BIOLOGY

GCE Advanced Subsidiary Level

Paper 8700/01
Multiple Choice

Question Number	*Key*	*Question Number*	*Key*
1	**A**	21	**D**
2	**B**	22	**C**
3	**A**	23	**D**
4	**A**	24	**B**
5	**C**	25	**A**
6	**B**	26	**A**
7	**C**	27	**B**
8	**D**	28	**B**
9	**B**	29	**C**
10	**A**	30	**B**
11	**D**	31	**C**
12	**B**	32	**D**
13	**B**	33	**C**
14	**D**	34	**C**
15	**B**	35	**C**
16	**C**	36	**B**
17	**D**	37	**C**
18	**A**	38	**A**
19	**A**	39	**D**
20	**C**	40	**A**

General comments

There was a very good spread of scores around the mean of 22 (55%), the standard deviation being 6.54. No question was found to be particularly easy but only three questions, **Questions 29**, **31** and **38**, were difficult, being answered correctly by fewer than 40% of candidates. Several questions were poor discriminators in that a smaller proportion than expected of the more able candidates were able to answer correctly. These questions were **Questions 5**, **26**, **27**, **28**, **29**, **31**, **32**, and **38**. These poor discriminators were balanced by other questions giving very good discrimination, where the poorer candidates could do little better than make a guess. Good discriminators tend to be items testing problem-solving skills, for instance **Questions 18** and **25** and items testing knowledge of biochemistry, for instance **Questions 7**, **8**, **9**, **14** and **19**.

Comments on specific questions

Question 5

The better candidates did not appear to be well informed about the role of cholesterol in cell surface membranes.

Question 14

This was a fairly difficult item with very good discrimination. Nearly three quarters of the better candidates knew the answer, while nearly half of the poorer candidates favoured option **C**.

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Question 23

94% of the most able candidates knew the answer, while options **B**, **C** and **D** were almost equally popular amongst the least able, making this item another good discriminator.

Question 26

This item was more difficult than anticipated, with an almost equal number of candidates choosing option **B** as choosing the correct option, **A**.

Question 28

The apparatus shows that the person is inhaling expired air and the change on the trace shows that breathing rate is increasing. It was expected that candidates should know that this change is due to a rise in the carbon dioxide concentration of the inhaled air (from sections 1(a) and 1(d) of the syllabus), yet a large proportion of the better candidates thought that it was due to a fall in oxygen concentration.

Question 29

The total volume of blood returning to the heart is 5.6 litres (option **D**) but the question asks for the volume of blood returning through only one of the two pulmonary veins. The low discrimination of this item was perhaps due to the better candidates being less observant than the weaker ones.

Question 31

This, admittedly, rather obscure effect of caffeine on the body was not known by even the better candidates.

Question 35

All four options were almost equally popular amongst weaker candidates, suggesting that they had not covered this topic, while the better candidates found this an easy item.

Question 38

Option **B** was more popular than the correct option, **A**.

Paper 8700/02
Structured Questions

General comments

Whereas many candidates were well prepared for this paper, there was a large number who were not, and they performed poorly on all six questions. Nevertheless, there were some excellent answers to all questions, but especially to **Question 4**. In most questions, one or more parts proved difficult for many candidates, but especially **Questions 2 (c)**, **3 (d)**, **5 (b)** and **6 (b)**.

Candidates often lost marks by not reading the questions sufficiently carefully. For example, in **Question 3 (a)(i)**, where candidates were asked to name the repeating monomer of a polypeptide chain, more than a few candidates gave the answer as a polypeptide. In **Question 5 (c)**, where candidates were asked to explain how phagocytes engulf invading organisms, such as bacteria, they stated that they engulfed them, without any elaboration.

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Comments on specific questions

Question 1

(a) The structure labelled **A** in Fig. 1.1 is a xylem vessel. Many candidates identified it as a xylem and did not appreciate that xylem is a tissue made up of a number of different cell types.

