



General Certificate of Education (A-level)
June 2011

Human Biology

HBIO1

(Specification 2405)

Unit 1: The Body and its Diseases

Report on the Examination

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General Comments

This paper appeared to be accessible to most candidates, as very few questions were left blank. There were several questions where poor use of language caused candidates to fail to score marks, and these are detailed below. There seemed to be an increased number of candidates with poor handwriting this year, whose answers were very difficult to read.

Question 1

- (a) This was fairly well known by most candidates.
- (b) This part was also well answered by most candidates, but some candidates gave structures that are found in eukaryotic cells, such as the nucleus, or structures found in both, such as the cell membrane.
- (c) This was well known by most candidates. A common misconception is that cilia secrete mucus. A significant number of students failed to score marks by omitting reference to pathogens getting trapped in the mucus.

Question 2

- (a) Candidates frequently failed to gain marks in part (i) because their answers were too vague. Only the best students referred to the virus being present in blood or body fluids, and being transferred to another person's blood. Weaker candidates did little more than re-state the information given in the stem of the question. In (ii), many candidates failed to read 'other' in the question, and so gained no marks for answering that HIV is spread through unprotected sex or by sharing needles. The commonest answers to be given credit were that HIV is spread from mother to baby via the placenta or breastfeeding.
- (b) Better candidates answered this well, showing a good understanding of the ways that antibiotics work, and that these made them ineffective against viruses. For example, many referred to antibiotics interfering with metabolism and viruses not having a metabolism of their own. Weaker candidates confused antibiotics and antibodies, and answered in terms of virus antigens not fitting. Others referred to viruses becoming 'immune' to antibiotics.

Question 3

- (a) This was very poorly known. Many candidates think that an attenuated microorganism is dead or inactive. Some who were aware that it is a weakened form of the microorganism went on to spoil their answer by describing it as 'weakened or dead'. A few knew that the microorganism had been weakened, or repeatedly sub-cultured, but did not say that this means they do not cause the symptoms of the disease.
- (b) This section was well known by most candidates. In (i) most candidates could give an explanation for the time delay, such as it takes time for the B cells to become activated, or for plasma cells to produce antibodies. Part (ii) was also well known, though there were fewer right answers here. Nevertheless, the majority of candidates were able to make some relevant reference to memory cells.

Question 4

- (a) This was not as well answered as the examiners expected. Good candidates knew that TB is a droplet infection, so more likely to be inhaled if people are in close proximity. Weaker candidates did not refer to the way in which TB is spread, and thought it could be spread by touch or by dirty surroundings.
- (b) Better candidates scored well here, and all the marking points were seen. However, weaker candidates did not read the y axis of the graph properly and thought the numbers referred to raw numbers. For example, many people concluded that there were more overcrowded houses in London than in the rest of England in 2001. They also thought that these were TB cases in overcrowded households rather than overall TB cases. It was difficult for these candidates to score any marks, as they did not understand what the data were showing.

Question 5

- (a) Part (i) was well answered, with most candidates understanding that this is a hydrolysis reaction. A few candidates failed to gain marks by writing 'hydration' or 'condensation'. In (ii), some candidates thought that a small amount of enzyme was used to make sure that the protein was not fully digested. The fact that an enzyme can be used over and over again, however, was well known.
- (b) This was well known by almost all candidates.
- (c) Aspartic acid was identified by most candidates. Some candidates used a correct method, but measured slightly inaccurately and obtained the answer valine. These candidates were able to score two marks.
- (d) This question proved challenging for most candidates. Many candidates thought the spots only travel the same distance, regardless of the length of paper. Others said that there was room left on the existing piece of paper, so a longer paper would not make any difference. Only a few said that the R_f value is the same, regardless of length of paper, or understood that a longer paper might reduce the effect of measurement errors, or could increase inaccuracy by spreading the spots.

Question 6

- (a) Some candidates gave good answers here, showing understanding of the effects of thick mucus in the gut on digestion and absorption. However, weaker candidates simply answered in terms of the effects of CF on the lungs. A misconception shared by some weaker candidates is that the mucus from the lungs is coughed up into the gut, where it causes problems, rather than realising that mucus is produced in the gut.
- (b) Most candidates scored both marks here, but a few failed to score marks by ignoring the flattening of the graph that occurred after 4.5 units of alpha-1-antitrypsin.
- (c) Many candidates understood that the graph would be helpful in selecting a dose of antitrypsin that was effective in producing maximum inhibition of trypsin. A few candidates were confused and thought that the graph indicated how much trypsin was present in the lungs.

