

Biology B

Gateway Science Suite

General Certificate of Secondary Education **J263**

OCR Report to Centres

June 2013

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This report on the examination provides information on the performance of candidates which it is hoped will be useful to teachers in their preparation of candidates for future examinations. It is intended to be constructive and informative and to promote better understanding of the specification content, of the operation of the scheme of assessment and of the application of assessment criteria.

Reports should be read in conjunction with the published question papers and mark schemes for the examination.

OCR will not enter into any discussion or correspondence in connection with this report.

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OCR REPORT TO CENTRES

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Overview

This was the first session for which the whole suite of papers has been offered and full certification has been available. This has also been the first time that the new controlled assessments have been submitted. With the removal of the January GCSE sessions, these papers will next be available in June 2014.

The papers are different from those of the legacy specification in several respects, including the paper totals being out of 75 marks (B731) and 85 marks (B732). The extra 10 marks in B732 come from the inclusion of a new fourth section, section D, which assesses Assessment Objective 3 (analysing and evaluating evidence, making reasoned judgements and drawing conclusions based on evidence). There are fewer one-mark questions and more that require more extended answers, including three six-mark questions, one in each of sections A, B and C, which are marked using 'level of response' mark schemes.

In general, candidates seemed to have been well prepared for the new examinations and controlled assessment. Concerns that candidates might not write at sufficient length to access the marks on the longer-answer questions, including the six-mark questions, have not materialised. If anything, candidates have demonstrated a tendency to write longer answers than sometimes lines are provided for. This has led many candidates to use supplementary answer sheets, although candidates should be encouraged to use any space provided below the answer lines before going on to supplementary sheets. Candidates were also well prepared for the new section D data-handling section.

There was evidence in candidates' responses that, in their preparation for the examination, many had clearly made use of mark schemes or examiners' reports from earlier sessions. It was noted that candidates did sometimes find it difficult to apply knowledge when it was in unfamiliar contexts, and this is perhaps an aspect that centres should be aware of when preparing candidates.

B731/01 Modules B1, B2, B3 (Foundation Tier)

General Comments

Most candidates made a good attempt at the paper, producing answers for most questions. Candidates generally wrote at an appropriate length. The quality of candidates' spelling, punctuation and grammar was generally good overall, although there were a small minority of cases where it was very difficult to interpret a candidate's writing and the candidate might have been better served by using a keyboard or an amanuensis.

Comments on Individual Questions

Section A

Question 1

- 1(a)** Half the candidates correctly identified the malaria pathogens as protozoa. 'Bacteria' and 'viruses' were the common incorrect choices.
- 1(b)** Some candidates did not read the question carefully and wrote about mosquitoes rather than malaria. In this case no credit was given. Of those writing about malaria, most gained 1 mark for simply describing an increase in the incidence of the disease. Only a small minority gained 2 marks which required a more detailed description of the spreading of malaria away from the equator. Two thirds gained at least 1 mark.
- 1(c)** Around half the candidates correctly named the injection as a vaccination or immunisation. Common non-scoring responses were 'antibodies', 'antibiotics' or the names of specific diseases. No credit was given for 'jabs' which was too vague.

Question 2

- 2(a)** A third of candidates correctly chose 'stimulus'. 'Response' was the most common incorrect choice, although all options were seen.
- 2(b)** This was better answered than part (a) with over half the candidates correctly choosing 'depressant'. The most common incorrect responses were 'hallucinogen' and 'stimulant'.
- 2(c)** Most candidates gained at least 1 mark and a quarter gained both. The most common correct response was the idea that the drug would need to be tested to make sure it would not harm people. The idea that it also needs to be tested that it works was also commonly seen. Only a few candidates suggested that the correct dosage needed to be worked out. No credit was given simply for the idea that humans may react differently from fish. Vague answers such as 'to see its effect' also failed to score.

Question 3

- 3(a)** To gain full marks candidates had to calculate the protein content in Linda's food as 51.0g, her EAR as 36g, and then make a conclusion, such as she was eating too much protein, or was eating more than enough. The principle of error carried forward was applied so if one, or both, of the calculations was incorrect but then a logical conclusion was made on the basis of that, credit was still given. One common error was to calculate the protein content of Linda's food as 48.0g (following on from halving 2.0g for the baked potato rather than doubling it). The question differentiated well with roughly equal numbers gaining 0, 1, 2 or 3 marks. More candidates were able to calculate the EAR correctly than the amount of protein. Some who made both correct calculations then were confused as to which was which and said for example that she wasn't eating enough protein.

- 3(b)** Three quarters of candidates gained the mark for pointing out that Sue was still growing. Some misread the question and thought that Sue was older than Linda.
- 3(c)** About a third of candidates gained both marks for explaining both that the vegetarian friends needed to make sure they ate enough protein, and for suggesting a suitable alternative source of protein. Candidates should aim to be as specific as possible in their responses, so for example, an answer such as they need to eat ‘meat substitutes’ did not score, nor did vague answers such as ‘vegetables or fruit’. Valid examples that were commonly seen included dairy products, fish, Quorn, nuts and beans.