(b) The Examiners were expecting candidates to state that xylem vessels have thick, lignified cell walls for support, preventing collapse, with a wide lumen, no contents and no cross walls to facilitate water movement. A surprising number of candidates stated that they have a narrow lumen to aid capillarity of water and were lignified to aid adhesion of water molecules. Some candidates referred to vessels as having no walls dividing one cell from the next, rather than specifically stating that they had no cross walls.

(c) The majority of candidates identified **C** as a companion cell and gave good accounts of how it is involved in translocation. It was not uncommon for candidates to state that glucose, rather than sucrose, was the sugar translocated.

Question 2

(a) Many candidates labelled **A** as bronchioles or capillaries, rather than elastin or elastic fibres. They then had difficulty in answering part **(b)**.

(b) Many candidates explained that the damaged elastic fibres prevented full recoil of the alveoli and thus air was not forced out so that not all the air in the alveoli was replaced. Others were much more imprecise and referred to tar blocking the alveoli and carbon monoxide affecting the haemoglobin in the blood.

(c) Many candidates confused epidemiological with experimental evidence. Others misquoted statistics which they had heard of. The fact that about 98% of those who die from lung cancer are smokers often became '98% of smokers die from lung cancer'.

Question 3

(a)(i) Most candidates knew that the repeating monomer of a polypeptide chain was an amino acid, but it was not uncommon for it to be named as an amide, a polypeptide, glucose or nucleic acid.

(ii) Many candidates explained that when the α helix of a polypeptide chain was heated to 60ºC, the hydrogen bonds would break and it would lose its shape and uncoil. It was not uncommon for candidates to state that disulphide bonds would break at this temperature.

(b) Virtually all candidates could name three types of bonds that help to maintain the tertiary structure of proteins.

(c) This part proved to be somewhat more difficult for many candidates. Many could name one way in which the structure of a polysaccharide chain differs from a polypeptide chain. The fact that a polysaccharide has glycosidic links and no R groups was commonly cited. Fewer candidates mentioned that they may be branched, or that the repeating unit was usually a single type of monomer. Some candidates lost one mark here by stating under 1. that polysaccharides had glycosidic links, and under 2. that polypeptides had peptide bonds.

(d) Candidates could not give two features that contribute to the tensile strength of either cellulose or collagen. For the latter, the Examiners were expecting candidates to mention that it consisted of three polypeptides twisted around each other in a rope, strand or helix, with hydrogen bonds between the polypeptides, covalent links between the chains, every third amino acid being glycine, its small size allowing the strands to lie close to each other forming a tight coil, cross links hold many molecules parallel together forming fibrils or fibres, with staggered ends or ends overlapping for added strength. Some candidates made some of these points but most were extremely vague, referring to the two molecules as being strongly bonded or with covalent bonds, with no further elaboration. Many thought that cellulose was strong because it was embedded in pectins or hemicellulose, or that it consists of glucose molecules 'heads up, tails down', leaving the Examiners to interpret what that meant. No candidates appreciated that it is not the strength of the hydrogen bonds, but their number, which contributes to the tensile strength of cellulose.

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Question 4

It was most encouraging for the Examiners to find many excellent answers to this question.

(a)(i) Most candidates knew that **P** in Fig. 4.1 was serine.

(ii) TAG, rather than UAG, was often given for the base sequence of **S**.

(iii) Anticodon was often given as the name of the base sequence on mRNA, rather than codon. The latter was commonly mispelt as condon.

(v) Most candidates knew that phenylalanine, not isoleucine, would be the next amino acid formed if the base sequence at **R** was changed from UUU to AUU.

(b) A few candidates misinterpreted the question, and described how enzymes act in the gut. Also, some candidates thought that all enzymes were packaged into lysosomes by the Golgi bodies.

Question 5

(a) **A**, the nucleus, in Fig. 5.1, was often named as a vacuole and **C**, a phagosome or vacuole, as a vesicle.

