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Examiners' Report Summer 2007

IGCSE

IGCSE Biology (4325)

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BIOLOGY 4325, CHIEF EXAMINER'S REPORT

General Comments

Candidates were able to access all the questions to demonstrate their knowledge and understanding of the specification. The course also encourages candidates to carry out practical activities with the appropriate collection, analysis and evaluation of data. This area seems less well assured and candidates are encouraged to practice quantitative manipulation of data so they can access questions of this type with greater success.

Paper 1F, Section A
Questions in this section are targeted at grades E, F and G.

Question 1
This question consisted of ten objective items. Most candidates scored well on these items with item (d) which required the identification of the heart chamber that supplies blood to the body proving the most difficult for candidates.

Question 2
In this question candidates had to match the correct donated body part to the description choosing their answers form the list provided. Most candidates gained marks with the most difficult being the secretion of insulin which was sometimes mismatched to the kidney.

Question 3
In this question candidates were given information about a cheetah. They then needed to perform a calculation converting speed in meters per hour into metres per second. Most candidates could do this. Part (b)(i) required a description of anaerobic respiration and for (ii) candidates to name the waste product produced and (iii) say how this may affect enzymes. Many scored well on (i) and (ii) but fewer gained credit for (iii). All we expected for (ii) was a description of reduction in enzyme action caused by denaturation.

Question 4
This question required the candidates to match the section of a leaf to descriptions of the region. Most gained good marks on these items.

Question 5
In question 5 (a) candidates were required to pick from the data the mammal that produces most sugar in its milk, identify the sugar in milk and compare the protein found in milk from cows with milk from rabbits. Many scored high marks on these items. Part (b) concerned digestion of milk protein with candidates selecting from a list of substances the products of protein digestion, the enzyme that digests protein and the acid used to help this enzyme. While some candidates gained full marks many seemed to be guessing. Part (c) asked candidates to explain why polar bear milk contains the most fat. Most were able to link this to the cold environment with the better responses describing how fat can act as an insulating layer and how the fat can be used as an energy source. Finally part (d) asked for two substances required in babies milk other than fat, protein and sugar. Vitamins and minerals were the most popular correct answer given.

Question 6
This question provided candidates with a diagram of a flask being used for micropropogation. The first part (a) required two functions of the roots inside the flask, most responses correctly described the roles as absorbing minerals and water and anchoring the plant in place. In part (b) many candidates could not explain the meaning of sterile. In this context it means free from bacteria or fungi. Candidates did better and were able to name a mineral in part (c). However part (d) which required the purpose of covering the opening of the flask was only answered correctly by the most able candidates who correctly described how this would keep out microorganisms and maintain the humidity or prevent water loss from the shoot. Candidates did better in part (e) naming two conditions that are needed for photosynthesis.

Question 7
Question 7(a) required candidates to count the bricks covered by plants and transfer this data to a table, calculating percentage coverage. Many gained full marks for this but very few gained both marks for part (b). Most responses correctly suggested that sulphur dioxide prevents plant growth but only very few linked this to its acidic properties.

Question 8
This question allowed candidates to demonstrate their knowledge of meiosis and changes in chromosome number. Most scored well on part (a) showing the change form 46 in somatic cells to 23 in gametes and back to 46 following fertilisation. In part (b) few candidates could correctly identify the number of divisions or the type of division that would produce a 4 celled embryo from a zygote. The more able candidates were able to name mutation as the change in genetic material.

Paper 1F, Section B / Paper 2H, Section A
Questions in this section are targeted at grades C and D.

Paper 1F Question 9 / Paper 2H Question 1
In this question many candidates were able to correctly identify where the horse would chew its food and store its faeces. They also were able to identify where most villi are found. The role of peristaltic muscular contractions in moving food along the oesophagus was recalled by the vast majority. A variety of answers were offered for part (c)(i), with starch and glucose being the most common wrong responses. Pleasingly, cellulose as the correct answer was seen on many scripts. The function of vitamin C is not widely known. A range of responses were accepted including its role in avoiding scurvy and ensuring skin and gums were kept healthy. Part (d)(i) was almost always answered correctly, but only the more able candidates were able to calculate that the horse would use 5 250 kJ of energy when walking fast for one hour. Many wrote 10.5 as their answer.

Paper 1F Question 10 / Paper 2H Question 2
This question discriminated very well, producing a range of marks from zero to the total of 4. Many candidates incorrectly believe that bacteria possess a nucleus, that yeast cells lack a cell wall and that they contain chloroplasts.

