Mark Scheme (Results)

Summer 2018

Pearson Edexcel GCE
In Biology Spec B (8BI0) Paper 01
Core Cellular Biology and Microbiology

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Publications Code

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.

Using the Mark Scheme

Examiners should look for qualities to reward rather than faults to penalise. This does NOT mean giving credit for incorrect or inadequate answers, but it does mean allowing candidates to be rewarded for answers showing correct application of principles and knowledge. Examiners should therefore read carefully and consider every response: even if it is not what is expected it may be worthy of credit.

The mark scheme gives examiners:
- an idea of the types of response expected
- how individual marks are to be awarded
- the total mark for each question
- examples of responses that should NOT receive credit.

/ means that the responses are alternatives and either answer should receive full credit.
( ) means that a phrase/word is not essential for the award of the mark, but helps the examiner to get the sense of the expected answer.
Phrases/words in **bold** indicate that the meaning of the phrase or the actual word is **essential** to the answer.
ecf/TE/cq (error carried forward) means that a wrong answer given in an earlier part of a question is used correctly in answer to a later part of the same question.

Candidates must make their meaning clear to the examiner to gain the mark. Make sure that the answer makes sense. Do not give credit for correct words/phrases which are put together in a meaningless manner. Answers must be in the correct context.

Quality of Written Communication

Questions which involve the writing of continuous prose will expect candidates to:
- write legibly, with accurate use of spelling, grammar and punctuation in order to make the meaning clear
- select and use a form and style of writing appropriate to purpose and to complex subject matter
- organise information clearly and coherently, using specialist vocabulary when appropriate.

Full marks will be awarded if the candidate has demonstrated the above abilities.
Questions where QWC is likely to be particularly important are indicated (QWC) in the mark scheme, but this does not preclude others.

Question Number	Answer	Additional Guidance	Mark
1ai	C 3, 2, 4, 1, 5		(1)

Question Number	Answer	Additional Guidance	Mark
1aii	P – nuclear envelope (1) Q– centromere (1)	accept nuclear membrane, nucleus membrane	(2)

Question Number	Answer	Additional Guidance	Mark
1b	A description that makes reference to four of the following: • ova { are larger cells / contain more food stores / contain more cytoplasm } (1) • spermatozoa contain an acrosome, ova do not (1) • spermatozoa has a {tail / flagellum / microtubules}, ova do not (1) • ova are surrounded by the {zona pellucida / other cells}, spermatozoa are not (1) • oogenesis produces polar bodies, spermatogenesis does not (1)	accept references to egg and sperm accept sperm are motile while ova are not accept each spermatid may produce a spermatozoa / the number of spermatozoa produced are much higher than the number of ova	(4)

Question Number	Answer	Additional Guidance	Mark
2ai	D		(1)

Question Number	Answer	Additional Guidance	Mark
2aii	D Z-Y		(1)

Question Number	Answer	Additional Guidance	Mark
2bi	An explanation that makes reference to the following: • Gram positive bacteria have a thick layer of peptidoglycan in their cell wall (1) • some antibiotics inhibit (enzymes involved in) the formation of peptidoglycan so are effective against Gram positive bacteria (1) • some antibiotics are not able to cross the peptidoglycan layer so they are {more / only} effective against Gram negative bacteria (1)	accept converse, accept reference to teichoic acid	(3)

Question Number	Answer	Additional Guidance	Mark
2bii	An explanation that makes reference to the following: • because viruses are not living cells (1) • because viruses do not have a cell wall (1)	 accept antibiotics usually target {cell walls / cell membranes / replication / translation / metabolism }	 (2)

Question Number	Answer	Additional Guidance	Mark
3a	An explanation that makes reference to three of the following: • this protein is folded so that hydrophilic groups are on the outside (and hydrophobic on the inside) (1) • these exposed R groups are { polar / ionic } (1) • therefore they form hydrogen bonds with water (1) • because water is a polar solvent (1)	 accept description of dipolar nature of water / ability to form hydrogen bonds with {charged / polar} molecules	 (3)

Question Number	Answer	Additional Guidance	Mark
3b	An explanation that makes reference to the following: • hirudin changes the structure of the enzyme (1) • this results in a change in the active site of the enzyme (1) • which prevents the substrate from binding (1)	 accept binds to the active site accept prevents enzyme substrate forming	(3)

