GCE AS EXAMINERS' REPORTS

BIOLOGY
AS

SUMMER 2017

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GCE AS BIOLOGY

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AS COMPONENT 1

Question 1

Many candidates scored well on part (a) of this question. Marks were lost mainly due to a lack of detail in their answers, eg., not qualifying insulation as being thermal or electrical. There was some confusion over saturated and unsaturated both in identifying correct fatty acids and in their involvement in human health.

In part (b) many students did not appreciate that the cell membrane is a phospholipid **bi-layer** and as a result did not double the value of 140µm^2 and could not provide a valid explanation for their answer.

In part (c) the main source of confusion was identifying the phospholipids as moving and occupying the area exposed to the laser even though the stem of the question stated that fluorescent **proteins** were affected.

Question 2

It was evident that many students did not understand that content from Component 2 would be tested in this paper as very few students gained all three marks for part (a)(i) of this question. Queries from centres have also highlighted that some teachers were unaware of this either even though this has been communicated through CPD and in the specification.

Calculation of magnification from a scale bar was overly complicated by many students. They need to realise that measuring the length of the scale bar, converting to µm and dividing by the actual length of the scale bar (as stated on the paper) is all that is needed rather than magnification = image / actual. Whichever method candidates used a major failing was the inability to measure accurately or to convert cm or mm to µm.

The definition of holozoic digestion and the internal digestion of the yeast cell were not well answered on the whole. There was much confusion over the role of the Golgi body – many stated that the phagocytic vesicles containing undigested materials fused to form the Golgi body and that its main role was in excretion from the cell.

In part (b) some candidates confused viruses with prokaryotic cells and lost marks as a result. The calculation in (b) (ii) was answered correctly by many candidates but again there were major errors in measurement of the length of the line, the ability to convert from cm or mm to µm or being able to state their answer to two significant figures as requested in the question.

Question 3

Candidates lost marks mainly in part (b) of this question through not providing the detail needed to explain events that take place during meiosis that increase genetic variation. Candidates also need to read the questions and answer what is asked. This was especially true of part (b) (iii) where most made no reference to the diagrams and as a result missed the point that the major difference in length of the X and Y chromosomes makes it very unlikely that chiasmata can form.

Question 4

The examination of living cells and tissues using a light microscope and the examination of *Allium* root tips for stages of mitosis are practicals included in the Biology Lab Book. However, a surprising number did not know the use of staining to visualise structures such as chromosomes. While some candidates cannot calculate percentages or give their answers to the same level of precision as other numbers already given, the main problems were faced in part (c) (ii) and part (d) where candidates were required to use information and reach conclusions. In part (c) many candidates made no reference to the mitotic index and did not link mitotic index to growth. In part (d) few candidates made accurate use of the information provided in the table together with that provided in the images and as a result did not make reasonable conclusions regarding growth in roots.

Ideally, for part (e) students needed to have carried out the practical in their Lab Books and appreciate the problems faced when using this technique. However, enough information was provided through the image and the rest of the question to allow access to three marks here even if centres have not carried out the practical.

Question 5

While most students obviously understood what is meant by hydrolysis many did not give enough detail in their answer to gain the mark. Again, comments written by students on their papers indicated that many did not know, understand or remember that Component 2 content would be tested on the Component 1 paper.

To answer (a) (iii) correctly students needed to know that cytosine and thymine are pyrimidines and also to read and understand the information provided. Sadly, there were many instances of students referring to adenine and guanine as pyrimidines and others recounting the steps in DNA replication!

In part (b) the calculation of rate from a tangent is a required maths skill but was incorrectly calculated by many. The explanation of initial rate being higher requires the use of comparative statements and words such as **highest substrate concentration** not just more substrate. While most candidates identified temperature and pH as control variables the explanations of many again lacked detailed reference to kinetic energy, formation of enzyme-substrate complexes, changing the shape of the active site, or denaturation at high temperatures or large deviations from the optimum pH.

Question 6

The better candidates were able to describe the four levels of protein structure and how they would be affected by the mutations shown. They made correct reference to the ribbon diagram and the numbered amino acids that had mutated and correctly explained how bonding, shape and functionality of the insulin would be affected.

In most cases there was a lack of detail in their answers regarding either what are the different levels of protein structure or how the changes would affect each level of protein structure. There were errors made in describing how hydrogen and disulphide bonds affect secondary and tertiary structures and in the descriptions of each level of protein structure. However, most of these answer were placed in the middle band as some attempt had been made at relating the information provided to the effects on the structure and / or functionality of insulin.

The weakest answers lacked significant amounts of detail, contained major errors and made no reference to the diagrams or the effect on the functionality of insulin. Some candidates gave excellent accounts of all four levels of protein structure without making any reference to the information provided. These answers were placed in the bottom band.

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AS COMPONENT 2

1. This question required candidates to demonstrate a knowledge and understanding of the control of the cardiac cycle.

   (a) Many candidates gained full marks for parts (i) and (ii) although some candidates seemed to have difficulty calculating the heart rate from the ECG trace in part (ii). The most common error seen was miscounting the number of time divisions between peaks.