Paper 1F Question 11 / Paper 2H Question 3
In this question oxygen being used and carbon dioxide being produced was understood by most candidates. In (a)(ii), one mark was awarded for having yeast in the middle of the food chain and one mark was awarded for drawing arrows in the correct direction. It was the latter point that caused most difficulty. Some candidates simply drew straight lines with no arrow heads which was not credited. Part (b) was well answered, though the calculation caused difficulty for some. The correct answer of 50% gained full marks. However, if this answer was not seen, markers were asked to look at the working and award one mark if 38-57, 57-38 or 19 were visible. As such, candidates are encouraged to show their working. In part (c) credit was given for appreciating that the temperature was higher and that this would affect the enzymes involved in metabolism, which would increase yeast reproduction and, therefore, increase the food available for the flies. Most candidates gained a mark for recognising that the temperature was higher, but very few candidates explained how this might be linked to obtaining more fly offspring. Knowledge of how sex chromosomes are inherited was poor, with very few candidates scoring full marks. The reason why equal numbers of male and female offspring were not obtained escaped most candidates who clearly struggle with the concept of random fertilisation.

Paper 1F Question 12 / Paper 2H Question 4
In part (a) marks were awarded for appreciating that that the insects would reduce crop yield because they would reduce leaf area, which would reduce photosynthesis. Less able candidates realised that there would be less yield but were unable to explain why. The fact that pesticide kills insects is well known but candidates need to be encouraged to answer questions fully. In this case an explanation was also required. The most common correct explanation made reference to the idea of increasing yield by reducing crop loss. Interpreting the data in the table in part (c) posed few problems with most choosing day 28 as the day when the crop was sprayed with pesticide for the second time, and 48 000 as the decrease in numbers after spraying on day 5. Several ideas were rewarded with regard to recognised disadvantages of using pesticides such as lack of specificity, bioaccumulation, food chain disruption, the need for reapplication and the possibility of promoting resistance. The most able candidates scored 2 marks, and most were able to gain 1 mark. A surprising number of candidates believe that the pesticide would damage the crop. Candidates are encouraged to avoid the use of bland phrases, such as, “causes harm to the environment”: the examiners are looking for specific ideas. Answers linked to cost implications were not rewarded. The use of the word “immune” rather than “resistant” should be discouraged for sound biological reasons.

Paper 1F Question 13 / Paper 2H Question 5
In this question some were able to recall the substances removed by the kidneys and most that red blood cells play an important role in oxygen transport. They also recalled that white blood cells, or more specifically, lymphocytes produce antibodies. Explaining why paralysis of breathing muscles is dangerous proved more discriminating. Marks were awarded for naming the muscles involved and for describing the effect that their inability to contract would have on pressure/volume changes and the uptake/removal of named gases.

Paper 1F Question 14 / Paper 2H Question 6
Part (a) was answered well by the most able candidates. However, most failed to appreciate that light would permit photosynthetic microorganisms to produce oxygen which would nullify the procedure for measuring BOD. In part b(i), many candidates appreciated that three farms were breaking the law: farms A, C and D. Naming only one or two of these farms was not credited. Few candidates calculated 600 mg as the correct answer to part (ii). There were many single answers of 20 and 30 from candidates who failed to appreciate the need to multiply these two numbers. Part (iii) was the most challenging. Candidates who had not understood the need to use numbers from both columns merely chose the biggest numbers and either selected farm A or farm B. The most able candidates correctly chose farm D. Explaining the role of microorganisms consuming oxygen by respiration was understood by those candidates who appreciated that waste with a high BOD was likely to have lots of organic material for microorganisms to consume.

Paper 2H, Section B
Questions in this section are targeted at grades A*, A and B.

Question 7
The detrimental consequences of cigarette smoking are well known. The examiners were impressed by the depth of knowledge shown by candidates. Emphysema, bronchitis and cancer were often discussed in detail and many candidates obtained full marks. A small number wrote about nicotine and addiction, and about the effects smoking has on the circulatory system. These topics were irrelevant and did not gain credit.

Question 8
This question was well answered with many candidates gaining full marks. Most difficulty seemed to relate to the placing of an arrow to represent the process of decomposition. One arrow from flowering plants, herbivores or carnivores to the atmosphere was the expectation. Answers to part (b) displayed a pleasing knowledge of a problem that concerns us all – global warming. Many made reference to terms and ideas such as greenhouse gas, greenhouse effect, global warming, polar ice melting, flooding and climate change.

