



General Certificate of Education (A-level)
June 2012

Human Biology

HBIO1

(Specification 2405)

Unit 1: The Body and its Diseases

Report on the Examination

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General comments

As always, there were some very weak students who gave weak answers and often used unscientific language. However, the examiners noticed a marked improvement among more able students in the way that evaluation and 'How Science Works' questions were answered. It was especially pleasing to see many answers gaining full marks in 10(f). There was no evidence that students were short of time, and there were far fewer blank answers than in previous examinations.

Question 1

- (a) This was well known by most students, although some students referred simply to 'circular DNA' rather than plasmid, and some students confused the cell wall with capsule. There were various spellings of 'flagellum' but phonetic spellings were acceptable.
- (b) This was well known by better students, with many students referring to lack of metabolism in viruses, or lack of cell walls. Weaker answers, however, confused antibiotics and antibodies, so described viruses as constantly changing their antigens.

Question 2

- (a) Many students failed to read the question properly, so wrote about the virus being dead or attenuated, even though the question told them that antigens from the virus were used. Even students who did realise antigens were used often failed to mention that other parts of the virus (or named parts) would be needed to cause the disease.
- (b) This part was well known and many students gained full marks. The correct points made by most students were that the virus mutates, and new strains are present each year.

Question 3

- (a) This was well known by most students. Students sometimes lost marks by poor understanding, for example, by saying that it helps in the digestion of food, or by poor expression such as 'it helps you to go to the toilet'. A significant number of students believe that fibre helps in avoiding diarrhoea, or in providing nutrients.
- (b) A large number of students explained the effects shown in the graphs by stating that white bread contains more glucose. Fewer students understood that bread contains carbohydrates that are digested into glucose, and went on to suggest that the carbohydrates in white bread are digested faster or more easily. Similarly, few students wrote about glycaemic index, or glycaemic load. A common misconception was that 'energy' from bread is released into the blood.

Question 4

- (a) Many students scored full marks here, recalling that an antibody is a protein produced by plasma cells, in response to a specific antigen. Poorer answers often described an antigen instead of an antibody, or suggested that antibodies are released by T cells.
- (b)(i) In this part there were many references to antigen presentation or the need for the antigen to be recognised. Many students then drifted off the point by describing the formation of memory cells so that the secondary response could be faster. Some

students wrote about antibodies being produced in response to the disease rather than to the antigen.

- (b)(ii) There were many references to memory cells, but references to the graph were not so frequent. It was unusual for a student to compare the secondary response to the primary response. So while they said antibodies were produced quickly, the comparison of 'more quickly' or 'more produced' was usually absent.

Question 5

- (a) This question was poorly answered. Many students believed this was body temperature, or else the optimum temperature. Relatively few students understood that the low temperature would slow down enzyme activity, or metabolism, leading to the blood cells surviving longer.
- (b) This part was better answered, with many students understanding that this would reduce osmotic damage to the blood cells. Some students referred to water concentration rather than water potential, however, or referred to plasma entering the blood cells rather than water.
- (c) Many students described the isotonic solution as if it was an isotonic sports drink. This produced incorrect explanations that the isotonic solution would 'replenish lost salts' or 'supply glucose for energy'. Others thought it would stop the blood cells drying out. Good answers focused on restoring blood volume and supplying oxygen to cells for respiration.

Question 6

- (a) This was well known by most students, with the most common correct answer making reference to thick mucus blocking the pancreatic duct. The most common incorrect answer was that the enzymes are needed to break down the mucus in the gut.
- (b) This was poorly answered. Many students left it blank, or tried various permutations of 38.3 and 40.4 (the figures in the table). Stronger students, however, understood that they needed to divide the increase in mass by the original mass and multiply by 100%.
- (c) Most students saw that the volunteers increased in body mass, and has less fat in the faeces. However, few related this to absorption or assimilation and thus failed to gain full marks.