Question 4

- 4(a)** Three quarters of candidates knew that sweating helps to lose heat or to cool the body down. No credit was given for the idea that it is a way of losing water.
- 4(b)** In part (i) three quarters of candidates gained at least 1 mark, with a third of these gaining 2, for correctly referring to the nucleus, chromosomes or DNA. In part (ii) a quarter of the candidates gained both marks for explaining that hyperhidrosis is a non-infectious disease because it is caused by a gene not a pathogen. Although a mark was given for saying that the condition is caused by a gene, there was no credit for simply saying that it is a ‘genetic disorder’, as this term had already been given in the question. Candidates should be made aware of this principle of marking. Credit was given for saying that the condition is inherited, but candidates should be aware that it ‘can be passed to relatives’ is not the same as ‘can be inherited’.

Question 5

This 6 mark extended answer question was targeted across low and standard demand. Accordingly, although two thirds of candidates gained some credit, very few went beyond 4, the most common mark. The question asked candidates to not only use the data provided but also their own biological knowledge and also to include calculations. Some candidates wrote at great length but only described what the pie chart showed, without adding anything extra, and were not awarded any marks. To gain level 1 (1 or 2 marks) candidates had to appreciate that the conditions could lead to heart disease or diabetes. For level 2 (3 or 4 marks) they had to correctly link heart disease or diabetes to the specific conditions tested for. To gain level 3 (5 or 6 marks), candidates should have stated that failure to respond to insulin is linked specifically to type 2 diabetes, as well as include at least one calculation using the data given, eg to state that 30 000 people had all three conditions. Very few attempted any calculations.

Section B

Question 6

- 6(a)** In part (i) most candidates found it difficult to explain what a trophic level is. Although some did gain the mark for answers such as ‘a stage in a food web’, no credit was given for answers such as ‘things that eat the same food’ or ‘things that have the same predator’, as these do not apply to all trophic levels. About a third gained the mark. In part (ii) common scoring answers included ‘shelter’ and ‘water’. No credit was given for responses such as ‘habitat’, ‘space’ or ‘land’ as the two species share these. No credit was given to the not uncommon response ‘mates’. Two thirds of candidates gained at least 1 mark for part (iii), usually for the idea that the beetles would only have the earwigs to feed on, but few expanded on this to explain that therefore the beetles would have to eat more of the earwigs. There was no mark simply for saying that the earwigs numbers would decrease. Credit was available if candidates suggested the earwig population would increase through reduced competition for food, though relatively few candidates successfully went down this route. A small minority of candidates thought that earwigs eat beetles.

- 6(b)** Most candidates correctly calculated the mean in part (i) as 32. Marks for part (ii) varied from 0 to 2, with over half gaining 1 mark. The second and third boxes were the most common incorrect responses.
- 6(c)** In part (i) the most common answer was the correct 'bacteria' followed by 'fungi'. No mark was given for examples of detritivores such as worms. Less than half the candidates correctly chose 78% in part (ii). 0.04% and 21% were common incorrect responses.

Question 7

- 7(a)** Most candidates correctly identified the mayfly larva as an insect. A small minority however correctly picked the caddisfly larva, with the water louse being the common second choice.
- 7(b)** Over half the candidates gained at least 1 mark, though few gained both marks, for explaining how both the hooks and the flattened body are adaptations to living in fast-flowing streams. Candidates should be encouraged to expand their answers, for example rather than simply saying that the hooks allow the larvae to hold on to things (no marks), a better answer is to say that the hooks allow them to hold on to rocks so they don't get swept downstream (1 mark).
- 7(c)** To gain full marks in this 6 mark extended answer question it was necessary to identify the high numbers of the sludgeworms or the rat-tailed maggots, plus the absence of the mayfly larvae, and then conclude that the Council should be concerned about the levels of pollution downstream from the factory, as there are other places that are clearly not (as) affected by pollution. About half the candidates gained 2 marks for identifying the high numbers of sludgeworms or the rat-tailed maggots, but very few went beyond this.

Question 8

- 8(a)** In part (i), a minority of candidates appreciated that there were four times as many whales in September compared with August. Among the many non-scoring answers, '0.75' was very common. In part (ii) less than half the candidates made a link between the amount of food and the whale numbers, and only a few gave a detailed enough answer to gain 2 marks, for example they described the overall increase from August to October, without mentioning the rise in September followed by the fall in October. Some simply described the change in whale numbers without an attempt at an explanation.
- 8(b)** Most candidates gained at least 1 mark for referring to whale hunting or pollution. Some mentioned a decrease in the whales' food and a very few explained that they have not been able to adapt yet to their changed environment. A third made two valid points, gaining full marks.