Question 7

- (a) Although similar questions have been asked on previous papers, candidates still show poor understanding. Nevertheless, many candidates scored one mark for realising that it is the effect of a food on blood glucose concentration. It was rare to see a comparison with glucose or white bread. Weaker candidates simply answered in terms of the carbohydrate or sugar composition of the food.
- (b) In (i), there were some good descriptions, mainly comparing the steep rise in blood glucose with the normal bread to the flatter curve of the bread with additive. Weak candidates simply described one or both curves without drawing a comparison. In (ii), weaker candidates simply wrote about the advantages of eating a low GI diet, without referring to the additive. These candidates did not score marks. Only a very few candidates understood that the additive lowered the GI of a food, so that a person could eat the same food without the corresponding high rise in blood glucose concentration.

Question 8

- (a) Most candidates scored two marks here by mentioning oxygen entering and carbon dioxide leaving. However, the term 'ventilation' was not well understood and it was common to see long, rambling answers about the breathing mechanism in which the correct answer was eventually found.
- (b) This was poorly answered by almost all candidates. Despite being told that the muscles involved in breathing have stopped working, most answers were in terms of the diaphragm and intercostal muscles contracting and relaxing. Very few candidates realised that a change in pressure in the chamber could change the pressure in the thorax, causing air to enter and leave the lungs.
- (c) This part was better answered, with many candidates realising that prolonged inactivity can lead to blood 'pooling' in the veins, leading to blood clot formation.

Question 9

- (a) Many candidates scored well in part (i). Most candidates realised that people with coronary heart disease might have an abnormal heart rate, or that it might be harmful to their health to take a betablocker. In (ii), candidates frequently gained the marks by realising that other medicines might interfere with the action of the betablocker, or might change heart rate.
- (b) Most candidates were able to score both marks here. Better candidates understood the need to compare the betablocker curve with that for the placebo group.
- (c) Better candidates scored three marks here, usually for noticing that there was a small sample size, the age range of the participants was varied, the groups must have been unevenly matched or that the investigation was not repeated. Weaker candidates simply selected one of these factors, and repeated the point over and over. Others gave an apparently pre-prepared answer which did not relate to these data such as, "The experimenters need to consider age, sex and sample size."

Question 10

- (a) This was poorly answered. Only the very few candidates understood that this was necessary to keep the volumes or concentrations in the tubes the same. Many

thought it acted as a buffer at pH7, or that it was a control to see what the effect of water might be on the enzyme.

- (b) There were some good answers here, but many candidates were confused. Many thought this was an investigation of pH on enzyme activity, while an equal number thought this was an investigation into the effect of temperature on enzyme activity.
- (c) Better candidates understood that this was a control, but did not necessarily realise that this showed it is an enzyme in the pineapple juice that digests the gelatine and not some other component of the juice.

Question 10

- (a) Many candidates failed to score marks here by poor use of language and vague terminology. For example, they did not refer to atheroma building up in the wall of the artery or referred to atheroma building up in all kinds of blood vessels. The process by which atheroma formation leads to blood clots is not well known, and the blood clots were often affecting capillaries, veins or even the pulmonary artery. The loss of oxygen/blood supply to the heart muscle was frequently omitted. While the best candidates were able to score full marks here, it was common to award only 2 or 3 marks.
- (b) Part (i) proved difficult for many candidates. Few could explain why it was necessary to match the men for age and not having had a myocardial infarction. In part (ii), however, most candidates could suggest a further factor for which the men should have been matched, and gave a suitable explanation. Part (iii) was very badly answered and very few candidates scored all three marks. Many weaker candidates suggested that blood cholesterol should be measured before and after the statin treatment 'and then calculate the percentage'. Better candidates, who compared rates of heart disease in both groups and made some attempt to explain how a percentage might be calculated, were able to gain marks, even if their answer was not complete. It is clear that mathematical skills are weak among many candidates sitting this examination.
- (c) Better candidates gave a full evaluation, using the information in the passage, and found arguments both for and against the use of statins. Weaker candidates ignored the passage altogether and wrote an argument based entirely on their own views and opinions, gaining few marks.

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