

# Examiners' Report/ Principal Examiner Feedback

January 2010

GCE O

GCE O Level Biology (7040) Paper 02

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## General Comments

Once again the examiners were impressed by the wide range of knowledge and understanding shown by the candidates and their ability to apply their knowledge to new situations.

## SECTION A

### Question 1

This required candidates to answer questions on a passage about Artificial Insemination and its uses. In part (a) most were able to explain the term 'genetically superior'. Part (b) required students to calculate how many sperm would be present in a sample based on data given in the passage. Many gained both marks for this calculation with only a few candidates gaining no credit. Candidates will often pick up one mark for correct working even if the final answer is incorrect. Parts (c)(i) and (ii) required candidates to give the role of glycerol and antibiotics in the storage liquid. Almost all were able to quote from the passage about glycerol protecting the sperm from cold shock but fewer explained the role of antibiotics as protecting from bacteria. In part (c)(iii) almost all responses correctly identified anaerobic respiration as the process that produces lactic acid during sperm metabolism. In part (c)(iv) however, only the best candidates were able to explain that changing the concentration of the storage liquid could lead to osmosis as water entered or left the sperm. Part (d) asked candidates to name the part of the reproductive system in which sperm are deposited beyond the cervix. Most responses correctly identified the uterus with a few suggesting the vagina. Part (e) was done less well with candidates often gaining some marks for describing how semen would be collected from bulls with desirable characteristics and the semen being inserted into the uterus of a suitable cow. However only the best responses went to describe how the offspring would be selected for the same characteristic and the process repeated. Finally, in part (f), most were able to suggest that transporting frozen sperm would help conservationists and zoo keepers. Suitable answers that gained credit described the transport as easier or more convenient and how it could help maintain numbers of endangered species.

### Question 2

This gave candidates a table showing pollution data from developed and developing countries. In part (a) almost all could identify Bangkok as the city with least sulphur dioxide pollution and explain that burning fossil fuels is a source of sulphur dioxide pollution. In part (b) candidates had to calculate the average maximum level of sulphur dioxide in the developed and developing countries. Most could carry this out. Candidates then had to explain why this is not the best way of comparing the pollution levels of these cities. The best candidates were able to point out that there are other pollutants and that average values do not indicate variability between cities. In part (c) most candidates could describe the consequences of sulphur dioxide pollution for organisms living in polluted cities.

### Question 3

This showed candidates a familiar experimental set-up to compare the concentration of carbon dioxide in inhaled and exhaled air. In part (a) candidates needed to explain through

which flask inhaled air would pass. The examiners were very pleased to note that most candidates were able to choose the correct flask and offer a sensible reason why they chose this flask. In part (b) almost all responses selected limewater as a suitable indicator and then most went on to describe the changes they would see in the flasks during the experiment. Part (c)(i) asked candidates to explain the differences in composition between exhaled and inhaled air. The best candidates explained that cellular respiration uses up oxygen and releases carbon dioxide while the less able candidates described rather explained the differences. In part (c)(ii) almost all candidates could give two other differences between exhaled and inhaled air. Part (d) was very well answered with most responses gaining full marks for an accurate account of the mechanism by which air is drawn into the lungs. Finally, in part (e), most candidates could correctly name bronchitis and emphysema as conditions affecting the breathing system caused by smoking.

#### Question 4

Candidates were presented with data from an unfamiliar experiment recording the behavioural responses of an earthworm. This consisted of stimulating an earthworm by repeatedly touching its head and looking at the changes its withdrawal response. Part (a) required candidates to plot a line graph of the data and describe how the response changed as the touches were repeated. Most gained 4 or 5 marks for the graph with the commonest errors being failing to label the axes with units or plotting the axes the wrong way. In part (b)(i) the best candidates suggested that an advantage to the earthworm of its initial response is to escape or move away from danger. In (b)(ii) most candidates described the worm as 'getting used to the stimulus' and this was accepted as an alternative to habituation or adaptation to the stimulus. Almost all were able to name touch as the stimulus in this reflex in part (b). Finally, in part (c), most candidates gained some marks for describing the pathway involved in the human withdrawal reflex.