Section C

Question 9

- 9(a)** Most candidates correctly chose 'fertilisation'.
- 9(b)** Few candidates gained full marks for identifying which cells were haploid and which were diploid, although over half gained at least 1 mark. More knew that eggs are haploid than they did for sperm cells. Many knew that embryo cells are diploid but were often confused regarding the zygote or the twin embryos.
- 9(c)** A small minority correctly named mitosis. There were many 'meiosis' answers.

- 9(d)** Most candidates gained both marks in part (i) for saying that the heart pumps blood. Part (ii) proved far more difficult, with a small minority able to explain the meaning of 'cell differentiation'. Of those candidates who appreciated that it was something to do with different cells, many thought it was simply describing the fact that cells are different.
- 9(e)** There were two marks available, one for the idea that the twins came from the same zygote, and one for the idea that they would be genetically identical. Only a minority gained both marks, although over two thirds gained at least 1 mark. No credit was given to the not uncommon answer that they had 'similar' genes. Some candidates said they came from the same egg or sperm cell but the mark was only given if they said that both egg and sperm were the same.

Question 10

- 10(a)** Almost all candidates correctly chose Abi's statement, gaining 1 mark. To gain the second mark it was necessary to use data as the question instructed. Many candidates ignored this instruction and failed to gain both marks. Those that did try to use data sometimes misread the graph, for example, although the girls reached a height of 164cm, many candidates gave this as 165cm.
- 10(b)** The marks were for the explanations, so the many candidates who simply said 'yes, the girls have stopped growing, but no, the boys haven't', gained no credit. What was wanted was the recognition that the line for the girls had levelled off whereas the boys' line was still rising. Candidates should be aware that 'the line goes straight' or 'the line has stopped' does not mean the same as 'the line has levelled off'. A noticeable number of candidates lost marks this way. Half the candidates gained at least 1 mark but only a few gained both.
- 10(c)** Very few candidates gained close to full marks on this question which was aimed at standard demand and was common with the higher paper. The vast majority gained no marks and many candidates left it blank. Of those who answered, many gave the names of different nutrients such as carbohydrates or calcium. Others gave answers such as 'skin protein' or 'muscle protein'. None of these gained credit. Marks were most commonly awarded for correct reference to enzymes or hormones.

Question 11

- 11(a)** Generic descriptions of selective breeding gained a maximum of 2 marks (level 1), although a third of candidates did make reference to breeding together animals with large heads or flat faces, and so gained at least 3 or 4 marks (level 2). Only a few candidates clearly explained that the best of the offspring would be selected for breeding and that this had to be repeated over many generations, which was necessary for level 3 (5 or 6 marks). It wasn't enough to say 'choose the dogs with the largest, flattest faces, breed them, and repeat this' as in this case it could just mean repeat the breeding with the original dogs. More candidates than in previous series' seemed to be confused with genetic engineering or cloning and there were quite a few references to putting genes into cells. Rather than selecting suitable dogs from the bulldog ancestors to breed, some candidates spoke about breeding the bulldogs with other dogs that already had large heads and flat faces. Some candidates wrote about trying to breed two different species, and in some cases pointed out that the hybrid offspring would be sterile. Over half the candidates gained some marks, which were fairly evenly spread over the marks available.

11(b) Most candidates tried to argue that breeding bulldogs should be banned, but despite writing at some length, did not gain any marks as they only repeated information already given in the question, instead of going on to say, for example, that the health problems could be seen as cruel, or caused pain or distress. Candidates could also have gained marks by arguing that breeding should not be banned, for example, by saying that they could be bred to get rid of the harmful features, but not many went down this route.

B731/02 Modules B1, B2, B3 (Higher Tier)

General Comments

- In general the paper was balanced and accessible to all candidates. Few candidates failed to complete the paper.
- Answers were appropriate to the question and there was little evidence of guessing taking place. Questions which tested the quality of written communication were largely well developed by candidates, although there was a reluctance to link data present in graphical form in the question to their response. This often limited the access to the higher marks in this type of question. Very few of these questions were no response answers.
- Artistic embellishments were not observed indicating that the candidates were 'on task' throughout the session.
- The rubric of most questions was interpreted correctly.
- Candidates continue to find difficulty in questions which test the candidates' ability to apply their knowledge and understanding. Marks ranged from low teens to low sixties and it is encouraging to see higher marks are now being obtained by the more able candidates.
- Most candidates were able to apply their knowledge of specialist organisms and also understood why some energy is not transferred between trophic levels. Fewer candidates were able to apply their knowledge of how nerve impulses are transmitted across synapses so the impulse is passed on to the motor neurone and then muscle. Encouragingly, most candidates could calculate EAR in Q.2(a) but it was very rare to see use of calculated energy transfer in Q.5(bii) as many candidates were answering in generalised terms rather than using the data they calculated and that available in the question.
- Candidates, as in previous exam series', need to be more aware of making comparisons to avoid losing marks. Candidates should also be more alert to applying their knowledge to new situations in questions.

