



## **General Certificate of Education**

# **Human Biology 1405**

**HBIO2      Humans – Their origins and  
adaptations**

## **Report on the Examination**

*2010 examination - January series*

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## General comments

Generally, the standard of work produced by most candidates was, again, encouraging. Most seemed to be well prepared, having a good grasp of the relevant facts. Occasionally, careless wording lost marks when it was clear that candidates understood the biology required in the answer. On a few occasions, too many candidates did not make use in their answers of the information supplied in tables/diagrams in the question.

The approach to 'How Science works' questions was generally quite pleasing with most candidates able to appreciate potential limitations of results from research that did not include repeats or more than one trial. Better candidates were more able to criticise research positively and negatively to produce a genuine evaluation.

Some candidates did not read the question carefully enough and produced answers that were not really related to the question asked. Careful reading of the questions is essential.

## Question 1

This question was generally well answered, with most candidates scoring two or three of the four marks available and a significant number scoring maximum marks. However, in 1 (a) (i), a disappointing number were unable to define a species in terms of organisms producing fertile offspring. In 1 (b) a surprising number of candidates lost a mark by not completing the top box in the right hand column.

## Question 2

Most candidates scored two marks in 2 (a), but some suggested that uracil 'pairs with adenine' in RNA. This is clearly not the case. In 2 (b) (i) candidates produced vague answers and many confused amino acids with nitrogenous bases. Good candidates were aware of a triplet of bases coding for a specific amino acid. In 2 (b) (ii), some candidates got side-tracked into descriptions of dominant alleles and recessive alleles rather than focusing on the influence of different alleles on the enzyme produced and, as a result, the pigment produced.

## Question 3

In 3 (a) too many candidates ignored the instruction 'Use the drawings . . .' and gave more general answers to the question, which could not be credited. Candidates who looked carefully were able to note the 'v' shaped jaw of *Ramapithecus* and the difference in the incisors and canines indicating that *Ramapithecus* was not an evolutionary link. Most candidates were able to suggest, in 3 (b) that a reconstruction of several different fragments could be unreliable because the jawbone was incomplete and the fragments may not have come from the same individual.

## Question 4

In 4 (a), disappointingly few candidates described the halving of the proportion of DNA that contained  $^{15}\text{N}$  at each generation. In 4 (b), more candidates were able to relate semi-conservative replication to the reduction in the proportion of DNA containing  $^{15}\text{N}$ .

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**Question 5**

Question 5 (a) (i), was intended as a relatively straightforward exercise in extracting information from a secondary source, but many candidates were unable to differentiate correctly between aerobic and anaerobic respiration. Others ignored the graph and answered in terms of the stages of a race. Most candidates were able to describe the general trend of energy release increasing with the increase of intensity of exercise and a good number could also describe the levelling of aerobic respiration at 60 – 65% of maximum exercise intensity. However, describing what happened at the highest intensities of exercise proved difficult for all but the most able candidates. In 5 (b) (ii), nearly all candidates knew that lactate was formed, but most still referred to it as lactic acid. Considerably fewer mentioned the effect of lactate on plasma pH and even fewer suggested how this might cause muscle fatigue.

In 5 (b), despite being given the starting point of oxygen in a red blood cell, many candidates wasted time by writing lengthy descriptions of the pulmonary circulation and oxygenation of the blood. Those who did read the question carefully confined themselves to the diffusion of oxygen into the muscle cell down a concentration gradient. Good candidates also mentioned the dissociation of oxyhaemoglobin and the use of oxygen in aerobic respiration as the cause of the concentration gradient.

**Question 6**

Most candidates were able to score two marks for their explanations of the term 'parasite' in 6 (a) (i). In 6 (a) (ii), too many candidates did not use the information in the diagram, which shows clearly that larvae in the intestines do not simply 'grow bigger and become adults in the intestines' as these candidates suggested. Parts (a) (iii) and (b) were, generally, answered rather better, although in (b) some candidates didn't make clear where the suckers were holding the tapeworm and others suggested that the cuticle protected the animal from the human immune system, rather than from digestive enzymes.

**Question 7**

This question was generally well answered by the candidature as a whole. Most were able to talk about the use of power and precision grips in 7 (a) (i) and to describe, in 7 (a) (ii), differential selection in favour of the alleles determining the opposable thumb. In 7 (b) some lost marks by referring only to surface area, rather than surface area to volume ratio.

**Question 8**

The question as a whole was well answered by the candidates. In 8 (a) (i) most candidates correctly suggested pressure receptors and cardiovascular centre (or just medulla), and in 8 (a) (ii), most realised that the widening of the arteries would result in an increased blood flow allowing increased delivery of oxygen or glucose (and increased removal of carbon dioxide). Part (b) was well answered with over half the candidates scoring full marks.

**Question 9**

This question was also generally well answered, but in 9 (a) some candidates forgot the setting of a hunter-gatherer community and described benefits in terms of more formal education. Most candidates were able to deduce the meaning of 'vocabulary explosion' in 9 (b) (i) and were then able to explain in 9 (b) (ii) how the lack of this could result in social withdrawal.

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**Question 10**

The responses to all sections of this question were disappointing. In 10 (a) candidates often used knowledge rather than information from the map in their answers. Given this specific instruction, answers that were based on flooding and covering the area with silt could not be credited. In 10 (b) (i) the understanding of 'standard deviation' was weak, with many confusing it with 'range'. Although 10 (b) (ii) was intended to discriminate, some candidates just did not read the question carefully and gave lengthy descriptions of how selective breeding is carried out. Good candidates were able to discuss the conclusion in terms of a fairly stable, small standard deviation, unknown sample size and lack of detail as to control of other factors.

**Question 11**

Parts of this question were answered well by a majority of the candidates, whereas others discriminated, as intended. This said, in part (a) (i), disappointingly few were able to make both points that the cancer cell has 'self' antigens on the plasma membrane. Part (a) (ii) was very well answered with almost one quarter of the candidates scoring all six marks. In part (b), most candidates knew the term 'metastasis' and were also aware of the problems of treating cancers. In part (c), only good candidates recognised the problems with describing a cell becoming a cancer cell and were able to raise issues such as several mutations being necessary over a period of time. Some did make the point that 'one day' all these changes would have been completed.

Part (d) (i) was answered well by the majority who could relate length of life to degree of exposure to mutagens.

Part (d) (ii), the last question on the paper, was intended to discriminate at the top end of the ability range, which it did. Only the very best candidates appreciated that natural selection can only operate on features that are present before reproduction takes place. Any feature that develops after this age has no selective advantage in terms of reproduction and does not alter the chance of survival to reproduce, which is the basis of natural selection. Some candidates appreciated that developing the feature after reproductive age meant that it would not be passed on to offspring, but missed the main thrust of the question.