Mark Scheme
(Results)

Summer 2022

Pearson Edexcel GCSE
In Biology (1SC0) Paper 1BF

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General Marking Guidance

1. All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
2. Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
3. Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
4. There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
5. 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.

1. Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
2. When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
3. 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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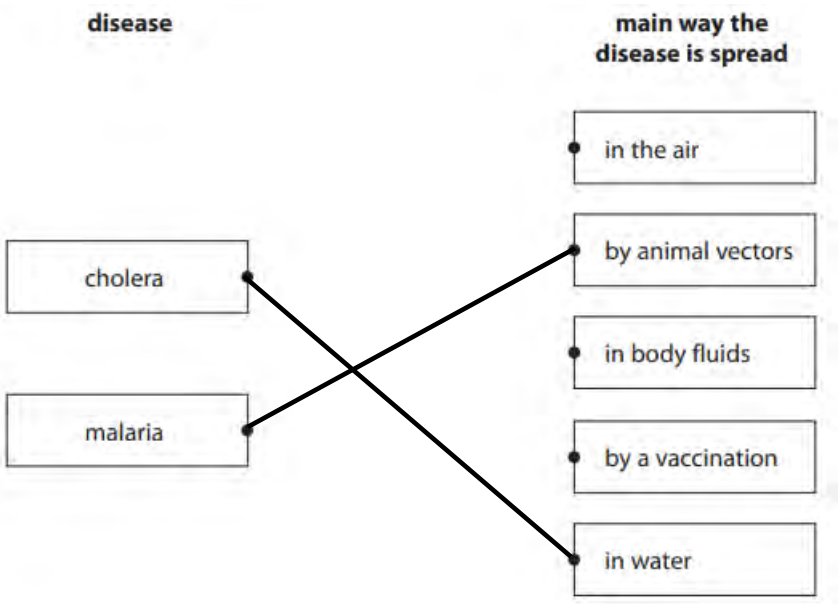
Question number	Answer	Mark
1(a)	A Pathogen The only correct answer is A *B is incorrect because a culture does not cause disease.* *C is incorrect because antibiotics do not cause disease.* *D is incorrect because platelets do not cause disease.*	(1) AO1 1

Question number	Answer	Mark
1(b)	 do not award mark if two lines are drawn from cholera box do not award mark if two lines are drawn from malaria box	(2) AO1 1

Question number	Answer	Additional guidance	Mark
1(c)(i)	all points plotted correctly ± one small square		(1) AO2 2

Question number	Answer	Additional guidance	Mark
1(c)(ii)	straight line of best fit going through all the plotted points ± two small squares.	ignore any extrapolation	(1) AO2 2

Question number	Answer	Additional guidance	Mark
1(c)(iii)	A description including two from: • 10 °C is slower (than growth at 20 °C) (1) • 10 °C is linear /straight (1) • 10 °C does not level off (1) • supported by manipulated data (1)	accept 10 °C is below / less (than the 20 °C line) differences must be in 1000s accept reverse arguments for 20 °C	(2) AO3 1a 1b

(Total marks for question 1 = 7 marks)

Question number	Answer	Additional guidance	Mark
2(a)(i)	A description including two from: • by hitting it (1) • with another stone / rock / flint / something hard (1) • to knock flakes /chips off (1)	not just another object accept knapped (2)	(2) AO2 1

Question number	Answer	Mark
2(a)(ii)	B tool Q is more pointed than tool P The only correct answer is B *A is incorrect because colour does not tell you how advanced the maker of the tool was.* *C is incorrect because colour does not tell you how advanced the maker of the tool was.* *D is incorrect because Q is more pointed than P.*	(1) AO3 2a

Question number	Answer	Mark
2(a)(iii)	• natural (1) • mutate (1) Must be in the correct order Reject migrate against either mark	(2) AO1 1

Question number	Answer	Additional guidance	Mark
2(b)	A description including two from: • compare with other tools / fossils (that have already been dated) (1) • from the (layer of) rock in which they are found / how deep down each was found (1) • radiometric dating / description of radiometric dating (1) • comparing to other finds (of known age) from the same layer (of rock) (1)	accept compare to other tools that are less well / better made	(2) AO2 1

(Total marks for question 2 = 7 marks)

Question number	Answer	Mark
3(a)	A diffusion The only correct answer is A *B is incorrect because respiration is the release of energy from glucose.* *C is incorrect because osmosis is the movement of water, not alcohol.* *D is incorrect because protein synthesis is how proteins are made.*	(1) AO1 1