Question Number	Answer	Additional Guidance	Mark
4ai	mitosis	accept mitotic	(1)

Question Number	Answer	Additional Guidance	Mark
4aii	An answer that make reference to two of the following: • can produce large numbers of offspring (1) • can reproduce rapidly (1) • does not need another plant (1)		(2)

Question Number	Answer	Additional Guidance	Mark
4bi	B diploid and haploid		(1)

Question Number	Answer	Additional Guidance	Mark
4bii	C - R S		(1)

Question Number	Answer	Additional Guidance	Mark
4biii	An explanation that refers to three of the following: • source of genetic variation (1) • because it involves random {assortment / fertilisation / crossing over } (1) • because it enables contribution of {DNA / genes / alleles } from two individuals (1) • because it produces new combinations of alleles (1) • genetic variation allows organisms to adapt to environmental change (1)		(3)

Question Number	Answer	Additional Guidance	Mark
5ai	An explanation that makes reference to two of the following: • a light microscope has limited (useful) magnification (1) • because a light microscope has limited resolution (1) • because the wavelength of visible light is more than a beam of electrons (1)	accept converse for electron microscope	(2)

Question Number	Answer	Additional Guidance	Mark
5aii	An explanation that makes reference to the following: • provides greater contrast (1) • because the stain {attaches to / is taken up by} specific {parts / types of}cell (1)		(2)

Question Number	Answer	Additional Guidance	Mark
5bi	A description that makes reference to two of the following: • folding of the {primary structure / polypeptide chain } (1) • into α-helix or β pleated sheet (1) • due to formation of hydrogen bonds (1)		(2)

Question Number	Answer	Additional Guidance	Mark
5bii	An explanation that makes reference to the following: • protease enzymes have an active site specific to certain amino acid sequences (1) • so the misfolded protein will not fit in the active site (of the protease enzyme) (1) • therefore enzyme is unable to hydrolyse peptide bond (1)		(3)

Question Number	Answer	Additional Guidance	Mark
6ai	C rough endoplasmic reticulum		(1)

Question Number	Answer	Additional Guidance	Mark
6aii	B X		(1)

Question Number	Answer	Additional Guidance	Mark
6aiii	To check on typeset version of the paper working shown (1) (1)	correct answer	(2)

Question Number	Answer	Additional Guidance	Mark
6aiv	An explanation that makes reference to the following: • organelle Z produces ATP (1) • which supplies the energy for the synthesis of proteins (1) • which supplies energy for {modification / transport / secretion} of proteins (1)	accept enzymes / hormones accept active transport / exocytosis	(3)

Question Number	Answer	Additional Guidance	Mark
6b	A diagram that includes the following: • amino group and carboxyl group shown (1) • a carbon attached to H and R on each side of (1) • a peptide bond shown (1)	accept reasonable example of an R group	(3)

Question Number	Answer	Additional Guidance	Mark
7a	B		(1)

Question Number	Answer	Additional Guidance	Mark
7bi	An explanation that makes reference to the following: • as glucose doubles mass of precipitate doubles between 0 and 12 mg cm^{-3} (1) • because all the glucose reacts with the Benedict's reagent (1) • the increase in the mass of precipitate is {non-linear above 12 mg cm^{-3} / stops increasing above 16 mg cm^{-3} } (1) • this is because { all Benedict's reagent used up after 16 mg cm^{-3} / there is an excess of glucose at 16 mg cm^{-3} } (1)	accept there is a linear increase between 0 and 12 mg cm^{-3} accept Benedict's becomes limiting after 12 mg cm^{-3}	(4)

Question Number	Answer	Additional Guidance	Mark
7bii	• Percentage error calculated	0.05 ÷ 0.28 x 100 = 17.9% accept 17.86 / 18	(1)

Question Number	Answer	Additional Guidance	Mark
7biii	An explanation that makes reference to one pair of the following: • repeat measurements more times (1) • to reduce standard deviation (1) • increase drying time (1) • to ensure all water removed (1) • check calibration of balance (1) • to increase accuracy of measurement of mass (1) • rinse all precipitate off filter paper (1) • to ensure all precipitate collected and measured (1)	ALLOW the precipitate should be repeatedly dried and weighed until a constant mass is achieved.	(2)

Question Number	Answer	Additional Guidance	Mark
8a	An explanation that makes reference to the following: • unable to {replicate / reproduce} independently (1) • because they do not have appropriate {organelles / enzymes} (1)		(2)