Comments on Individual Questions

Section A

- 1(a)** This was a challenging start to the paper. A significant number did not associate neurotransmitters with synapses. Some candidates had the misconception that paralysis happened because neurotransmitters couldn't reach the brain. It was rare to see responses that made the link to the muscles.
- 1(b)** Many candidates scored well on this question. There were many good descriptions of double blind testing. The candidates who concentrated on animal testing did not gain credit.
- 2(a)** Many got all marks available on this question. Where there were errors, these were made in the calculation of protein content. The principle of error carried forward limited the effect of such an error.
- 2(b)** Good responses discussed different exercise levels and muscle growth. Some candidates ignored the reference to the same mass in the question and discussed differences in size.
- 2(c)** Most candidates pinpointed the need to find an alternative protein source but may not always have suggested a source other than plants.

- 3(a)** Most knew that it was the evaporation of sweat which caused the cooling effect. Other candidates did not mention that the evaporation of sweat needed heat from the body. A few candidates' responses suggested that the sweat, itself, cools the skin.
- 3(b)** There were a lot of Punnett squares drawn in response to this question, the majority correct. Although many did work out the correct ratio, a number of candidates tried to work out the probability based on the ratio of brothers and sisters affected, rather than the genotypes of Gemma and Leroy.
- 3(ci)** A good discriminator question.
- 3(cii)** The best responses clearly described the roles of white blood cells in antibody production and phagocytosis. With a few candidates there was some confusion between antigens, antibodies and even antibiotics, for example 'antibodies engulfing antigens' or 'antigens producing antibodies'. Other candidates incorrectly referred to pathogens.
- 4(a)** There were some good descriptions of the effects of cholesterol and high blood pressure. A number of candidates simply repeated the data given in the pie chart without any type of numerical calculations. The distinction between type 1 and 2 diabetes was often confused and this often limited access to the higher marks.
- 4(b)** This was generally well answered.

Section B

- 5(ai)** The best candidate responses correctly highlighted the difference in size or numbers between the snails and the larvae. Common errors involved references to the mass of the dead leaves.
- 5(aii)** This was a well answered question with correct references to respiration, excretion or egestion. Candidates who did not understand the concept often referred to growth.
- 5(bi)** Many correctly answered this question.
- 5(bii)** Candidates often referred to their answer from (i) but did not use it numerically, along with other data in the question, to predict the energy available to the next level.
- 6(a)(i)** Many candidates answered this question correctly. A significant number of candidates just ticked the boxes rather than stating 1 and 2.
- 6(aii)** A number of correct versions of the idea of a universal language were seen. There were vague responses about making it easier to study them which did not gain credit.
- 6(b)** The concept of specialists was well understood. Different versions of the definition of a specialist were often correctly stated.
- 6(c)** There were some good responses that referred to the three different regions of the river, giving evidence for the different levels of pollution. Candidates often missed gaining the higher level marks by just referring to a single region.
- 7(ai)** There were a number of different correct ways of giving the ratio of 1:4 and these were all seen. A significant number of candidates did not gain credit because they stated the ratio was 4:1.
- 7(aii)** Candidates scored marks for linking the general trend of more food and more whales. To gain full marks the exceptions needed to be stated and this was rarely done.

- 7(b)** This question was well answered by most candidates.
- 7(c)** There were a number of credit-worthy references to adaptations such as blubber and migration when the sea is cold. The concept of a small surface area to volume ratio was misunderstood by many candidates.

Section C

- 8(a)** The candidates who understood the concepts of haploid and diploid were able to score full marks here. For some candidates all the ticks were in the reverse boxes which indicated a misunderstanding of the key words haploid and diploid rather than the underlying processes involved.
- 8(b)** This recall of knowledge question was a good discriminator.
- 8(ci)** There were some good references to differences in pressure or speed of flow but incorrect responses often concentrated on the difference between the route of the blood.
- 8(cii)** The concept of transfer of oxygen between maternal and foetal blood was poorly understood.
- 8(ciii)** Many candidates stated that ATP is used for growth without referring to the supply of energy.
- 9(a)** A number of candidates gave the correct reason. To gain full credit they needed to use the graph correctly to pinpoint the age, and many could not. The interpretation of the graph for this question proved to be challenging.
- 9(b)** The overlap between the two distributions was not recognised by many candidates although there were some references to the average of mean heights being different.
- 9(ci)** Enzymes were often correctly stated as a type of protein along with a correct function. Haemoglobin was also given along with structural proteins or named examples like collagen. Responses that were not credited included references to first and second class proteins.
- 9(cii)** Where candidates gained credit it was usually for amino acid sequence coding.. This is always a challenging concept and again this proved to be the case.
- 10(a)** Candidates could often give a convincing argument for banning selective breeding of bulldogs. The alternative view was seen less often. Higher level references to the size of the gene pool allowed candidates to access higher level marks.
- 10(b)** Most candidates gained at least one mark in this question but in some cases the answers were too vague to gain credit. It was rare to see the idea of improved health care in candidates' responses.

