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# Examiners' Report Summer 2009

IGCSE

## IGCSE Biology (4325)

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## Contents

## 4325 Biology Paper 1F

### General

The paper was felt to be of a similar standard to those set previously. The candidates' performance was felt to be similar to that of the previous series. The paper discriminated well, with a very wide range of marks seen. The full range of marks was seen for each part of each question.

### Comments on individual questions

**Question 1**
The multiple choice questions were a gentle start to the paper – many candidates showed good knowledge and scored 7 marks or more. The questions that were answered less well were (e) where many felt that the weight would not change if the fan was switched on, (g) where many thought that carbon dioxide was used in respiration or was needed for combustion and (j) where some candidates thought that there were only two greenhouse gases.

**Question 2**
This question tested the candidates' knowledge and understanding of the nervous and endocrine systems.
(a) Most gained the mark for neurone / nerve (cell).
(b) (i) Almost all candidates labeled the nucleus correctly.
(b) (ii) Most candidates had the arrow going away from the cell body.
(c) Most candidates gained one mark, usually for the idea that hormones were slower.

**Question 3**
This question tested the candidates' knowledge of factors affecting plant growth and also of selective breeding.
(a) This question was not particularly well done. Most candidates scored one mark only and many did not refer to increased temperature, etc.
(b) Many candidates gave vague answers for the effect of fertilizer. Many only gained one mark for reference to increased growth. Only the better candidates made reference to specific minerals and their effects.
(c) (i) The question was done fairly well, with most candidates gaining two marks or more. The most common answer was reference to desired characteristics. Few mentioned choosing offspring and repeating the process.
(c) (ii) Most gained the mark here for reference to either increased milk yield or meat production.

**Question 4**
This question focused on the structure of an insect-pollinated flower.
(a) (i) Candidates scored fairly well here. Almost all gained the mark for petals. A few got anther and stigma the wrong way round.
(a) (ii) The question proved difficult for many candidates. Many did not refer to features that could be seen in the diagram. The most common correct answer was to refer to large petals.
(b) This was answered well, with many gaining the two marks. The most common correct answers were transfer of pollen by insects.

**Question 5**
This question tested the candidates' understanding of photosynthesis and the procedure for testing a leaf for starch.
(a) (i) The word equation for photosynthesis was answered well, although some candidates got carbon dioxide and oxygen the wrong way round.
(a) (ii) Only the better candidates got the idea of chlorophyll trapping light.
(b) This was answered fairly well, with most candidates scoring at least two marks. The most common marking points gained were iodine and blue/black colour.

**Question 6**
This question tested candidates' knowledge of enzymes, their substrates and products.
It had mixed responses, with many being confused between the large molecule broken down and the small molecule produced. This was especially true for lipids and fatty acids.

**Question 7**
This question tested the candidates' knowledge and understanding of the production of beer.
(a) This was answered well, with the two most common answers being warm and moisture.
(b) Most candidates knew that stage 5 was where alcohol was made.
(c) (i) This question produced mixed responses, with about half the candidates gaining the mark for the idea of removing debris. Many mistakenly thought it was to kill microorganisms,
(c) (ii) The was answered well with almost all of the candidates referring to microorganisms being killed.

**Question 8**
This question tested the candidates' knowledge of the structure of viruses, bacteria and fungi. It was not answered particularly well, with many showing a poor knowledge of the structure of fungi.

**Question 9**
This question focused on turtles and tested candidates' knowledge and understanding of food chains and global warming as well as their ability to analyse data.
(a) This was answered well, with candidates showing a good knowledge of the term endangered species.
(b) Candidates showed a good knowledge of food chains, although some still have the arrows going in the wrong direction.
(c) (i) The relationship between temperature and time to hatch was deduced well by most candidates.
(c) (ii) This temperature was read from the graph well.
(d) (i) This temperature was read from the graph well.
(d) (ii) This question discriminated well. Many candidates gained the two marks, although some only got one mark for giving the percentages.
(e) (i) The mark scheme allowed for a variety of answers to this question. It produced a mixed response, with some just giving the relationship from the graph, rather than a scientific explanation.
(e) (ii) This was answered well, with candidates showing a good knowledge of how global warming might be reduced. The most common answers related to less burning of fossil fuels and deforestation.