Question Number	Indicative content
*8bi	Answers will be credited according to candidates' 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. • graph shows rapid rise between April and December 2014 in Sierra Leone • maps show rapid spread between April and December 2014 in all three countries • initial outbreak at border between Guinea, Sierra Leone and Liberia • more case in Guinea in March 2014 • greater increase in Sierra Leone compared with Liberia and Guinea • greater density of cases in Sierra Leone at high of outbreak • some areas of Guinea have {few/no } cases (even at height of outbreak • spread in Sierra Leone has come from {Guinea / western districts of Sierra Leone} • in April 2014 month Ebola has spread further into Liberia • January 2015 graph shows slight decrease and so does one region in Sierra Leone • most rapid increase near capital cities • because of high population density • maps show significant variation in number of cases in different districts • graph shows rapid fall in Sierra Leone after January 2015 • no information provided whether there was also a fall in Guinea and Liberia after January 2015

Level	Marks	
0	0	No awardable content
1	1-2	An explanation may be attempted but with limited interpretation or analysis of the scientific information with a focus on mainly one piece of scientific information. The explanation will contain basic information with some attempt made to link knowledge and understanding to the given context.

2	3-4	An explanation will be given with occasional evidence of analysis, interpretation and/or evaluation of both pieces of scientific information. The explanation shows some linkages and lines of scientific reasoning with some structure.
3	5-6	An explanation is made which is supported throughout by sustained application of relevant evidence of analysis, interpretation and/or evaluation of both pieces of scientific information. The explanation shows a well-developed and sustained line of scientific reasoning which is clear, coherent and logically structured.

Additional Guidance

Level 1 response = either the graph or maps have been analysed with some relevant trends and patterns identified.

Level 2 response = data from both the graph and the maps are used and some links are made between the two sets of data

Level 3 response = detailed trends in both the graph and maps are compared and there is some consideration given to the evaluation of the data e.g. what data is missing for relevant conclusions to be reached.

Question Number	Answer	Additional Guidance	Mark
8bii	A description that makes reference to three of the following: • rapid {identification of disease / diagnosis} (1) • methods used to prevent transmission described (1) • identify who may have been in contact with the infected individual and isolate them (1) • education program for burial of corpses (1)	Accept: hygiene / barrier methods of contraception / isolate infected individuals / sterilisation or disposal of equipment, bedding or clothes / wear protective clothing / increased border security	(3)

Question Number	Answer	Additional Guidance	Mark
8c	An answer that makes reference to four of the following, including a conclusion: reasons for − • Ebola has high mortality (1) • new drug is unlikely to affect other people (1) • may help develop the drug for other patients (1) reasons against − • unknown side effects (1) • patient may not be able to provide informed consent (1) • who decides who can be treated if the drug is in limited supply (1) • conclusion reached (1)	epidemic may be difficult to control e.g. benefits may outweigh the risks due to the severity of the Ebola outbreak	(4)

Question Number	Answer	Additional Guidance	Mark
9a	• mean calculated (1) • mean rate calculated (1) • expressed as appropriate significant figures	3.25 min 0.3077 min^{-1} 0.31 min^{-1} accept ECF	(3)

Question Number	Answer	Additional Guidance	Mark
9aii	An answer that includes one of the following reasons • there is no information about the effect of other variables e.g. temperature, type of milk used (1) • there is no consideration about the time needed for a useful yield of cheese (1)		(1)

Question Number	Answer	Additional Guidance	Mark
9b	• interconvert dm^3 and cm^3 (1) • cost calculated (1)	200 dm^3 = 200000 cm^3 or 100 cm^3 = 0.1 dm^3 3.6 x 2000 = £72	(2)

Question Number	Answer	Additional Guidance	Mark
9 c	A method that includes at least four of the following features: • source of milk identified as the independent variable with at least one control considered e.g. volume(1) • time for clotting identified as the dependent variable with some detail about how to determine the end point (1) • identification of at least one other variable with description on how to control it (1) • discussion of what effect the variable would have if it was not controlled. (1) • description of how to increase the validity or reliability of results	e.g. enzyme {volume / concentration / source}, temperature, pH, stirring. method e.g. use of a thermostatically controlled water bath, pH buffer, etc e.g. what effect would changing temperature have on enzyme activity. e.g. repeats for each milk type, consideration about how to deal with anomalous results.	(6)

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