

# Examiners' Report June 2007

GCE

GCE O Level Biology (7040)

Edexcel is one of the leading examining and awarding bodies in the UK and throughout the world. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers.

Through a network of UK and overseas offices, Edexcel's centres receive the support they need to help them deliver their education and training programmes to learners.

For further information please call our Customer Services on 0870 240 9800, or visit our website at [www.edexcel.org.uk](http://www.edexcel.org.uk).

June 2007

All the material in this publication is copyright

© Edexcel Ltd 2007

# Contents

1. Paper 1	1
2. Paper 2	4
3. Grade Boundaries	8

## Paper 1

---

### General Comments

Once again the examiners were impressed by the range and depth of knowledge and understanding shown by the candidates this summer. This series was the first time that the revised specification and new format papers were used. Candidates seemed to cope well with the new system with only a few papers in which candidates failed to follow the rubric.

This paper is the new style paper 1, which mirrors the style of the old paper 2. As such, there were no new challenges facing candidates and this was evident in the responses made.

### Question 1

Candidates had an excellent knowledge about floral structure in (a), and were easily able to identify the ovary and the petal. Identifying the anther and the stigma posed greater difficulty, with many candidates getting them the wrong way round. Many incorrectly chose C as the place where pollen would land, presumably misreading the question and answering where pollen is found. Parts (b) and (c) were extremely well answered. Most were able to identify where meiosis would take place but only the better candidates made reference to gametes.

### Question 2

In (a), most appreciated that walking up and down stairs uses the most energy per minute. Many found the calculation challenging. Two marks were given for the correct answer of 460%, but one mark was available for 28 - 5 or 23 seen in the working. Candidates are encouraged to show their working because it might allow them access to one mark even if their actual answer is wrong. In (b), the examiners were looking for some indication that dancing involves a greater degree of movement however this was expressed, and that the movement involves muscle contraction. An easy mark was available in (c) for stating that the woman is heavier. This mark was obtained by most. Only the better candidates linked her increased body mass to the need for a greater energy requirement or more respiration.

### Question 3

This question enabled candidates to demonstrate their knowledge of the groups specified in the course. If they made a mistake by not naming plants, animals and bacteria as the correct groups, they could still gain credit by giving a correct example based on the listed features. As such, single-celled animals were not accepted as the feature specifically states multicellular. Many recalled acceptable fungal features and most were able to provide an example of a virus, with HIV and tobacco mosaic virus being most popular.

### Question 4

This question posed little difficulty for the better candidates. Weaker candidates used incorrect terms such as 'egestion' rather than 'excretion' and 'urea' rather than 'urine'. There were a number of instances where 'ureter' and 'urethra' were swapped over.

### Question 5

Many candidates identified adrenaline, oestrogen and testosterone as the correct hormones. Many also recalled that ADH has an important role to play in osmoregulation. The main error in this question involved candidates confusing the role of oestrogen and progesterone, with many believing that progesterone repairs the uterus lining as opposed to maintaining it. Very few candidates were able to recall that insulin lowers blood glucose by manufacturing glycogen. In fact, about half made no attempt and left the answer line blank. The role of osmosis in causing the red blood cells to crenate was understood by most candidates. However, descriptions of the concentration gradient involved were less impressive. A pleasing number wrote excellent accounts describing how bacteria are genetically modified to produce human insulin. In fact, many of the answers would have scored highly on an A level paper.

### Question 6

Naming the upper and lower epidermis was well done. Most recalled B as the palisade mesophyll, but many failed to recall that C was made from spongy mesophyll cells. In both latter cases the term mesophyll was not essential to gain the mark. Many appreciated that the palisade mesophyll would carry out most photosynthesis, justifying their answers by commenting on its physical position near to light and on the greater number of chloroplasts found within its cells. Stating that the cells contained chloroplasts, with no reference to relative quantity, was insufficient to gain credit. The role of guard cells in gas exchange for photosynthesis was recalled with apparent ease. However, fewer candidates were able to recall that guard cells have a role in opening or closing stomata and the impact this has on water loss.

### Question 7

Obesity is a topic well understood by many. The problems of weight gain and fat deposition associated with intake of excess fat and carbohydrate were recalled with ease. Weaker candidates made reference to "junk food" rather than technical biological terms and lost credit as a result. Candidates were able to describe the detrimental effects that obesity has on the circulatory system with similar ease. In fact, many candidates used terms more suited to A level. Whilst it is at the discretion of centres to teach to the level they wish, they might want to consider the effect on weaker students who may struggle to cope with the challenge.