(b) Very few candidates appreciated that the problem with the light microscope was its resolution rather than its magnification. Resolution and magnification were commonly confused. Candidates did not appreciate that the resolution of the electron microscope was much greater and that the shorter wavelengths of electrons have greater resolving power than wavelengths of light. Vague references were made to the fact that light wavelengths were 'too large' or the magnification was too small. Many candidates even saw movement of phagocytes being a problem when using the light microscope and that they had to be alive to be seen with the light microscope.

(c) There were many good, extensive answers to this part and it is a topic well understood by many candidates. There were some common inaccuracies. Some candidates stated that bacteria were killed by enzymes and digested by free radicals or hydroxyl ions. Others stated that bacteria were engulfed without further elaboration. Some used terms such as complement proteins, opsonins, opsonisation, antibodies and antigens without any clear understanding of their meaning.

Question 6

(a) More than a few candidates placed ticks in some boxes but neglected to use a cross. Common errors were to place a cross, rather than a tick, in the TB box for stating that the causative agent is a bacterium and a tick, rather than a cross, in the TB box for stating that the causative agent is water-borne.

(b) Many candidates found this a difficult topic. The Examiners felt that it came within the section on infectious disease in the syllabus under the global patterns of distribution of malaria and sickle cell anaemia. The main misconception was that people suffering from sickle cell anaemia, rather than the heterozygous carrier, are resistant to malaria.

Paper 8700/03

Practical Test

Comments on specific questions

Question 1

On the basis of the results from a majority of Centres, the experiment clearly worked very well, and offered candidates an excellent base from which to proceed.

(a) Most candidates gained credit for green or a variation on green in all three tubes.

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(b) The presentation of results in table form has improved, with many candidates giving clear headings: flask/beaker and volume of sulphuric acid in cm^3. Many candidates gained credit for 3 burette readings, but generally the results too often did not conform to what was expected: how candidates could get titrations of the order of 10-20 cm^3 of sulphuric acid, when the enzyme was boiled for 5 minutes is clearly unimaginable; it is also erroneous to have a result where the titration value of A is greater than that of tube C – A should have been maintained at 50º C for 5 minutes and would have undergone some denaturation.

(c) The good results above led to some excellent explanations involving complete and partial denaturation, producing little or no product (ammonium carbonate) in B, and some in A and C, with more in the latter; too few answers made a reference to enzyme colliding with substrate to give product, or to the protein nature of an enzyme.

Wayward results in **(b)** still allowed candidates to gain credit for over half the allotted marks.

(d) This was answered well with many expecting less product in A, and less product or the same amount in B. A significant number of candidates thought A would produce more product, with increased collision between enzyme and substrate at 50º C, therefore failing to appreciate that the incubation temperature for the reaction was 38-40º C.

(e) There were many very good answers here with any 2 of the following being acceptable: temperature, pH, and substrate concentration.

(f) Very poorly answered with most candidates only considering the idea of replication: acceptable responses would have been to stagger mixing times, to boil immediately after 30 minutes to stop enzyme action, or to control a missing variable such as temperature, with the application of heat from the Bunsen burner to the beaker or tin.

Question 2

Two excellent slides allowing clear identification of tissues resulted in a mixed response.

(a) This question was very well answered by a majority of candidates, but there were still the odd few who ignored instruction and drew lots of cells, and filled in the outlines of the bundles with many lines presumably to represent tissues.

(b)(i)(ii) The response of many candidates to this interesting idea of linking a TS to a LS was most disappointing: the LS was a radial one, and clearly passed through a vascular bundle, followed by a space, and then more often then not a vascular bundle on the other side.

The very best candidates drew a sectional line across a radius and through a vascular bundle, and then correctly reasoned that xylem and phloem tissue was visible in the section.

Most candidates did not represent a sectional idea and drew collective brackets around the vascular bundles, describing all the tissues within them.

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