Question 9
Despite being given diagrams to help answer part (a), many candidates struggled to gain full marks. The position of the stamens and the stigma being outside the petals of the wind pollinated flower and inside the petals of the insect pollinated flower was credited. Many struggled to describe this fact and many confused the two types of flower in their answers. Most appreciated that the petals of the insect pollinated flower are larger. Many described shape rather than size, a subtle but significant error. Most realised that the wind pollinated stigma is feathery, or words to that effect. In part (b), most candidates appreciated that insects were involved in transferring pollen and the best answers also stated that the pollen was collected from an anther and deposited on a stigma.

Question 10

The vast majority appreciated that the palisade cells of the mesophyll would contain the most chlorophyll. Many candidates had clearly not read the question carefully and put "chloroplasts" as their answer. In part (b) credit was not given for naming colours. Answers in the range of 420 to 460 and 650 to 690 were accepted. The nm units were not expected. The vast majority realised that there would be less photosynthesis in green light and a pleasing number made reference to green light being reflected or not absorbed. Most recalled that light intensity, ambient temperature and carbon dioxide are the main factors that affect the rate of photosynthesis.

Question 11

The early part of this question proved to be challenging. Candidates were expected to recall the structure of the human heart and compare it to the unfamiliar heart of a fish. It was therefore pleasing to note that candidates had little difficulty in appreciating that both hearts have an atrium, a ventricle, a valve and that they both have a vein bringing blood to the heart and an artery taking blood away from the heart. Structural differences between the hearts were less well answered, though many understood that there were numerical differences in the number of chambers and the number of associated blood vessels. Part (c) proved difficult for candidates with most appreciating that blood only flows through the heart once, but then struggling to amplify this point. The role of adrenaline in speeding the heart rate at times of "fight, fright and flight", however couched, was recalled by most. Surprisingly, many failed to identify the endocrine gland that secretes adrenaline. Those who claimed it was the adrenaline gland did not gain credit. The table in part (d) was well answered by most. Lungs or alveoli were accepted for oxygen. The small intestine or villi were accepted for glucose. Intestine alone gained no credit. A surprising number of candidates wrongly wrote pancreas. Kidney, nephron or renal tubule, were often seen as correct answers for urea. Answers to ADH had the greatest variety but the more able candidates recalled pituitary (despite some mis-spellings) and the terms kidney, nephron, renal tubule or collecting duct.

Question 12

Base pairing in DNA is known by many. Candidates either tended to gain full marks or none, suggesting that some candidates are oblivious about the structure of this remarkable molecule. However, candidates did know that a double helix has two strands which are twisted in a spiral fashion. Simply saying the two strands were **joined** together was not credited. The enzymes involved in genetic modification are well known, though a surprising number referred to endonuclease rather than restriction endonuclease. Nevertheless, the term endonuclease alone was credited. The term transgenic is only familiar to the more able candidates, weaker students quoting clones or merely repeating the term genetically modified. In part (c) many were able to name a human hormone, with insulin being the most popular choice. Less able candidates then stated what the hormone does, (control blood glucose levels), rather than answer the actual question which expected candidates to discuss the process. As such, answers mentioning the speed and bulk of production were credited, as were answers that appreciated that it is **human** insulin that is manufactured and that this would have fewer side effects, however this idea was couched.

Question 13
This question generated the full range of marks. The term explant is unfamiliar to most, as is the fact that these small pieces of plant are cultured in sterile nutrient agar. Most were able to suggest what the nutrient medium should contain with minerals, vitamins and hormones, (accepted despite the fact that they should really refer to growth regulators), being the most common responses. Most appreciated that the pots contain soil or compost and that light intensity, ambient temperature and carbon dioxide levels can be controlled. Other sensible conditions were accepted. The fact that clones are produced which are, by definition, genetically identical was understood by many candidates.

Question 14
The structure of the eye is well known and almost all candidates correctly stated the brain as the part of the CNS demanded by the question. A mark was given for appreciating that vision would be impaired if the retina became detached. Most candidates gained this mark, but only the more able candidates linked the idea of a blurred image to the inability to focus light on to the retina.

