



General Certificate of Education (A-level)
June 2011

Human Biology

HBIO2

(Specification 2405)

Unit 2: Humans - their origins and adaptations

Report on the Examination

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General comments

Most candidates were well prepared for this examination, in that many demonstrated a good knowledge of most of the factual material and an understanding of the basic concepts of the unit.

As noted in last year's report, many candidates were able to make good use of information from stimulus material in their answers. However, there was still a sizeable minority who failed to gain marks through a lack of precision when describing data presented in either tabular or graphical form.

Many candidates were not only able to describe and analyse data, but were also able to identify limitations in methodology and in results of investigations. On the other hand, an appreciable number gave generic responses to "How Science Works" items, rather than addressing the specifics of the context in which the questions were set.

In responses to all parts of the paper there was evidence that some candidates did not read questions carefully; answers sometimes gave information about particular terms in a question without addressing what was being asked. Candidates would be well advised to take time to think about the requirements of each question before beginning to answer it.

Question 1

Parts (a) and (b)(i) were generally well answered with a large majority of candidates scoring full marks. About half of the candidates did not gain the mark for (b)(ii). Many suggested that the change in stage S was due to division of DNA or chromosomes, rather than cell division.

Question 2

Down's syndrome was well known, with over 80% of candidates gaining full marks on part (a), but less than one fifth were able to explain the term homologous with sufficient detail to gain both marks for part (b). Many answers said no more than it meant identical.

Question 3

In (a), over 80% of candidates correctly stated two differences between DNA and RNA, all alternatives in the mark scheme being seen frequently. A few candidates failed to score because they mismatched features across the two columns, e.g., giving a base for DNA opposite a sugar for RNA.

Part (b) discriminated well between candidates, with a fairly even spread of marks from three down to zero. Many candidates knew that RNA is copied from DNA, or that it moves from the nucleus to the ribosomes, but relatively few were able to give a clear or correct account of coding.

Question 4

The contribution of body shape in maintaining a constant body temperature was widely understood, with nearly two thirds of candidates gaining two marks. Most of the rest scored one mark for part (a), either describing the body shape, or making a correct statement about surface area to volume ratio.

Part (b) was less well answered. Many candidates scored one or two marks for greater carriage of oxygen, normal amounts of oxygen reaching cells or enough oxygen for respiration, but the other marking points were rarely seen and only one in nine candidates

gained full marks. There was some use of unscientific language, e.g., 'haemoglobin wants to carry more oxygen' and 'haemoglobin grabs oxygen'.

Question 5

Many candidates stated that tumour suppressor genes were responsible for inhibiting cell division or causing cell death, but relatively few stated that they code for proteins. Over one third of candidates scored no marks for part (a), often just stating that the genes slow or stop tumour growth.

In part (b), very few candidates scored full marks and less than one in five scored three or more. Many noted correlation between cigarette consumption and incidence of lung cancer, or made a statement about other factors possibly causing cancer, or factors not being controlled in the study. Few candidates made a valid point about the time lag. Common misconceptions included suggestions that the time lag, or the fact that not all smokers develop lung cancer, indicate that smoking does not cause lung cancer.

Question 6

Over 95% of candidates named at least one energy source other than triglycerides and over 60% named two. Some candidates thought oxygen to be an energy source and some appeared not to understand the term triglyceride, giving lipid as an answer.

In part (b)(i), less than one third of candidates scored the two marks available for a simple description of part of a graph; common failings included omission of units and wrongly giving the maximum outside the range of 72 -74 % of maximum heart rate.

Few candidates scored more than half of the marks for part (b)(ii). Many stated that increased exercise needs more energy, ATP or oxygen, and many stated that oxygen was carried in the blood. Few specified aerobic respiration and many failed to specify greater uptake of oxygen or faster delivery. A substantial minority misinterpreted the question and gave what were often detailed and correct accounts of the mechanisms of control of breathing rate or heart rate.

Question 7

There were nine possible points from which candidates could gain the two marks available for part (a). All points were seen frequently in answers. Three quarters of candidates scored at least one mark and just under half scored two. The one common misconception was that *Toxocara* has suckers.

In part (b), nearly all candidates knew of the faecal transmission of *T. canis* and many also knew of the risk of transmission through physical contact with dogs.

In (c)(i), nearly 90% of candidates were able to describe the difference in percentage infection between city centre and outskirts, but over 60% did not gain any marks in (c)(ii) for suggesting why conclusions drawn from the results should be treated with caution. A common misconception was that group sizes had to be identical to make comparison of percentages valid.

Question 8

In part (a), many candidates scored a mark for the idea of more time to learn, but less than one third gained the second mark. Answers to (b)(i) followed a similar pattern, with over half of the candidates gaining the first mark for the concept of non-verbal communication but few gaining a further mark.

In part (b)(ii), most candidates were able to use data from the table to support the hypothesis, but few identified that some of the differences were very small.

Question 9

Part (a) was generally well done with three quarters of candidates gaining both marks. A few candidates ignored the instructions to use the statements provided and instead wrote their own version of stages in the boxes.

Parts (b)(i) and (b)(ii) were marked as a single item and proved to a good discriminator, with a spread of candidates through the whole of the mark range. Marks were more frequently scored in part (ii) than part (i), and marks were awarded relatively infrequently for the genetic/breeding points. Some answers were poorly expressed, with some candidates apparently thinking that the starch grains or pollen were discovered 9000 years ago.

Part (b)(iii) was a good discriminator. The range of species and habitats ideas were seen frequently but the variety of food was given much less often. Most answers were expressed in terms of the converse of the mark scheme; i.e., the situation in the absence of woodland. This was perfectly acceptable.

Question 10

Two thirds of candidates scored the mark for part (a). The most common incorrect response was *Homo*.

In (b), most candidates gave at least one correct dating method and over two thirds gave two. Potassium-argon dating was the best known method, but a substantial minority of candidates incorrectly gave carbon dating.

Part (c) was generally not well done. A majority of candidates scored only one mark, usually for citing the large number of specimens as evidence for reliability. Points relating to the work being that of many biologists were sometimes given but other points were rarely seen in answers.

Over half the candidates gained two of the three marks available for part (d)(i), with most of the remainder of responses being split equally between one mark and three marks. The two advantages of bipedalism most widely known were freeing of forelimbs and allowing a better view of surroundings. The idea of exposing more of the body to cooler air was seen in less than 2% of answers.

Part (d)(ii) was a good discriminator with a fairly even spread of candidates throughout the mark range and with some full and clearly expressed accounts. Weaker candidates often gave an answer that described the mechanism of natural selection in general terms without reference to the specific characteristic of knuckle walking. Many answered in terms of the phenotypic characteristic only, thus failing to score marks for the passing on of alleles, or increase in allele frequency. Many failed to give an indication that the process requires many generations.

In part (d)(iii), few candidates were able to identify or explain how evidence could be used to decide between two hypotheses on human evolution. Where marks were awarded it was

usually for DNA or immunological evidence. Very few creditworthy comments relating to fossil evidence were made.

Most candidates found part (e) difficult. Only a minority of candidates quoted the 2% similarity / 98% difference in DNA between the two species. Few of those who did were able to explain clearly how it might be used to estimate the age of the common ancestor.

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