B732/01 Modules B4, B5, B6 (Foundation Tier)

General Comments

The level of difficulty of the paper appeared to be appropriate for the ability range of the candidates, producing a good distribution of marks. In a number of cases candidates answering two mark questions only gained one mark. They often neglected to give more than one idea in their answer. All candidates appeared to have had sufficient time to complete the paper, with the majority attempting most of the questions.

The quality of candidates' spelling, punctuation and grammar was good however there were a few cases where deciphering a candidate's writing posed a serious difficulty.

The majority of candidates had attempted all three levels of response questions. There was some evidence that candidates had been well prepared for the new style of questions. Responses at all three levels were seen with the majority of candidates being awarded marks for at least one of the three questions.

Candidates found the questions that required some mathematical skills difficult. Few candidates were able to calculate percentage drop in pressure or show an understanding of the < and > signs. However, it was evident that candidates could interpret patterns in graphs and data from tables as question 11b and 13 were both answered well.

Comments on Individual Questions

Section A

- 1(a)** The majority of candidates were able to identify the correct substance and name of food. However some candidates lost the mark in part (i) as they listed all the substances in the treatment.
- 1(b)** Most candidates successfully gained the mark for either bacteria or fungi. Some candidates gave named bacteria but could not be awarded the mark as they were asked for the type of organism and they often named bacteria that were not decomposers.
- 1(c)** Most candidates gained the mark; some however incorrectly referred to feeding rather than decomposing.
- 2(a)** Very few candidates gained both marks for the question. A few understood that osmosis was involved but neglected to mention water molecules when they described the differences in concentration. Centres should encourage candidates to describe osmosis in terms of water concentration to prevent the confusion that occurs with concentrated solutions. Many candidates also incorrectly stated movement was through a permeable membrane rather than a partially permeable membrane.
- 2(b)** This question was successfully answered by very few of the candidates. Candidates tended to answer in terms of the chip rather than the cells. Those that gained marks tended to do so by saying the cells were turgid.
- 3(ai)** Very few correct answers were seen. Natural pest control and organic pest control were the most common incorrect answers.
- 3(aii)** Many candidates incorrectly thought the pesticide would harm the swede plants. Very few realised it was because he was an organic farmer.

- 3(b)** The majority of candidates provided a level 2 answer mainly by calculating the population size and providing some interpretation of the data. Very few candidates were able to give a good description of a correct collecting method, nor did they include the idea of repeats or random sampling. Many candidates thought capture - recapture was a collecting method rather than a way of estimating the population. A large number of candidates thought he had been successful as he had only caught 5 in the second sample demonstrating their limited understanding of the data.
- 4(a)** The majority of candidates correctly identified glucose but many lost the mark by including energy rather than oxygen in their answer.
- 4(bi)** Many candidates realised the soil only lost 1kg of mass and the tree gained 78kg. However a number of candidates failed to use the data to answer the question, simply stating the mass must have come from somewhere else.
- 4(bii)** The majority of candidates gained one mark, normally for the idea that the roots take in water and a second for the water moving up the stem or xylem. Few candidates mentioned that water is lost by evaporation from the leaves.
- 4(c)** Very few candidates could recall the term hydroponics.
- 4(cii)** Most candidates understood that soil contains minerals for growth. Although many candidates referred to them as nutrients, this should be discouraged as it could cause confusion in some contexts.

Section B

- 5(a)** The majority of candidates could identify all three joints.
- 5(b)** This question was not answered successfully by many candidates. Very few could name the types of fractures as part of the correct descriptions. Greenstick fracture was a popular answer for both the right and the left leg.
- 5(c)** The most popular answer was the correct answer, however antigen and antibody were both common incorrect answers.
- 6(a)** This question discriminated well with only the more able candidates gaining full marks. In many cases candidates simply used the terms on the diary rather than refer to the more scientific ideas of menstruation or ovulation.
- 6(b)** The majority of candidates gained level 2 for a simple description of the effects. Very few went onto provide a more detailed explanation of why the problems might contribute to infertility.
- 7(ai)** Few candidates could calculate percentage drop in pressure. Most candidates did a simple subtraction to give an answer of 9%.
- 7(aii)** Very few candidates understood that by the time the blood has reached point A it will be in the capillaries. Some candidates did however gain one mark for veins at point B.
- 7(bi)** Candidates struggled to explain the idea of a reduced effective blood circulation. Many incorrectly thought oxygenated and deoxygenated blood would become mixed.
- 7(bii)** Candidates tended to get one answer correct, normally mechanical but failed to identify the second answer. Physical was a common incorrect answer.

- 8(a)** The majority of candidates understood that enzymes break down food, however they then went on to incorrectly explain that they make the food easier to digest instead of absorb. Few candidates answered the question in terms of molecule size.
- 8(bi)** Candidates were able explain that enzyme A worked best at a pH of 2 but few could explain that there was no evidence to support the idea that the enzyme was a protease.
- 8(bii)** The majority of candidates identified the correct answer of small intestine. Some candidates lost the mark for either large intestine or intestine on its own.