**Question 10**
This question allowed candidates to demonstrate their knowledge and understanding of the human heart and the effects of smoking on the heart.
(a) (i) This was answered well, with most candidates knowing the vena cava and the aorta.
(a) (ii) Almost all candidates knew that LV stands for left ventricle.
(a) (iii) This produced a mixed response, ranging from no marks to two marks. Most candidates gained one mark for the idea of taking blood from the heart to the lungs.
(b) Candidates produced the full range of marks here. A significant number talked at length about the effect smoking has on the lungs rather than on the heart. The most common marking points gained were increase in heart rate, heart attack and lack of oxygen.

**Question 11**
This question was centred around the effect of exercise on heart rate.
(a) Most candidates scored one or more marks here, but some only gained one mark as they did not refer to the rise leveling off.
(b) Many candidates gained the two marks for the calculation, but some just gained one mark for some appropriate working.
(c) (i) Not many candidates gave the correct response of anaerobic respiration.
(c) (ii) Most candidates gained one mark for the idea of more oxygen, but few gained the mark for aerobic respiration/less anaerobic respiration.
(d) This question was poorly answered. Most candidates only gained the mark for increased heart rate as the effect of adrenalin.

**Question 12**
This question tested the candidates' knowledge and understanding of how plants respond to certain stimuli.
(a) This was not answered well. If a mark was gained, it was the plant part of stem. Few knew negative phototropism as the response of light on roots.
(b) This question had a mixed response. Many got the idea of growth, but little else.

**Question 13**
This question tested the candidates' knowledge of cloning.
(a) This produced a mixed response. The most common mark was 3 or 4, with the answers best known, nucleus, uterus and identical.
(b) This question was answered fairly well, with most candidates gaining the two marks for XX and XX.

**4325 Biology Paper 2H**

**Question 1**
This question examined candidate knowledge of the structures found or not found in three different types of organism. It served as an easy introduction to the paper. Virus structure is the least well known with many believing they contain cytoplasm and have a cell wall.

**Question 2**
Almost every candidate offered a sensible explanation for the term 'endangered species', which is very encouraging to those of us who care about the plight of the Earth's fauna and flora. It was also pleasing to note that drawing food chains is a skill mastered by most. Though not compulsory, the examiners also appreciated the occasional sketches of the organisms. Candidates appreciated that the warmer the sand is the quicker eggs will hatch and most candidates could read the correct answer to (c) (ii) from the graph. Pleasingly, most were able to calculate the number of males and females. Those who transposed the numbers in the table were still given one mark and those who did % only were also awarded one mark. In part (e), a small number of candidates lost marks by thinking the temperatures would rise to ridiculous levels sufficient to cook organisms. There were many excellent answers suggesting how global warming could be reduced.

**Question 3**
Candidates scored highly in part (a) (i) and (ii), demonstrating excellent knowledge of the heart. The role of the pulmonary artery in taking deoxygenated blood to the lungs to be oxygenated was also understood by most. Less able candidates merely mentioned that it transports blood with no indication of oxygen level or destination. Part (b) exposed a common weakness with candidates. candidates need reminding of the importance of reading a question carefully before they start their answer. This question makes it clear that it is the effects of smoking on the human heart that is being examined. Unfortunately, many candidates wrote copious accounts about the human lung. Nevertheless, credit was given for recognising basic principles. The examiners continue to be concerned by the number of candidates who believe tar blocks arteries.

**Question 4**
Candidates should notice that two marks were available for part (a), which ought to key them into writing two different observations. Most stated that there is an increase in heart rate but only the more able candidates noticed that the heart rate reaches and stays at a maximum. In the calculation, two marks were awarded for 100%. For those who struggled with the calculation, one mark was still available if the examiners could see the numbers 120 and 60 somewhere in the working, once again stressing the importance to candidates of showing their working. The vast majority recalled that anaerobic respiration produces lactic acid and that deep breathing can reduce the build up of lactic acid because more oxygen is available for aerobic respiration. Part (d) demonstrated that most candidates understand that sweating allows heat loss, that adrenaline increases heart rate and that vasodilation increase blood flow to the skin. There are still a large number of candidates who refer to veins and capillaries when discussing vasodilation.

**Question 5**
The format of part (a) helped candidates score highly on a topic that is often found to be difficult. A large number of candidates were able to recall that positive phototropism allows plants to obtain light for photosynthesis.

**Question 6**
Putting the correct words into the passage proved to be a good discriminator. A common error was believing that a gene had been taken and put into an unfertilised egg, rather than a nucleus being put into an enucleated egg. Many believed that the ball of cells is called a zygote; that the embryo is placed into an ovum, and that meiosis is the cell division producing the embryo. Most had the courage to put XX twice in the table in part (b). Candidates ought to be reminded of the importance of making a clear distinction between the letter X and the letter Y when putting pen to paper. Markers are told not to give a mark if they are uncertain.

