General Certificate of Education (A-level)
January 2013

Biology

(Specification 2410)

Unit 1: Biology and Disease

Report on the Examination
General comments

The paper produced a good range of marks and correct responses were seen in all parts of all questions. Many students scored highly on factual recall questions, most notably question 9.

Students frequently scored poorly where they were expected to use information or data provided in questions. In particular, the examiners noted that in questions with a *How Science Works* component, many students ignored the context and produced stock phrases and expressions that failed to gain credit. It was also evident that many students failed to read questions carefully and gave answers triggered by certain words in questions, rather than what was required.

Question 1

This question was intended to be a highly accessible start to the paper but produced a lot of discrimination.

(a) A third of students could not name both structures.

(b) Answers to this question were better and a majority scored two marks. It was pleasing to see many references to pressure gradients and relatively few references to ‘sucking’ air into the lungs.

(c) In this question some students got confused with cardiac output and others thought that vital capacity should be used, rather than tidal volume; about forty percent failed to score.

Question 2

(a)(i) This question proved easy for almost all students.

(a)(ii) This question proved easy for almost all students. It was pleasing that they were able to identify the Golgi apparatus from a photomicrograph, rather than an artist’s impression.

(b) A large majority of students understood that the light microscope does not have sufficient resolution and scored one mark. About forty percent gained the second mark for some reasonable statement about wavelengths of light or electrons. Some students persisted in thinking, wrongly, that magnification is the issue.

Question 3

(a) It was pleasing to find that the vast majority of students are familiar with the monosaccharides in sucrose and lactose.

(b) This proved to be one of the most challenging questions on the paper. Only about ten percent of students got both marks and sixty-five percent scored zero. The question clearly asks about digestion of starch in the small intestine. Despite this, many had the salivary glands as the site of production of the amylase active in the intestine (which was ignored by the examiners). Very few had any idea where maltase is produced and answers ranged from the thyroid gland to the pancreas.
Question 4

(a) Two-thirds of students obtained all three marks. Many students had obviously learnt good explanations of the effect of cholera toxin. These answers included correct references to changes in water potential, water potential gradients and osmosis.

(b) This proved unexpectedly challenging, with over seventy percent getting zero. Many wrote about slow digestion of starch to glucose, or simply had no idea that the (relative) insoluble nature of starch leads to a higher water potential.

Question 5

This was a question where many students failed to use the information given, or were let down by poor expression of ideas.

(a) Sixty percent of students obtained both marks and thirty percent obtained one mark. Those who obtained one mark frequently stated that phosphate was a non-competitive inhibitor and then went on to say that it made the enzyme active. Some students made more considered observations along the lines of, ‘Like a non-competitive inhibitor, phosphate binds to a site other than the active site, changes the shape of the enzyme and causes the active site to form.’ These answers were given full credit.

(b) This proved very difficult for the majority of students. Many failed to make any use of the information or diagrams in the question and resorted to vague statements about cancer and uncontrolled division. Some wrote about TK as though it was a cancerous cell, rather than an enzyme. Many got confused between faulty and non-functional forms of TK.

(c) This proved to be accessible, with marks awarded being very similar to those for (a). The context was obviously more familiar to students. Weaker answers often involved references to there being two active sites on the faulty TK. It has been noted in many papers that some students think any binding site, on any protein, is an active site.

Question 6

(a) Two-thirds of students were able to identify the aorta.

(b) Students had difficulty expressing their ideas. However, nearly fifty percent obtained both marks. Some students failed to score one of the marks because they made vague references to ‘pushing’ by the left ventricle, rather than pressure.

(c) The majority of students correctly identified the valves with the same function. The commonest error was to put semi-lunar for both; perhaps students focused more on the appearance of the valves, rather than their function.