Section C

- 9(a)** Most candidates gained at least one mark, normally for methane. A large proportion of candidates incorrectly thought biogas is made by burning organic matter in a distiller.
- 9(b)** Few candidates made the link between yeast and gasohol. Many candidates thought the carbon dioxide produced by yeast could be burnt.
- 10(a)** Few candidates gained both marks for this question. Many simply thought the open flask allowed the maggots to get in and did not make the link with the flies.
- 10(b)** Candidates tended to provide vague answers such as 'There was still mould on the bread'. Very few understood the concept of there not being enough evidence.
- 10(c)** A large proportion of candidates scored no marks for this question. Many thought the DNA was a nucleus and the flagellum a tail.
- 10(d)** The majority of candidates failed to apply their knowledge in this question. Many thought the shape of the neck prevented air entering the flask. Few realised the boiling of the flasks would kill the microbes.
- 11(a)** The majority of candidates were able to correctly identify 8 km as the answer.
- 11(b)** Most candidates scored marks for this question either at level 1 or level 2. Only the more able candidates were able to answer in terms of eutrophication.
- 12(a)** Many candidates incorrectly thought the answer was type 2 diabetes showing they did not understand the symbols < and >. A number of candidates gave the correct answer of type 1 but no explanation so were awarded no marks.
- 12(b)** Very few candidates understood the concept of immobilised enzymes. The majority answered in terms of denaturing.
- 12(c)** The majority of candidates correctly identified genetic engineering.

Section D

- 13(a)** The majority of candidates were able to successfully interpret the data in parts (i) and (ii).
- 13(b)** Candidates tended to gain at least one mark for realising that the first conclusion was incorrect. However they often simply repeated the second conclusion instead of modifying it to include the idea that in Cyprus females have a higher BMI.
- 13(c)** Most candidates were able to identify the correct relationship.

13(di) Many candidates found the scale of the graph difficult. This question also appeared on the higher tier paper and therefore it was expected that only the more able candidates would cope with the scale.

13(dii) Many candidates failed to realise there was no longer a link so they tried to find one. This often resulted in answers that referred to the affluence of the different countries.

B732/02 Modules B4, B5, B6 (Higher Tier)

General Comments

Most candidates made a good attempt at the paper, producing answers for most questions. Candidates generally wrote at an appropriate length, although many did go beyond the lines provided. It should be noted that a minority of candidates felt the need to use a supplementary writing sheet even if they only needed to add a single word. There is no need to do this for short additions, and it is perfectly acceptable to use the space below the answer line(s) if candidates need to (although they should not go into the 'margins' as these may not be scanned). Candidates should only use supplementary sheets if there is not enough space below. The quality of candidates' spelling, punctuation and grammar was generally good overall, although there were a small minority of cases where it was very difficult to interpret a candidate's writing and the candidate would have been better served by using a keyboard or an amanuensis.

Comments on Individual Questions

Section A

Question 1

- 1(a)** Most candidates gained at least 1 mark, though relatively few got both. Most linked decay to the action of microbes and explained that at high temperatures they respire or reproduce faster, or they linked decay to an increase in enzyme activity. Candidates should avoid vague answers such as 'enzymes work better' or 'microbes work better', as in other situations, 'better' could mean slower.
- 1(b)** Most candidates correctly linked the foods to the preservation methods.

Question 2

- 2(a)** The common weakness in answers was to make unqualified references to concentration. To say that water would move from an area of high water concentration to an area of low water concentration would have gained a mark. However to say that water would move from a high concentration solution to a low concentration solution would not. Unqualified references to concentration were taken by markers to refer to solute concentration. The second mark was for reference to a partially permeable membrane. 'Semi-permeable membrane' was acceptable, but 'partially permeable wall' was not. Neither was 'permeable membrane'.
- 2(b)(i)** Marks won't be given for points that are already given in the question, so for example there was no credit for saying that the chip did not bend, nor for alternative wordings, such as 'the chip was rigid'. Markers were looking for references to what was happening to the cells, ie that they became full of water and turgid.
- 2(b)(ii)** Less than half the candidates correctly chose graph A. B was the most common incorrect choice.

Question 3

- 3(a)** To gain full marks candidates had to work out the new population estimate, interpret this in terms of the success of the control method and state at least two of the assumptions necessary for the mark-release-recapture method. Candidates must make sure they attempt all aspects of the question, so for example, although the question asked candidates to say how successful the control method was, not all candidates made that straightforward statement. The question differentiated well with a wide distribution of marks seen.

- 3(b)(i)** Over half the candidates correctly chose C.
- 3(b)(ii)** No marks were given for the adaptations of leaves being thin, or having a large surface area, as these didn't address the question asked. About a quarter of candidates successfully wrote about most chloroplasts being near the top of the leaf, or about the transparent upper epidermis.
- 3(b)(iii)** About half the candidates gained at least 1 mark for stating that carotene and xanthophyll absorb different wavelengths from chlorophyll, or that this therefore means that a wider range of wavelengths can be absorbed. Very few gained both marks. Some candidates incorrectly thought that carotene and xanthophyll could change the wavelength of the light they absorbed.