Question number	Answer	Additional guidance	Mark
3(b)(i)	readings from graph 3.0 / 3 (1) 1.8 (1) Evaluation 3.0 − 1.8 = 1.2 (units higher of developing cirrhosis of the liver) (1)	award full marks for correct answer with no working ecf for (3 − 1.7 or 3 - 1.9)	(3) AO3 1a 1b

Question number	Answer	Additional guidance	Mark
3(b)(ii)	An answer including two of the following: • reduce alcohol intake / do not drink alcohol (1) • drink alcohol with meals / do not drink it on its own (1)	 accept data from graph / manipulated data from graph reflecting a reduction in drink	(2) AO2 1

Question number	Answer	Additional guidance	Mark
3(c)(i)	in the nucleus / on a chromosome	accept on DNA / it is part of DNA accept in mitochondria	(1) AO1 1

Question number	Answer	Additional guidance	Mark
3(c)(ii)	An explanation including: • person B must have an F allele because she does not have cystic fibrosis (1) • person B must have an f allele because person E must have inherited an f allele from her (1)	 accept because person E is ff / homozygous recessive	(2) AO2 2

Question number	Answer	Additional guidance	Mark
3(c)(iii)	ff (both letters must be lower case)	accept: homozygous recessive accept: double recessive accept: 'two small fs'	(1) AO2 1

(Total marks for question 3 = 10)

Question number	Answer	Mark
4(a)(i)	C 50^{th} to 75^{th} The only correct answer is C *A is incorrect because his height percentile is 50 − 75* *B is incorrect because his height percentile is 50 − 75* *D is incorrect because his height percentile is 50 − 75*	(1) AO3 1a

Question number	Answer	Mark
4(a)(ii)	Any one from: • to monitor height / growth (over time) (1) • to compare the growth of an individual against the standard growth pattern (1)	(1) AO1 1

Question number	Answer	Additional guidance	Mark
4(b)(i)	A description including any two from: • tail / flagellum (1) • acrosome / sac with enzymes (1) • (many) mitochondria (1) • streamlined (1) • haploid / has 23 chromosomes (1)	accept has enzymes to digest the membrane around the egg	(2) AO1 1

Question number	Answer	Mark
4(b)(ii)	Award one mark for each correct square in the table. For mitosis (number of chromosomes) ignore 23 on its own, must be qualified as 23 pairs	(4) AO1 1

	mitosis	meiosis
number of daughter cells produced	2	4
number of chromosomes in each daughter cell	46 / 23 pairs	23

Question number	Answer	Mark
4(c)(i)	A meristem The only correct answer is A *B is incorrect because root hair cells are not the area of the root where many cells are dividing by mitosis.* *C is incorrect because xylem is not the area of the root where many cells are dividing by mitosis.* *D is incorrect because phloem is not the area of the root where many cells are dividing by mitosis.*	(1) AO1 1

Question number	Answer	Additional guidance	Mark
4(c)(ii)	An answer including three of the following • add {enzyme (solution) / plant root cells} to glucose (solution) (1) • test for presence of starch (1) • test {each minute / at set time intervals} / time until a positive result for starch (1) • repeat at more than one pH / (in buffers) of different pH values (1) • reference to controlling one variable, e.g., same volume of solutions / same temperature (1)	accept use iodine	(3) AO3 3a

(Total marks for question 4 = 12)

Question number	Answer	Additional guidance	Mark
5(a)	A description linking two from: weak (1) hydrogen bonds (1) complementary bases (1) A – T / C – G (1)	 accept H bonds reject hydro bonds accept the names of the base pair	(2) AO1 2

Question number	Answer	Additional guidance	Mark
5(b)(i)	<table><tr><td>T</td><td>T</td><td>G</td><td>A</td><td>T</td><td>T</td><td>G</td><td>C</td><td>G</td><td>T</td><td>A</td><td>A</td></tr><tr><td>A</td><td>A</td><td>C</td><td>T</td><td>A</td><td>A</td><td>C</td><td>G</td><td>C</td><td>A</td><td>T</td><td>T</td></tr></table> award 1 mark for all the As and Ts in the top line correctly paired (1) award 1 mark for all the Cs and Gs in the top line correctly paired (1)	accept lower case letters	(2) AO2 1

Question number	Answer	Mark
5(b)(ii)	B 4 The only correct answer is B *A is incorrect because 3 amino acids would need 9 bases to be present* *C is incorrect because 6 amino acids would need 18 bases* *D is incorrect because 12 amino acids would need 36 bases*	(1) AO2 1

Question number	Answer	Mark
5(b)(iii)	D double helix The only correct answer is D *A is incorrect because a DNA molecule is not three separate strands* *B is incorrect because the DNA molecule consists of two strands* *C is incorrect because a DNA molecule is a double helix not a single helix*	(1) AO1 2