   (b) Many candidates were able to identify the correct section of trace for the three cardiac cycle events in part (i) and gained the two marks available. A significant minority appeared to be guessing the answers and many different combinations of letters were seen in the table. In part (ii) most candidates were able to correctly identify the roles of the sinoatrial node and the atrioventricular node and most gained marks for their answers in sections I and II. Section III was the least well answered section of part (ii) and many candidates gained no marks at all despite this being a fairly straightforward AO1 question.

2. This question required candidates to apply their knowledge and understanding of factors affecting the rate of transpiration including the use of practical investigatory methods.

   (a) Part (i) was very well answered with the majority of candidates gaining the mark for identifying the apparatus. A variety of responses were seen in part(ii) with many candidates unable to gain the mark because they did not mention xylem in their response. Many good responses were seen in part (iii) and it was encouraging to see that most candidates clearly had experience of using the potometer. Those unfamiliar with the apparatus were clearly at a disadvantage.

   (b) Many good answers were seen in part (i) with the majority of candidates gaining at least one mark for their response. However, many candidates did not link changes in temperature or light intensity to direction and so their responses could not be credited. It was also common to see answers referring vaguely to loss of water rather than water vapour. Graphs in part (ii) were generally drawn well with many candidates gaining the full 4 marks available. The most common errors seen included; missing the value at the origin on one of the scales, not using the full label, including units, for both axes and missing out the plot for 0 minutes. Most candidates used a ruler to join the plots accurately but a few drew inconsistent or sketchy freehand lines which did not pass through plot lines and lost marks accordingly. Responses to part (iii) ranged widely in quality and few candidates gained all 5 marks available. Quality of written communication was distinctly variable and poorly planned answers gained few marks. Candidates often embarked on long, rambling answers which only covered one relevant point.

3. This question examined the candidates' ability to apply their knowledge of microscopy techniques as well as their knowledge and understanding of adaptations of the human gut.

   (a) A surprising number of candidates had difficulty calculating the size of one eyepiece unit with several misreading the eyepiece scale despite the detailed explanation in the stem of the question.

   (b) Part (i) was well answered with many candidates gaining four marks for correctly labelling the drawing. Part (ii) was also well answered with error carried forward allowed from part (a). In part (iii) candidates were required to show clear logical numerical reasoning and a number of different logical approaches were credited here.

   (c) This was well answered in both parts but some candidates missed marks by giving answers which lacked clarity with some stating that the active enzyme would damage the intestine.

4. This question required candidates to demonstrate a knowledge and understanding of adaptations for transport in mammals. Parts of this question proved quite difficult for many candidates.

   (a) The calculation was generally well done. Some candidates used the figure for myoglobin concentration in their calculation rather than oxygen carrying capacity but were credited if they had correctly calculated the muscle mass. Few candidates gained both marks for part (ii) despite this being a fairly straightforward question. In many cases, candidates were simply repeating the stem of the question without attempting an explanation.

   (b) This proved very difficult for most candidates and few gained 4 marks although there were some excellent responses which did. Many candidates missed the significance of more red blood cells and therefore more haemoglobin being introduced to the general circulation despite the diagram providing a strong hint. The quality of written communication was often poor in answers to this section.

   (c) Some good responses were seen to part (i) although again quality of written communication let many candidates down as lack of clarity in their answers resulted in missed marks. Better answers were seen to part (ii) as expected since versions of this question have appeared in past papers.

5. This question required candidates to demonstrate a knowledge and understanding of biodiversity.

   (a) Many candidates were able to identify a suitable mesh size to capture the three species of phytoplankton but most were unable to explain their reasoning clearly enough to gain the second mark.

   (b) This was generally well answered showing that the candidates had a good grasp of the concept of biodiversity. Some candidates even went to the trouble of calculating Simpson's diversity index for the two sites and were credited accordingly. Most candidates were able to correctly identify Simpson's index as a suitable statistical test for biodiversity. Good responses were also seen to parts (iii) and (iv) although few candidates made the link between phytoplankton numbers and the increased risk to humans for the second mark in part (iv).

6. This question assessed the quality of extended response (QER). The best answers fully addressed the three aspects relating to the tubifex worm's adaptations for gas exchange, namely; structural adaptations, behavioural adaptations and physiological adaptations. Weaker answers tended to focus mainly on the structural adaptations relating to the worm's body shape and folding of the outer surface providing an increased surface area but made little or no reference to the other aspects. The behavioural adaptations proved most challenging to many candidates and responses were often vague or confused, referring to the worms "looking for" oxygen molecules in the water. A significant minority of candidates believed that the worms were terrestrial despite the fact that the question clearly refers to the worms surviving in polluted water. Weaker candidates also struggled with the physiological adaptations although many very good responses were seen from stronger candidates on this aspect.

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