Question 4

- 4(a)** The majority of candidates correctly completed the symbol equation for photosynthesis.
- 4(b)** To gain both marks candidates had to both explain that the tree took on more mass than the soil lost, and support this with an appropriate calculation using the figures provided.
- 4(c)(i)** About half the candidates explained that the plant lost water through transpiration or evaporation. Very few also explained that a small proportion of the water added was used in photosynthesis. Some candidates thought that water left the leaves by osmosis.
- 4(c)(ii)** About half the candidates correctly explained that transpiration increased on windy days. A minority explained this in terms of the wind moving away water vapour.

Section B

Question 5

- 5(a)(i)** About half the candidates correctly calculated the percentage drop in pressure as 90%. The common error was to convert 9/93 to a percentage.
- 5(a)(ii)** Many candidates could not identify either the vessel at A as a capillary, nor the one at B as a vein. A minority correctly identified both. The most common error was to identify A as an artery.
- 5(b)** Most candidates gained at least 1 mark, usually for explaining that damaged valves could lead to backflow. A small minority gained both marks, usually for adding that blood pressure would fall. Some candidates seemed to confuse damaged valves with a 'hole in the heart' and wrote about oxygenated and deoxygenated blood mixing.

Question 6

- 6(a)** Almost all candidates gained at least 1 mark for correctly identifying the parts of a kidney. The most common error was to confuse the cortex and medulla.

- 6(b)** This was a challenging question with a very small minority gaining all 6 marks. No credit was given for repeating the statements given in the question that alcohol reduces ADH release, and that drinking either beer or water will make urine more dilute. Many candidates' answers were little more than these statements reworded. To gain credit, candidates had to give some explanation of the role of ADH, as well as explain why urine was more dilute after drinking beer than after drinking the same amount of water. Many candidates thought that drinking 2 litres of alcohol would lead to more concentrated urine than drinking 2 litres of water, explaining this as being because alcohol is more concentrated than water.
- 6(c)** Marks were available for explaining that David's identical twin would be the best possible kidney donor, either for the idea that they had identical genes or tissue, or the idea that their kidneys would be the same age or size. Although most candidates gained at least 1 mark, a minority gained both. A common error was to say that their genes or tissue were 'similar' as opposed to 'identical'. Many answered in terms of the twins having the same blood group – the confusion between tissue type and blood group continues.

Question 7

- 7(a)** Most candidates explained that enzyme A had an optimum pH that matched that found in the stomach. Very few picked up on the fact that there was nothing in the scientists' results to support the claim that it was a protease, as opposed to another type of enzyme.
- 7(b)** The question differentiated well in that there were a spread of marks, although there were more candidates gaining level 2 compared with those gaining each of the other marks available. Most candidates explained that protease breaks down protein in the stomach, although a few simply referred to stomach acid causing the break down. Relatively few fully explained that the medicine would take longer to be released from the thicker-walled beads.

Question 8

- 8(a)** Only a small minority gained any marks, but those that did usually gained both marks. One common wrong answer was 4 litres, but 2 and 6 litres were also frequently seen.
- 8(b)** About half the candidates gained at least 1 mark, with a minority of these gaining both. The question was about how asthma affects the lungs, and the common error was to instead write about the symptoms of asthma, such as difficulty in breathing, which gained no credit. Those who did write about the effects on the lungs often were confused as to which parts were being affected.

Section C

Question 9

- 9(a)** No credit was given for just rephrasing the question without adding anything, nor for simply using the phrase 'carbon neutral', without a further explanation. What was required was an explanation involving photosynthesis, combustion and carbon dioxide.
- 9(b)** Over half the candidates knew that biogas becomes explosive when the percentage of methane falls below 10%.
- 9(c)** Around half the candidates gave a valid disadvantage of biogas compared with natural gas, usually its lower energy content, although the idea that its production uses up land that could be used for other crops was also acceptable. A noticeable number suggested that it was more expensive.

Question 10

- 10(a)** Around half the candidates scored at least 1 mark for explaining the link between flies and maggots, with about a quarter gaining 2 marks for a full explanation of the results. Some thought the maggots entered the flasks from outside, not making the link with flies that was given in the first part of the question.
- 10(b)** Two thirds of candidates gained at least 1 mark, with the most frequent mark being 2. Candidates usually mentioned the fact that it was harder for bacteria to get into flask B, but not all explicitly linked this to the shape of the neck. A common misconception was that the curved neck stopped the entry of air or oxygen. Only a minority appreciated that the boiling in stage 2 killed any bacteria already present.
- 10(c)** Most candidates said that raw milk should be banned, although full marks were also available for reasons against banning it.
- 10(d)** To gain marks, candidates had to make specific suggestions as to how the bacteria were able to survive, for example, that their enzymes do not denature in the high temperatures at the ocean vents. No credit was given for general statements about them being extremophiles, or that they had evolved by natural selection. A small minority of candidates gained any marks on this challenging question.