Question number	Answer	Additional guidance	Mark
5(c)(i)	An explanation linking two from: • (protease) breaks down proteins (1) • in the {cell/nuclear} membrane (1) • destroys enzymes that may break down the DNA (1)	accept break down {the cell / nucleus/ cell wall}	(2) AO1 2

Question number	Answer	Additional guidance	Mark
5(c)(ii)	to precipitate the DNA / because DNA is insoluble in ethanol	accept to see the DNA	(1) AO1 2

Question number	Answer	Additional guidance	Mark
5(c)(iii)	Any two from: • mass of peas and beans (1) • method of crushing (1) • volume of {washing up liquid / detergent} / water (1) • volume of protease (1) • temperature if qualified (1) • volume of ethanol (1) • time if qualified (1)	accept weight accept keep the temperature of the mixture the same accept time the mixture was heated / time exposed to ethanol	(2) AO3 3a 3b

(Total for question 5 = 11 marks)

Question number	Answer	Mark
6(a)(i)	Gonorrhoea accept phonetic spellings	(1) AO3 1a

Question number	Answer	Additional guidance	Mark
6(a)(ii)	66 000 000 ÷ 1000 = 66 000 (1) (66 000) x 3.7 =244 200 (people) or 3.7 ÷ 1000 / 0.0037 (1) (0.0037) x 66 000 000= 244 200 (people) or (66 000 000 x 3.7) = 244 200 000 (1) (244 200 000 ÷ 1000) = 244 200 (people)	award full marks for correct answer no working accept answers in standard form accept 244 200 to any incorrect magnitude for one mark	(2) AO2 1

Question number	Answer	Additional guidance	Mark
6(a)(iii)	Any one from: • it is {passed / spread} from person to person (1) • caused by bacteria (1)	 accept it is spread by {sexual contact / body fluids} accept pathogen ignore caused by a virus	(1) AO1 1

Question number	Answer	Additional guidance	Mark
6(a)(iv)	Any one from: • avoid sexual contact (1) • use a {condom / femidom} (1) • screen people for an infection (1) • treat the infection / give antibiotics (1)	accept use a barrier form of contraception ignore protection / contraception	(1) AO2 1

Question number	Answer	Additional guidance	Mark
6(a)(v)	An explanation including the following: • it is {killed / inhibited} by antibiotics (1) • because chlamydia is caused by bacteria (1)	accept disrupt cell processes (in bacteria) / prevent (bacteria) reproducing accept antibiotics are used to kill bacteria for 2 marks	(2) AO2 1

Question number	Indicative content	Mark
6(b)	AO2 Area A • antigens are on the bacteria • which are detected by WBCs / phagocytes • white blood / phagocytes engulf bacteria (phagocytosis) • swelling / inflammation of tissues / fever Area B • number of white blood cells increases • antibodies are produced • by lymphocytes / white blood cells • antibodies surround / cover / inactivate the antigens / pathogens Area C • memory lymphocytes / cells are produced • which remain in the blood • then if a secondary infection occurs • memory lymphocytes produce antibodies faster / in greater numbers • so the bacteria / pathogens are destroyed faster	(6) AO1 1

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

Level	Mark	Additional Guidance	General additional guidance The level is determined by the areas of indicative content covered within the response. The mark within the level is determined by the detail and /or use of biological terms within each description.
	0	No rewardable material	
Level 1	1−2	Makes a simple reference to a feature of the immune response	Possible candidate responses • White blood cells are involved (bottom of level 1) • White blood cells engulf bacteria (good level 1)
Level 2	3−4	Refers to two areas of indicative content OR Gives an explanation of one area of indicative content	Possible candidate responses • Bacteria have antigens on them and white blood cells make antibodies (bottom of level 2 − two areas) • Infection by bacteria causes more white blood cells to be produced. Lymphocytes make antibodies which inactivate antigens on the pathogens (good level 2 − one area explained)
Level 3	5-6	Refers to three areas of indicative content OR Gives an explanation of two areas of indicative content	Possible candidate responses • There are antigens on bacteria which are detected by white blood cells. Lymphocytes make antibodies and then memory lymphocytes are produced for a faster secondary response (bottom of level 3 − three areas referred to) • Phagocytes detect antigens on the bacteria and engulf them. This is called phagocytosis. People might also develop a fever. Memory lymphocytes are produced and these stay in the blood to produce specific antibodies very quickly if there is a secondary infection by the same bacteria (good level 3 − two areas explained)

(Total for question 6 = 13 marks)

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