Question 7

- (a)(i) The name of the bacterium was known by a large minority of students, with others guessing at 'tuberculosis bacillus' or 'Microbacterium'.
- (a)(ii) Tubercles were well known, but there were other vague references to lung damage or loss of surface area without specific detail.
- (b)(i) Many students incorrectly stated that a control was pointless as the scientists knew the outcome. However, many others correctly said that it would be unethical not to treat a potentially fatal disease, or referred to the fact that the scientists were comparing antibiotics with each other.
- (b)(ii) Isoniazid was correctly identified by most, as it decreased the bacteria by 50% in the shortest time, but a significant number of students misread the data and chose moxifloxacin.

Question 8

- (a) Most students scored full marks here, but a few failed to gain by describing the fall in gradient in Figure 1 but not the levelling out, or by misreading the x axis as days rather than weeks.
- (b) Many said that once you have CHD it doesn't go away, so this is why people with CHD should not be included. Many others did recognise that CHD may also affect blood pressure; but linking this to the need for only one variable was not so well understood. Only a few students mentioned the idea that cigarette smoke might interfere with orlistat, or that orlistat might not be compatible with CHD medication.
- (c) The most common correct answers here were that orlistat reduces blood pressure and body mass. Better responses linked these factors to atheroma and CHD, or mentioned the reduced absorption of fats and lower lipid concentration in the blood.

Question 9

- (a) While most students clearly had the right idea about the meaning of myogenic, many failed to gain marks through poor expression. Weaker students wrote that 'it works on its own' or that 'it doesn't need the brain to make it work'. However, there were some excellent answers, with all the marking points seen.
- (b) This did not prove as easy as the examiners had hoped. While many got this correct, the most common incorrect answer was to reverse C and D.
- (c) This was poorly answered. Many students thought that the fetal heart did not need to pump because the mother's heart was pumping the blood and the mother's lungs were oxygenating the blood.
- (d) This part was also badly answered. Some students thought that this still referred to a fetus and wrote about the placenta oxygenating the blood, or even the mother's heart pumping the blood. Many thought that increasing the size of the hole in the septum meant that the atria could pump blood round the body while the ventricles relaxed. Only a few realised that the surgery allowed the right side of the heart to pump blood round the body, improving the efficiency of oxygen supply round the body.

Question 10

- (a) While the benefits of gut bacteria were well known, many students failed to gain marks through poor expression. Many described them as 'fighting bad bacteria' or helping to 'digest food'.
- (b) This was surprisingly badly answered, since this has been examined frequently in the past. Most students described atheroma as forming in the lumen or on the wall of the artery, rather than in the wall. A large number of students described this as happening in all kinds of blood vessels without specifying arteries. This was often followed up by a description of the heart having to work harder and harder to get blood past the blockage, rather than referring to the effects of a blocked coronary artery and the lack of oxygen to heart muscle tissue.
- (c) Oedema was confused with atheroma by a significant number of students. Consequently, these students thought that increased protein in the blood allowed the repair of damaged arteries, and making CHD better. Others thought the protein in the blood was an enzyme that digested cholesterol. Good answers showed

understanding that protein lowers the water potential of the blood at the venule end of the capillary, increasing the absorption of water from tissue fluid by osmosis.

- (d) Many students recognised the need to reduce the number of variables, but few gained any other marks. Better answers referred to the need for comparison, or making sure that any change in bacteria was the result of the chocolate.
- (e) Most answers here were vague, saying the men might be different ages, ethnicities, have different genes or live in different places, without relating this to the diet eaten and the presence of bacteria in food. Better answers did consider possibilities such as taking antibiotics, eating different foods containing different bacteria, or consuming probiotic yogurts.
- (f) Some students scored the maximum six marks here, by noting the lower cholesterol and lower risk of oedema among chocolate eaters, but then commenting on the flaws in the study. The main flaws noticed were sample size, length of study, and the fact all the participants were men. On the other hand, some students appeared not to have read the passage at all, and wrote from their own opinion that chocolate increases blood cholesterol and is generally unhealthy. Many wrote answers in between these two extremes, so the full range of marks was seen by the examiners.

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the [Results statistics](#) page of the AQA Website.