**Question 7**
Many candidates appreciated that the wind-pollinated flower had anthers and a stigma that dangled outside the flower. Recognition that the stigma was feathery was also credited. Candidates who chose features that could not be seen in the diagram lost credit. Many were able to suggest a correct feature of pollen from a wind-pollinated flower. Credit was given to answers that gave the converse and described pollen from an insect-pollinated flower. There were many poor drawings of a root hair cell and often the quality of labelling left much to desire. However, there were some outstanding drawings. Most were able to write sensibly about osmosis in part (b).

**Question 8**
Most knew that F is where bile is made. Common errors were to choose E or D. The role of bile is emulsification of fat and neutralisation of stomach acid is well understood. However, there are many who still believe bile digests fat. In part (b)(i), the small intestine, ileum or the letter C was accepted. The structural reasons to explain how a villus is adapted for absorption challenged candidates. Markers credited answers that discussed the large surface area provided, the dense network of capillaries close to the surface to reduce diffusion distance and containing blood that moved to maintain a concentration gradient. Recognition that a lacteal was present was also credited. The names of the products of digestion were not credited.

**Question 9**
Many candidates were able to draw an acceptable genetic diagram and gain three marks. The more able candidates also gave the correct phenotypes. A common error was to describe a phenotype, such as having PKU, with incorrect terminology, such as homozygous recessive. A surprising number of candidates produced a correct genetic diagram and then quoted the probability of the child not having PKU as 25%. Markers assumed they had not read the question carefully. The treatment for PKU is to provide a diet lacking in phenylalanine but other sensible suggestions were credited. A surprising number of candidates believe that protease digests amino acids.

**Question 10**
The importance of transpiration in helping water and minerals be transported, cooling plants and helping water be available for support and turgidity was known by many candidates, and most were able to point out that light opens stomata which leads to an increase in transpiration.

**Question 11**
In part (a) marks were awarded for the correct pyramid shape, the names of the organisms at each trophic level and the correct order of these names. Many incorrectly drew an inverted pyramid. Those who understood this part of the specification had little difficulty in explaining that a pyramid of biomass would have a much smaller bar representing the producer trophic level. In part (b), examiners were very impressed by the knowledge candidates have about energy transfer efficiency. However, some still confuse the processes of excretion and egestion. In part (c (i), most candidates appreciated that the leaf canopy would block light. In (c) (ii), most were aware that chlorophyll is the green pigment that absorbs light in photosynthesis. Suggesting how a plant that is not green is able to survive posed more of a challenge with only the more able candidates writing acceptable answers with reference to ideas such as saprophytism, parasitism or masking pigments.

**Question 12**
Part (a) was well answered. Sadly, part (b) posed greater problems. There were many excellent answers describing the procedures used with genetic modification, but there were many answers that described selective breeding or concentrated on aspects of cloning or micropropagation. In part (c), a large number of candidates appreciated that micropropagation allows for large numbers of identical plants to be produced in a short space of time.

**Question 13**
Many were able to get maximum marks in part (a). Common errors confused the pancreas and the liver, and confused glycogen with glucagon. Answers to part (b) (i) showed that candidates understood the need to start the test with normal glucose levels. In part (ii) of this question, only the more able candidates gave three distinct reasons to support the idea that the person was not a diabetic. Most commented on the fall in glucose levels caused by release of insulin but few acknowledged that the starting level was within a normal range and that the levels did not rise above 9 mmol per litre.

**Question 14**
The vast majority of candidates correctly identified Iceland and Japan as the two countries where more fish is eaten than meat. The calculation was challenging. The correct answer of 13 was seen quite often but there were many scripts that had variations of this number. Candidates who gave an incorrect answer could still be awarded one mark if the markers could see 130, or 100 and 30 in the working. Most candidates were able to give an acceptable reason why protein is important for growth. In part (b) (i), answers that mentioned the need to remove organic waste and to allow maintained oxygenation were credited and in part (ii) markers credited answers that made it clear that this method of feeding would reduce wastage and the chance of oxygen depletion by bacterial decomposition. Answers to part (c) showed an excellent appreciation of the formula. In part (d), many appreciated that solving overcrowding, providing sufficient food and separating different sized fish would help to reduce intraspecific competition, and that separating different species by a sensible method would reduce intraspecific competition.

## 4325 Biology Paper 03

### General

The paper was felt to be of a similar standard to those set previously. The candidates' performance was felt to be similar to that of the previous series. The paper discriminated well, with a very wide range of marks seen. The full range of marks was seen for each part of each question.