### Question 8

In (a), most were able to identify organ X as the liver, although the heart was a common error. Similarly, most recalled that the aorta is the artery coming from the heart, although pulmonary artery was a common error. The term artery alone was not credited. The better candidates named the hepatic portal vein correctly, although many struggled. The term vein alone was not credited. In (b)(i), the term renal artery was recalled by the better candidates but many struggled. Once again, the term artery alone was not credited. The style of this question seemed to help weaker candidates as most answers for urea, water and red blood cells were correct. The answers for carbon dioxide were more varied, with only the better candidates appreciating that cell respiration within the kidney would generate carbon dioxide.

### Question 9

In (a), candidates showed an excellent knowledge of the blood vessels entering and leaving the heart. Most were correctly identified and, surprisingly, the vena cava caused greatest difficulty. Part (b) was more challenging with most candidates recalling that the lungs or alveoli represent the adult gas exchange surface but many failing to recall the role of the placenta in a fetus. Part (c) was even more of a challenge but answers appreciating that the blood flows between atria and from the pulmonary artery to the aorta in a fetus were present.

### Question 10

Candidates would benefit from practice at writing out genetic diagrams.

Part (a) (i) posed problems for many, which surprised the examiners. Questions like this have appeared on past papers and caused few difficulties. Even more surprising was the fact that candidates who struggled in (a)(i) had no problems with (b), a similar style of question. Despite being given the letters to use in (b), some candidates chose their own. Candidates who chose incorrect genotypes for the parents were still credited thereafter for correct gametes and genotype of offspring from their chosen parents. Only the best candidates were able to explain why no intermediate offspring were found, usually by stating that the tall allele was dominant and that the offspring were heterozygous. A main observation in (b) was that many candidates are unaware of the meaning of the term phenotype.

### Question 11

It was pleasing to note that many students have an excellent grasp of what constituents are found in a balanced diet. Most common responses were: bones and teeth linked to milk; vitamin C linked to a named citrus fruit; muscle growth, meat and Kwashiorkor, and, finally, iron, haemoglobin and liver. Most candidates were able to recall the test for a protein. The term Biuret was sufficient, though many chose to name the chemicals involved as sodium hydroxide and copper sulphate.

## Paper 2

---

---

### General comments

The new format and structure of paper 2 had been widely promoted on the Edexcel International web site and through INSET training over the last two years. It broadly followed the structure of the previous paper 1. Containing comprehension, data analysis and interpretation and longer essay type questions.

### Section A

#### Question 1

This question consisted of a passage on athletics and respiration on which most candidates were able to gain marks.

Many candidates correctly identified ATP or glycogen as an energy store in (a). In (b), it was expected that candidates would refer to aerobic respiration as requiring oxygen. Candidates were asked to explain what happens to the energy not available to the muscles in (c) and correct responses described heat loss and overcoming friction in the joints. Some candidates incorrectly referred to energy being used in respiration which did not earn credit. In (d), the majority of candidates could identify correctly that anaerobic respiration would lead to an accumulation of lactic acid in the muscles causing cramp. Only the best candidates were able to link the short duration of jumping and throwing events in (e) to the use of anaerobic respiration and therefore no oxygen requirement. Some responses to (f) correctly stated that only a very small percentage of energy would come from anaerobic respiration since the race lasts a long time and the speed is not so quick so oxygen can be available. Responses that mentioned the large accumulation of lactic acid were also credited. Most candidates gained marks for (g) and (h), noting how the increased breathing rate enables more oxygen to be provided to enable conversion of lactic acid into harmless substances and could identify large heart muscles and lung capacity as suitable characteristics of a middle distance athlete.

#### Question 2

This question required candidates to interpret data on absorption of mineral ions by a water plant.

Both (a) and (b) were answered correctly by almost all candidates. Most were able to correctly identify magnesium as the ion that must be absorbed by diffusion since it is in higher concentration in the pond water than in the cell sap. Part (c) required the correct role of magnesium in the plant, which most did. Part (d) was less well answered with only some correctly describing the role of oxygen in enabling respiration thus allowing energy for active transport of ions. Most could identify water as the source of dissolved carbon dioxide in (e) and could go on to describe the requirement of light for photosynthesis, oxygen for respiration or temperature for enzyme action.

### Question 3

Part (a)(i) required candidates to plot a graph to illustrate feeding rate of mussels at high and low water marks. Many answers gained full credit for choosing a suitable linear scale, labelling the appropriate axes with units, plotting accurate points and drawing clear lines which were labelled. As in previous papers, candidates should choose sensible scales that are easy to use and fit into the grid provided. Most candidates could correctly calculate the feeding rate in (a)(ii). Part (a)(iii) proved to be more difficult with only the better candidates recognising the link between the feeding rate and the time spent under water. Part (b) asked about a food web containing the mussels and most responses correctly identified four food chains and identified the primary consumers in each case. Slightly fewer correct pyramids of biomass were drawn in (b)(iii).

