1) • to calculate a {mean/average} (1)	accept to be sure their {results are valid / conclusion is valid} (1) ignore accuracy/precision	**(1)** AO2(2)

Question	Answer	Additional Guidance	Mark
5(d)	Any three from: • mitosis produces 2 cells and meiosis produces 4 cells (1) • mitosis produces **genetically** identical cells and meiosis produces **genetically** different cells (1) • mitosis produces diploid cells and meiosis produces haploid cells (1) • mitosis produces body cells and meiosis produces {gametes /sex cells} (1)	accept offspring for cells mitosis is involved in asexual reproduction and meiosis is involved in sexual reproduction (1)	AO1 1 **(3)**

Total for question 5 = 13 marks

Question	Answer	Additional Guidance	Mark
6(a)	An explanation linking three of the following: • they are immune (to *Clostridium tetani*) (1) • because the vaccination contained an antigen / bacteria have antigens (1) • **memory lymphocytes** (1) • leading to the production of antibodies (1) • leading to a **secondary** (immune) response (1)	accept idea of inactive/dead bacteria in the vaccine accept bacteria killed {faster/ quicker/ quickly}	AO2(1) **(3)**

Question	Answer	Additional guidance	Mark
6(b)	An explanation linking four of the following: • people do not finish their course (of Colistin) (1) • natural selection /evolution (occurs) (1) • some bacteria have a mutation/ (genetic) variation (1) • (these) resistant bacteria survive /resistant bacteria reproduce (1)	accept overuse / repeated exposure (to the antibiotic) accept they have evolved accept some bacteria have a {**gene/allele**} for resistance accept the non-resistant bacteria die / the fittest bacteria survive ignore immune bacteria	**AO2 1** **(4)**

Question	Indicative content	Mark
6(c)*	**AO2 (6 marks)** **Area 1 - Age of tools** • Younger rock layers towards top / older rock layers lower down • C is older than B which is older than A • Tools can be compared with other fossils from known time period • Rocks can be dated, e.g. radiometric dating **Area 2 - Quality of tools** • A is the most sophisticated / most finely worked / more specialised / more refined / more symmetrical • B shows some evidence of being worked / is rough • C most basic / most simple / less sophisticated / unworked **Area 3 – Skills and intelligence** • tools show evidence of greater human manipulation / greater skill (between C and A) • higher intelligence in more recent (species of) humans	**(6)** AO2 1

(Total for Question 6 = 13 marks)

Level	Mark	Descriptor
	0	• No awardable content
Level 1	1-2	• The explanation attempts to link and apply knowledge and understanding of scientific ideas, flawed or simplistic connections made between elements in the context of the question. • Lines of reasoning are unsupported or unclear. (AO2)
Level 2	3-4	• The explanation is mostly supported through linkage and application of knowledge and understanding of scientific ideas, some logical connections made between elements in the context of the question. • Lines of reasoning mostly supported through the application of relevant evidence. (AO2)
Level 3	5-6	• The explanation is supported throughout by linkage and application of knowledge and understanding of scientific ideas, logical connections made between elements in the context of the question. • Lines of reasoning are supported by sustained application of relevant evidence. (AO2)

Level	Mark	Additional Guidance	General additional guidance
			The level is determined by the number of areas covered within the response. The mark within the band is determined by the presence of **linkage** between areas.
	0	No rewardable material.	
Level 1	1–2	A simple observation **with** a brief explanation from one of the three areas of indicative content.	<u>Possible candidate responses</u> The deeper the rock the older it is. Tool B is older than tool A. Tool C is just a rock but tool B has been made. Tool C is older than B/A because it is found in deeper rock.
Level 2	3–4	A simple explanation from at least two areas of indicative content.	<u>Possible candidate responses</u> Tool B is older than tool A. Tool C is older than tool B. Tool B has been shaped by a more intelligent human. Tool C is older than tool B and tool A is more sophisticated than tool B showing that the brain of the human who made tool A is more developed.
Level 3	5–6	<u>Additional guidance</u> A detailed explanation linking ideas from all three areas of indicative content.	<u>Possible candidate responses</u> Tool C is older than tool B which is older than tool A. Older rocks are found further down. The person who made / used tool A was more intelligent. Tool A was found in younger rock because it is higher up in the cliff. Tool A is more sophisticated which suggests the person who made it is more intelligent than the person who made tool A or B. Production of tool A suggests more skilled / intelligent humans when compared with tools B and C which were found in deeper rocks.

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