### Question 1

This was a long question based on an ecological investigation. It was a fairly easy start to the paper.

(a) (i) Most candidates scored full marks here. A few got crucible and gauze the wrong way round.

(a) (ii) Almost all candidates gained this mark. Those who did not just made general references to safety instead of referring to protecting the eyes.

(b) Most candidates gained the first mark for using some form of heat. Fewer gained the second mark for the reference to time. Candidate who referred to a drying agent or to detection of water using a chemical method were rewarded.

(c) Many candidates gained the 2 marks here. Those who did not tended to gain one mark for appropriate working.

(d) (i) Most candidates referred to the correct sample – 2.4.

(d) (ii) Most candidates gained the mark here. The most common answer was more plants or seaweed.

(d) (iii) Again, most candidates gained the mark here, with the idea of more plants being the most popular answer.

### Question 2

This question tested the candidates' knowledge and understanding of the effect of exercise on pulse rate. It gave the candidates an opportunity to demonstrate their knowledge of accuracy in taking measurement as well.

(a) Most candidates gained one mark here for knowing where the pulse would be taken. Not so many made reference what they would use to measure the time. Some confused it with a similar question in a previous paper where candidates had to refer to counting per minute, but this was given in this question.

(b) (i) This question was done well, with many candidates gaining full marks. The most common error was to miss out the units in the table.

(b) (ii) This question was done well, with many candidates gaining the three marks. The most common answers referred to oxygen and muscles. Fewer referred to glucose and energy.

(c) This question discriminated well. Many candidates gained one mark for the idea that the heart slows, but not many linked this to less accurate answers. A few confused accuracy with reliability.

Part (a) was answered well, although some candidates put microscope and/or funnel as items needed for testing food samples for glucose. Most new Benedict's test, although some thought iodine was used. The majority of candidates knew that iodine was used to test for starch. A significant number lost the part in (b) (iii) as they simply put 'no colour change', rather than giving the colour of iodine itself, e.g., yellow/brown etc.

**Question 3**

This question was centred around enzymes. It allowed candidates to demonstrate their graphical skills and knowledge of how to work out concentrations.

(a) Most candidates gained at least 4 or 5 marks when drawing the graph. The most common mistake was to have the axes the wrong way round.

(b) (i) Most candidates were able to give an appropriate conclusion drawn from the data in the graph.

(b) (ii) Some candidates had difficulty in realizing what the question was asking and merely repeated their answer to the previous question. Others usually gained the first mark for the idea of digestion or breakdown, but only the more able candidates gained the second mark by referring to the idea of becoming more fluid.

(c) Most gained at least one mark here, with the most common answers being temperature, size of funnel and pH. Some wrongly referred to the mass of jelly/paste, but this was not credited as it was said to be the same in the stem of the question.

(d) Most candidates answered this well, although some wrongly said 0.5g in 50 $cm^3$.

**Question 4**

This question centred around trapping insects and tested the candidates' ability to record information, as well as their knowledge and understanding of reliability and drawing conclusions.

(a) (i) Most candidates gained full marks here. Some lost a mark or two in their tallies by miscounting, but were then allowed a carry forward error mark if they transferred the number correctly.

(a) (ii) Most candidates gained the mark here for the idea of using 10 traps or repeating.

(a) (iii) This question was reasonably well answered. The most common answers were more food at night and fewer predators.

(b) Most candidates had a good go at this question. Credit was given either for agreeing or disagreeing as long as an appropriate reason was given. The most common answers related to the fact the dead animals cannot escape or that it was inhumane to kill them.

**Question 5**

This question tested the candidates' understanding of planning and carrying out an experiment. It was based on how the distance apart seeds were planted would affect their growth.

Most candidates scored around 4 marks. The most common points missed were how growth would be measured or reference to the same age/species of seed.

## 4325 Biology Paper 04 (Coursework)

The total number of centres entering candidates for this component of the examination increased again this year.

The moderating instrument used was the Sc1 criteria previously used by home centres, using exemplars provided by the JCQ (Joint Council for Qualifications) as a guide.

Generally the work seen was of grade C or higher standard, with very few grade G candidates. The marks awarded by the centres for investigations for the separate sciences tended to be high and a number of full marks were seen in the samples and the average mark for the centres' assessments was in the mid twenties. In fact the lowest mark for a number of centres was in the low twenties.