Question 15
Most candidates appreciated that mutations are changes to genetic material, though few mentioned that they are rare and that they can be inherited. Marks were awarded for recognising that mutations can be detrimental or beneficial, and how either of these might impact on the size of a population. Marks were also awarded for naming a particular characteristic caused by a mutation such as Down syndrome, cystic fibrosis or albinism. Finally, marks were credited for reference to the impact mutations have on the processes of natural selection, evolution or speciation. Candidates find continuous prose difficult, particularly when the task is as challenging as this one. They are encouraged to think before they leap and to create a plan before starting to write. That said, there were many excellent answers gaining full marks, which represents credit to their understanding and their teaching.

Paper 3

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 was marked out of 47 instead of 50. There was an erratum for this paper, but it was felt that the candidates from some centres had answered as if they had not seen the erratum notice. It was decided to discount answers from the related questions. Those were Q1bi and Q1bii. In the data for Q6, there was a minus sign missing from the last percentage change figure in the table. The plotting of this point was disregarded. It was felt that no candidates were disadvantaged by this omission.

Question 1
Part (a) was answered well with almost all candidates able to identify 'measuring cylinder' and correctly drew the line at 5 cm^3. Both parts of (b) were discounted, as it was clear that not all candidates knew about the erratum.

Question 2
Part (a) was answered well, although some candidates got 'Heat the leaf in boiling ethanol' and 'Add iodine solution' the wrong way round. In part (b) most candidates either gained 1 mark for 'no photosynthesis' or for 'the idea of 'de-starching', with some gaining both ideas. In (c) most candidates recognised that ethanol was flammable and thus was dangerous, but some missed the point of the question and talked about aspects of heating. In (d), almost all candidates gained the mark for the colour iodine would turn if starch was present.

Question 3
In part (a) most candidates gained 1 or 2 marks, but some either missed the time or where the pulse should be taken. In part (b)(i) most gained 1 mark, but not mainly gained the second mark for the increase being slower as the time of exercise progressed. In part (b)(ii) most candidates gained the mark for 4/64. In part (b)(iii) most candidates gained 2 marks, usually saying that the pulse rate would decrease to 68 or the resting value. In part (c) the majority of candidates gained the 4 marks for the table, but some missed out the value at 10 minutes.

Question 4
In part (a) most candidates had the tallies correct and also the calculation. Part (b) discriminated well, with the full range of answers given. The most common answers related to the size of the bubbles not being equal and named abiotic factors not being controlled. Some candidates, however, did not appear to understand the question.

Question 5
This question was answered well, with many candidates gaining full marks. It is clear that 'CORMS', from feedback meetings and the previous reports is being used well. A few candidates forget to give examples of fair testing.

Question 6

Most candidates gained full marks in part (a). In part (b) many candidates gained full marks for the graph (the last point was discounted), although some got the axes the wrong way round. Most candidates gained the mark in (b)(ii), reading off their graph, and also the mark in (c). Part (d) discriminated well, with some candidates thinking that sucrose moved into the cell instead of water.

COURSEWORK (PAPER 4), PRINCIPAL MODERATOR'S REPORT

General Comments on Science Coursework

The coursework component is only available to centres which are recognised by Edexcel as International Teaching Institutions.

The number of students entered for this component of the iGCSE examination was as follows:

Code	Subject	Number entered in 2007	Number entered in 2006
4325	Biology	257	202

All of the centres that entered students for this component of the examination had their science coursework moderated by Edexcel's co-ordinating Principal Moderator for GCSE. The moderating instrument used was the Sc1 criteria as used by Home centres, using exemplars provided by the JCQ (Joint Council for Qualifications) as a guide.

Centres entering students for the coursework component of the iGCSE examinations in 2007 therefore had their coursework moderated to the same standards as for all Home centres.

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.

Other tasks seen this year were: effect of pH changes on the activity of pepsin, light intensity on watercress, protein ratio in legumes and the effect on growth rate of mice, and the effect of temperature change on the activity of lipase.
Most of these are very familiar tasks to home centres, which can yield the full range of GCSE grades.

The one exception was "dissection of a pigs heart", which was not an investigation. For this reason, it is not recommended for Sc1 coursework.

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				55	43	32	21	10
Higher Tier	79	69	59	49	38	32		

Option 2: with Coursework (Paper 04)

	A*	A	B	C	D	E	F	G
Foundation Tier				58	46	34	22	10
Higher Tier	81	71	61	52	40	34		

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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