### Question 4

This question followed the experimental design model used in previous papers and many candidates used the CORMS prompt to earn full credit.

### Question 5

This question described an unfamiliar investigation into the effect of an insect repellent on the number of bites from mosquitoes.

Most candidates were able to suggest that glucose from the blood could be used for energy by the insects in (a), but few candidates were able to name a second energy source such as fatty acids or glycerol. In (b)(i), most candidates could calculate the mean number of bites from the data. Some were unable to suggest a suitable treatment for the control group such as no repellent or spraying with water. The best candidates were able to name the species or number of mosquitoes as one factor and temperature as the second factor to control in (b)(ii). Weaker students repeated the information given in the question such as time the arm was in the tank.

### Question 6

This question described a familiar experiment using Visking tubing as a partially permeable membrane.

In (a), candidates had to explain the term 'partially permeable membrane'. Most were able to explain that not all molecules could pass through the membrane. The better candidates also described that it is the small molecules that were able to pass through. Some responses failed to earn credit because they wrote about 'things' or 'materials' not being able to pass. Those candidates that could calculate percentage change in (b)(i) had no difficulty gaining full marks. The examiners would like to remind centres to encourage students to practise these calculations from past papers and to show their working. In (b)(ii), most of the candidates were able to describe how a difference in water potential enabled water to enter the bag by osmosis. Part (b)(iii) enabled most to gain one mark for an increase in the mass of the bag with increasing concentration with only the best candidates starting their line at 30g and thus earning full credit.



## Section B

The revised paper format for section B required candidates to answer 2 of 3 questions in this section

### **Question 7**

This question was the most popular choice being answered by 88% of the candidates.

Very many excellent answers were seen gaining full credit for (a) and (b). The only common error made several candidates was to describe the response of roots rather than shoots as stated in the question.

### **Question 8**

This question was also popular, answered by 81% of the candidates.

Most could gain 3 marks for describing how cutting down trees would reduce photosynthesis leading to less absorption of carbon dioxide and hence an increase in carbon dioxide in the atmosphere. Only a very few of the best responses mentioned how less food would be available to primary and secondary consumers or how decomposition would be affected.

### **Question 9**

Question 9 was chosen by only 29% of the candidates. Those that answered it however often did well.

We expected candidates to discuss how the temperature would rise due to respiration and how this might effect yield and enzyme action. Some responses described a temperature fall which would be less likely in a fermenter. Candidates gained credit in (b) for describing how lack of mixing would lead to fewer nutrients and less oxygen being available for respiration by the microorganisms thus causing anaerobic conditions and a reduced yield of product or indeed a different product. The best responses in (c) described how the lack of aseptic conditions could lead to invasion by another bacteria thus causing competition for oxygen or nutrients leading to a reduced product or a contaminated product.

## Section C

In section C, candidates were also required candidates to answer 2 of 3 questions.

### **Question 10**

This question was the most popular answered by 91% of candidates and usually the most mark yielding. Those students that had carefully prepared this part of the specification had no difficulty earning full credit for their answers.

### **Question 11**

Question 11 was also popular with 68% of students choosing to answer this question. The examiners saw some excellent answers but this was not as mark yielding as question 10.

The candidates that scored best often chose a bacterial disease, a viral disease, a fungal disease and a disease spread by a protoctist such as malaria. They then described how the diseases are contracted, how they could be controlled and how the body responds to them. Some candidates restricted their accounts to one disease such as malaria so were limited in how many marks they could earn.

### **Question 12**

This question was answered by 36% of the candidates and generally the scores on this item were less than the other two items. If candidates are to score well they need to choose the items that they are able to write about. The questions chosen should reflect their knowledge. This was rarely the case for this question. The mark scheme shows what we expected from the candidates.

## BIOLOGY 7040, GRADE BOUNDARIES

---

Grade	A	B	C	D	E
Lowest mark for award of grade	148	127	107	97	69

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

---

---

Further copies of this publication are available from  
Edexcel Regional Offices at [www.edexcel-international.org/sfc/schools/regional/](http://www.edexcel-international.org/sfc/schools/regional/)

For more information on Edexcel qualifications, please visit [www.edexcel-international.org/quals](http://www.edexcel-international.org/quals)  
Alternatively, you can contact Customer Services at [www.edexcel.org.uk/ask](http://www.edexcel.org.uk/ask) or on + 44 1204 770 696

Edexcel Limited. Registered in England and Wales no.4496750  
Registered Office: One90 High Holborn, London, WC1V 7BH