**Skill Area P: Planning**
Comprehensive and detailed scientific information was often written but it was not always used sufficiently to support predictions and inform plans. Students did not always consider the control and monitoring of all relevant factors when they were planning how to obtain reliable evidence as often no plan was made to control or monitor the ambient temperature during the course of the investigation even though students had stated it was a variable to consider. As a consequence, it was not always possible to support the award of P.8a. Most students carried out some form of preliminary work involving the establishment of the range to be investigated, but on occasions some other factor was investigated, such as a suitable time duration for the osmosis activity. Students did not always appreciate that in order to satisfy P.8b they should show how this preliminary work informed the main investigation that they were going to perform.

**Skill Area O: Obtaining Evidence**
Many of the centres and their students failed to recognise that taking averages of results where there are significant variations, does not give reliable evidence. Very rarely did students identify these anomalies and then repeat the measurements so that they could ignore rogue results when calculating averages. Occasionally students averaged the readings for individual components such as voltage and current for a particular length before carrying out a calculation to determine the variable linked to the investigation (i.e. resistance) and, if the values of the item being averaged showed significant variations, then the reliability of the evidence was compromised. Some students did not appreciate the need to control and monitor significant variables. The obvious one being the ambient temperature at which the investigation was carried out. For these reasons, rarely was it possible to support the centre's award of eight marks for this Skill Area. However, most students were able to justify the award of at least six marks by the systematic and accurate means they had collected and presented their evidence.

**Skill Area A: Analysing and Considering Evidence**

Most students were able to carry out the required calculation for the factor under investigation, i.e. percentage change in mass of potato stick, rate of chemical reaction and resistance of a wire, and then use this information to draw the graph of the evidence, with a line of best fit in the form of the expected straight or curved line, thus achieving A.6a. Detailed scientific knowledge was often used to discuss the evidence to produce a valid conclusion, but this evidence was not always the processed evidence shown by the graph. Sometimes the data in the table of results made the award of A.8a problematical. It was good to see discussions that often considered the shape or angle of the graph in order to determine the exact relationship between the variables investigated. Students still find it difficult to discuss the prediction in terms of the processed evidence displayed in the graph and often ignored the tentative nature of any relationship displayed by the scattering of plotted points around the line of best fit, making the award of A.8b difficult to justify.

**Skill Area E: Evaluating**

Most students were able to identify anomalous results and make some comment on the quality of the evidence obtained and so satisfy E.4a. Discussion of the procedure and identification of possible improvements was surprisingly weak in some cases, although E.4b had usually been awarded. Most students understood that any further work suggested had to be described in some detail and justified in terms of the original task, either by extending the range investigated or by investigating a linked factor for E.6b to be awarded. However, discussion of the reliability of the evidence obtained and, in particular, explaining the cause of identified anomalies, was not always easily accomplished, yet E.6a seemed to be freely awarded in a number of cases.

At most centres there was clear evidence that internal standardisation had been scrupulously carried out, and there appeared to be consistency in assessment across the various groups in a large entry. The marks were always confined to a single investigation for the separate sciences (two could have been used) and mainly just two for the Double Award Science entries when a maximum of four investigations is possible.

**Biology 4325**

The tasks chosen by the centres were generally appropriate for iGCSE students. Osmosis in potato chips was once again the most common practical task seen this year. Catalase was also a popular option in some centres.

Overall a range of Biological investigations were seen and the Osmosis investigations usually gained high marks. One centre did four different investigations. Some other investigations seen this year were respiration in yeast and energy in peanuts. One student had carried out an investigation on diffusion of ammonia gas which barely qualified as a Biology activity and the level of demand for this task was low.

The quality of annotation was variable, with some centres not annotating the students' work at all. Teachers are respectfully reminded that when scripts are marked, teachers should use the printed coursework mark criteria as a guide, putting minimalist annotation such as P6b, P8a, and P8b alongside the point in the script where the student achieves the mark description.

Centres are respectfully reminded that students should work individually, with minimal teacher guidance, on the investigations presented for moderation. For this reason, one would not expect to see virtually identical scripts with identical safety issues, the same preliminary task with the same number and range of readings, the same task with the same results, and the same improvements suggested.

## BIOLOGY 4325, GRADE BOUNDARIES

Option 1: with Written Alternative to Coursework (Paper 3)

| | A* | A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|---|---|
| Foundation Tier | | | | 62 | 49 | 36 | 23 | 10 |
| Higher Tier | 83 | 72 | 61 | 50 | 39 | 33 | | |

Option 2: with Coursework (Paper 04)

| | A* | A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|---|---|
| Foundation Tier | | | | 63 | 49 | 35 | 22 | 9 |
| Higher Tier | 84 | 73 | 62 | 51 | 39 | 33 | | |

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

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