#### Question 5

This was the usual item in which candidates are required to describe an investigation. In this case to find out if larger female rats produce more offspring than smaller female rats. As is usually the case those candidates from centres where they have had an opportunity to practise such items perhaps using a 'CORMS' prompt scored well. The very weakest candidates left the item blank.

### SECTION B

A small number of candidates chose to attempt 3 instead of the required 2 questions from this section. These candidates would have less time to complete each question and in almost all cases scored poorly.

#### Question 6

This was the least popular of the questions, answered by 59% of candidates. In part (a) candidates were required to explain the effect on plant growth of increasing availability of carbon dioxide at low and at high light intensities. The examiners saw some very good answers where candidates clearly stated that in low light intensities increasing carbon dioxide would have little effect on growth as light is the limiting factor. In high light

intensity carbon dioxide is the limiting factor and increasing it will increase photosynthesis producing more glucose and increasing rate of growth.

In part (b) many candidates gained full credit for explaining how each feature of the leaf is adapted to maximise photosynthesis. Candidates from centres where such items have been practised were able to clearly state the feature such as leaf has large surface area and explain how this feature maximises absorption of sunlight.

### Question 7

This question was quite popular being answered by 61% of candidates. In part (a) candidates were asked to explain how (i) a reduction in temperature and (ii) an increase in enzyme concentration would affect the rate of an enzyme controlled reaction. Many candidates gained full marks for each item, clearly stating that (i) a reduction in temperature would reduce the kinetic energy of the enzyme and substrate molecules and hence reduce the rate of reaction and (ii) an increase in the availability of enzyme molecules would increase the frequency of collisions and the rate of reaction would increase. In part (b) candidates did less well. Only the best responses explained that as proteins enzyme have a specific shape and a region called the active site into which a complementary shaped substrate molecule can fit.

### Question 8

This was the most popular question being answered by 83% of candidates. Part (a) required candidates to compare xylem and phloem. As stated above, those candidates who were from centres where such items have been practised, performed very well. What the examiners expected was a clear statement about a feature and how it differs between xylem and phloem. So for example many candidates wrote that xylem transports water and phloem transports sucrose.

Part (b) proved easier and almost all candidates gained credit explaining how transpiration rate changes in hot and windy and cloudy and still environments.

## SECTION C

As for section B a small number of candidates chose to attempt 3 instead of the required 2 questions from this section. These candidates would have less time to complete each question and in almost all cases scored poorly.

### Question 9

This question was quite popular being chosen by 64% of candidates. Those who had carefully prepared the material could write well and with confidence about the how bacteria can be genetically modified and then grown to enable production of human insulin in large quantities. Many candidates gained full marks. Some candidates wrote well about genetic modification of bacteria but did not describe use of a fermenter or the conditions required for large scale production. The mark scheme gives the most commonly credited responses.

### Question 10

This was by far the most popular question being answered by 87% of candidates. Those who had carefully prepared the material could write well and with confidence about the digestion of protein, lipid and carbohydrate. Some candidates were confused about the site of production of the enzymes involved however, many candidates gained full marks. The mark scheme gives the most commonly credited responses.

### Question 11

This was by far the least popular item being answered by only 47% of candidates. Those who had carefully prepared the material could write well and with confidence about pathogens from different groups of organisms and how they cause disease and how we can prevent their spread. Many candidates gained full marks. The examiners expected the candidates to write about diseases caused by bacteria, viruses, protoctists and fungi and give examples explaining how the disease is caught and how we can prevent its spread. Weaker candidates wrote in general terms about disease without naming the groups of organisms or the diseases caused.

## BIOLOGY 7040, GRADE BOUNDARIES

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Grade	A	B	C	D	E
Lowest mark for award of grade	136	118	100	90	67

**Note:** Grade boundaries may vary from year to year and from subject to subject, depending on the demands of the question paper.

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