(d) This produced a full range of marks. Some students ignored the instruction to use calculations and just described the results. Others made vague references to percentages but without calculating any. Another approach seen was to approximate on the basis that there were about twice as many patients given X than Y. These approaches were not given credit. There were many good answers where students calculated percentages based on the columns of data in the table. Some students failed to gain one mark through incorrect rounding of percentages. There was a minority of students who calculated both percentage survival and percentage mortality, without appreciating that they are converse expressions of the same point. A third of students obtained all three marks and twenty-five percent scored zero.
Question 7

This proved to be the most challenging question on the paper, probably because of its high How Science Works content.

(a) This question was answered correctly by almost all students.

(b) On the other hand, only sixty percent of students obtained a mark in this question, usually for some reference to the men being 'at rest'. Many students thought it was to negate the effect of gravity, or because surgery is always carried out with people lying down.

(c) About half of students obtained one mark, usually for linking pulse rate to beats of the heart. Few got a second mark for the idea that each beat produces a pressure surge in arteries.

(d) This question produced quite a large number of answers where the stem of the question was repeated, in that the monitor was more reliable because it recorded continuously. A significant number of students also thought, wrongly, that it would allow one to discard anomalous results. Marks were most commonly awarded for ideas of obtaining more data, or avoiding human error in recording the pulse. The other mark points were seen. About a quarter of students obtained both marks and sixty percent obtained one mark.

(e) This question was most notable for the use of apparently rote answers; “there’s no control”, “there’s no placebo”, “there are other factors, ......”. Relatively few students appeared to make efforts to use the information and consider the study in the question. About half of students obtained one mark. The commonest observations were that the men with the condition always had higher heart rates, or that this involved only one study and more investigations were needed. Very few noted that blood pressure itself was not measured in the study.

Question 8

The questions in each part of this question related to the short comprehension passage. Very many students appeared to pay little attention to the contents of the passage and many did not read the questions carefully enough.

(a) This produced some very good answers where students clearly described invasion by pathogens, their reproduction, invasion of host cells and production of toxins. They then linked these to death of host cells and tissues. About a third obtained three marks. Some students concerned themselves with the immune response that they had been told the people with AIDS did not have; they scored very poorly.

(b) A commonly stated misconception in this question was that vaccines are given after infection, to treat rather than to prevent.

(b)(i) Nearly forty percent scored one mark, either for the idea of there not being time for antibodies to destroy HIV, or for there not being time for memory cells of the immune system to respond. Few gave complete explanations; for example, following up the antibody point by stating that antibodies do not/cannot enter cells to follow HIV.

(b)(ii) Students did better in this question and both lines of argument were seen. The commonest correct answers involved different antigens being produced and antibody not being able to bind any more. Students’ powers of expression frequently let them down here.
(c) Rather like 7(e), this question was notable for the use of rote answers; “there might be side effects”, “it might cost too much”, “it has only been tested on animals”, “it’s not ethical…..”.

The question asks about these types of vaccines, the ones discussed in the passage, with their various characteristics. A few very good answers were seen, where students did discuss, for example, the possible perils of an attenuated virus as a vaccine, when HIV is stated to show a lot of variability. In a ‘real world’ context, it was interesting to note that almost no students appreciated that one would become HIV positive if one had been vaccinated. Encouragingly, one of the more common acceptable observations was that vaccination might encourage unsafe practices, which could spread HIV if the vaccine did not work.

Question 9

The answers to both parts of the question displayed good factual recall.

(a) In this question there was some confusion between channel and carrier proteins and their roles in facilitated diffusion and active transport. Quite a large number attempted to write about co-transport and obtained credit via the mark points for facilitated diffusion and active transport. Some who took this approach got themselves rather confused about what moved where, and how. About a third of students scored five marks.

(b) The role of atheroma in increasing the risk of dying was very well known and half of students obtained five marks. Again, where students failed to score, it was usually due to poor expression and incorrect use of terminology. Sometimes it was due to an incomplete ‘story’, where they would write about reduced blood flow to heart muscle but not mention coronary arteries, or reduced oxygen for respiration.

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the Results statistics page of the AQA Website.