



**General Certificate of Education (A-level)**  
**January 2011**

**Human Biology**

**HBIO1**

**(Specification 2405)**

**Unit 1: The Body and its Diseases**

***Report on the Examination***

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## **General comments**

The paper produced a wide range of marks and correct responses were seen in all parts of all questions.

It was pleasing to note that many candidates did relatively well on parts of questions that involved descriptions of trends in graphs and use of information in diagrams. They also appeared to be quite well prepared for questions requiring explanations of these trends, or evaluation of decisions based upon data presented.

Many candidates scored poorly on factual recall questions. A number of these were in questions at the start of the paper and were intended to allow E-grade candidates to obtain marks and work their way into the paper. In practice, these questions discriminated across the ability range.

## **Question 1**

This question was intended to be an accessible start to the paper but proved challenging to many. In (a), over a third of the candidates obtained all three marks. However, about the same number of candidates obtained nought or one. The examiners felt that the structure of a membrane was something candidates would be familiar with.

In (b), only just over half of candidates could give two structures of prokaryotic cells. About a fifth of candidates obtained nought or failed to attempt the question.

## **Question 2**

Some very good answers were seen to each part of this question. However, for a topic which has been so well covered by the media and educational programmes, and been a familiar part of A level for many years, it was disappointing to find many candidates scoring very poorly.

In (a), half of candidates failed to score any marks. The mark scheme only required candidates to know basic facts about replication of HIV. For example, the ideas that there is an enzyme that makes a DNA copy of the HIV RNA, this DNA is inserted into the host cell's DNA and is used to make new HIV RNA and proteins. The statements in this sentence would have obtained all four marks.

Part (b) was better answered and the majority of candidates expressed the idea that people die from infections they are unable to suppress because of their compromised immune system.

## **Question 3**

There were many good answers to (a), with about half of candidates obtaining both marks. However, a fifth obtained no marks, often because they got active and facilitated transport the wrong way round.

In (b), marks were most commonly awarded for references to the small size of the molecules and a diffusion gradient. Some candidates were aware that these are non-polar molecules and can dissolve, or diffuse through, the lipid bilayer.

Nearly half of candidates obtained no marks in (c). It was disappointing to see how few had any real idea about the importance of ventilation of the lungs in maintaining a concentration gradient. Most answers were in terms of what happens in the alveolus, between the air space there and the blood.

#### **Question 4**

This question was answered well by many candidates. In (a), nearly half of candidates obtained both marks for correctly describing what an enzyme is. It was pleasing in (b) to see that most candidates followed the instruction to use the letters in the diagram in their descriptions.

#### **Question 5**

In (a), only a small minority were able to explain what myogenic means in terms of the intrinsic nature of the heart beat, initiated by the SAN. Quite a few obtained one mark by expressing the idea that no external nerve impulses were required to initiate the beat. The examiners did not accept references to 'signals' or 'messages'. A nearly equal number scored nought.

In (b), the vast majority of candidates correctly deduced that the recording shows a first-degree heart block and many gave good explanations. In fact, three-quarters of candidates scored two or three marks.

Part (c) discriminated well. Some candidates had considerable trouble expressing their ideas clearly enough, with references to 'signals' and 'messages' sent to 'the heart'. The best answers referred to electrical impulses sent to the AVN to cause contraction of the ventricles without the long delay seen in heart block.

#### **Question 6**

Part (a) was intended to be simple factual recall. Nearly a third of candidates scored no marks. Many got confused with stents, and others wrote about removing parts of arteries and replacing them with grafts. Some candidates used small diagrams to assist with their answer, which was acceptable and seemed sensible.

Part (b) was answered well by most candidates. Some got rather confused and wrote that there was a positive correlation whilst describing the negative correlation that actually exists. In (c), there were some good answers in terms of other factors that might affect heart disease. Quite a large number of candidates ignored the information in the graph and simply stated that the study was wrong because everyone knows that saturated fats do increase heart disease. The data were derived from a peer-reviewed article in a journal.

#### **Question 7**

Part (a) was another simple factual recall question, aimed at E grade candidates. In practice, nearly a third of candidates scored nought. There were many vague answers with chloride, or chlorine, ions moving in undefined directions and producing undefined 'effects' on diffusion

of water, due to bigger or smaller water potentials. The best answers involved clear naming of the faulty protein, the effect on the movement of chloride ions out of cells and the consequent effects on water potential and osmosis.

Parts (b) and (c) were well answered. Part (d) was only answered well by the very best candidates; usually those who spotted that the treatment would prevent further damage but not repair past damage.

### **Question 8**

Part (a) proved very accessible to most candidates. In (b) and (c), many candidates were unable to make the link between the rate of respiration of the bacterial cultures and either the survival of bacteria, or the ability of bacteria to grow. These parts of the question proved to be good discriminators.

Part (d) required candidates to apply their knowledge of enzymes and protein structure. The specification does not require candidates to be taught about inhibitors. In this question, they were expected to deduce that binding of clavulate to the enzyme would either change its shape, or block the active site. The question proved to be a good discriminator.

### **Question 9**

Part (a) proved difficult for many candidates and nearly two-thirds scored nought. Many candidates simply re-stated the information in the stem of the question that the antibody binds to B cells. Others got very confused between antibodies, antigens and cells and appeared to use all three interchangeably. Good answers included the deduction that the antibody must bind to an antigen found on the surface of B cells (only).

Part (b) discriminated across the whole range. Weaker candidates had a lot of trouble expressing themselves clearly and got confused between cancerous B cells and the normal functions and functioning of B cells. The best answers were in terms of the cancer having spread in patient Q and radioactivity doing damage to vital organs.

On reflection, part (c) was either too difficult, or not worded clearly enough. Very few candidates gave good responses to this question.

There were many good answers to (d). Many candidates obtained both marks for answers along the lines that existing antibodies would destroy the Zevalin before it became bound to cancerous B cells, thus making the treatment ineffective.

### **Question 10**

One thing that became apparent from the answers to various parts of this question was that most candidates are not aware of the relationships between energy intake in food, energy expenditure, weight gained as fat and obesity. There were many statements about how too much fat and carbohydrate makes you fat. This was particularly apparent in parts (a) and (f).

Part (a) discriminated well across the whole range of marks. Only the best candidates were able to make a suitable suggestion in (b). The question did require an appreciation that the

blood vascular system is a closed one, so if more water gets into the system its pressure is likely to go up.

The answers to (c) were a little disappointing, given that atheroma formation has already been asked about in other Human Biology exams. Many answers were spoiled by poor, or little use of terminology.

The calculation in (d) was too challenging for many candidates and over half obtained no marks, or did not attempt the question.

Part (f) produced a skewed normal distribution of marks. Unfortunately, it was skewed towards the bottom end of the range. As stated above, this was mainly because most candidates appeared unaware the link between energy intake in food, weight gain and obesity. The main thrust of the third and fourth paragraphs was about this relationship.

## **Mark Ranges and Award of Grades**

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