Question 11

The most common mark was 2, although all marks were seen. Those who gained 2 marks for working out that the factory was around 10 km from point P, often then went on to describe how the bacteria and fish populations changed, but without any explanation, so gaining no further credit. Of those candidates who did give valid explanations, more linked the fish numbers to the level of oxygen, than correctly explained the change in bacteria numbers. A variety of reasons why the oxygen levels in the water varied was given, usually linked to an algal bloom, although the precise mechanism was generally not well understood. For example, some thought that the algae used up the oxygen and others that the algae stopped oxygen entering the water from the air. Very few used the words 'decay' or 'decompose' in their answers, with far more candidates saying that the bacteria simply fed on the increased algae. Some candidates thought that the bacteria fed on the dead fish.

Question 12

- 12(a)** Over half the candidates gave a valid explanation why the soil needed to be dry before it was burnt. One common, non-scoring answer was the idea that if the soil was wet, it simply wouldn't burn.
- 12(b)** Over half the candidates correctly calculated the percentage of humus in the soil, but only about half of these gave the answer to two decimal places (3.10) for full marks.
- 12(c)** About half the candidates correctly chose soil A for its higher humus content. B was the most common incorrect response.
- 12(d)** Those candidates who didn't score usually did not specifically mention particle size, or the corresponding size of the air spaces.

Section D

Question 13

- 13(a)** Two thirds of candidates correctly stated from the table that overall males had higher blood cholesterol and BMI figures.
- 13(b)** Most candidates gained at least 1 mark for explaining that children younger than 15 years are still growing, and about a quarter went on to explain that therefore their results would be too variable to use for a valid BMI calculation.
- 13(c)(i)** Just over half the candidates were able to plot all five points on the graph correctly, despite there being half a square tolerance. A quarter failed to score at all.
- 13(c)(ii)** Generally, candidates lost marks for 'hedging their bets' and instead of saying that the graph shows no link, giving answers such as there being 'not much of a link'.
- 13(d)** This was designed to be a challenging question and about a third of candidates gained 1 mark for explaining that the two countries have different numbers of people. Only a very few then went on and fully explained why this means that averaging the means is not valid.

B733 Controlled Assessment

This was the first full year of assessment for Controlled Assessment. The number of centres entering candidates for the separate sciences was higher than in previous years following the national trend. Many centres had entries for all five specifications and these were, as far as possible, dealt with by the same moderator.

Most centres followed the procedures for carrying out assessment, submission of samples and application of marking criteria with little problem but there were, as always, exceptions. Problems faced by some centres are described below and centres should take care to avoid them when entering candidates next year.

Carrying out the assessment:

The word 'Control' in Controlled Assessment refers to control of the candidates to ensure that the work completed is the candidate's own. Some centres gave candidates far too much guidance as to how plan, execute and write about the task. Centres should ensure that all of the work, not just the 'high control' part 3, is the candidate's unaided work.

For the same reason, writing frames are not permitted. This includes generic ones which do not refer directly to the task.

Candidates can work together in groups of no more than three but the plan produced by any candidate must be their own work not a copy of that of other members of the group. Plans within a group will, of course, be similar but examples were seen by moderators of plans which were identical. The same principle applies to tables of data and graphs.

Controlled Assessment tasks can only be used in the year printed on the front cover. They can be completed at any time but can only be submitted in that year. A 2012 task done in 2012 cannot be submitted in 2013 neither can a 2014 task done a year early. If a task is completed but not submitted in the appropriate year it cannot be used.

Some centres submitted tasks from 2012 and 2014 and some centres submitted a mixture of different years. Such mistakes are not without penalty.

Submission of samples:

Many centres organised their samples of work very well whereas others adopted a rather more random arrangement which varied according to which teaching group the candidate was in. It is helpful to moderators if the work is arranged in order with the front page of the part 3 booklet at the front.

This page is what the moderator needs to look at first as it contains all of the essential information; year, specification, task name, candidate name, centre number, candidate number and the marks for each Skill quality. It is disappointing when this page is incomplete. In too many cases centre number and/or candidate number were missing. Sometimes the marks were not completed or were wrongly totalled.

Centres are asked to ensure next year that in the sample sent for moderation this sheet is at the front of the candidates' work and is correctly and completely filled in.

Application of the marking criteria:

This is dealt with in detail below under the heading of the individual Skill qualities but a few general points follow:

The 'Additional guidance' given below the criteria in the Teacher Guidance for each task, should not be used as a mark scheme.

No other mark scheme, whether from the internet or generated by the centre should be used.

The only valid mark scheme is the marking criteria provided by OCR.

There have been issues in some centres this year where candidates were disadvantaged by centres using mark schemes other than the official marking criteria.

Guidance follows on how to apply the Criteria when marking a candidate's work.

Researching:

It is the notes which the candidate makes on their original research which are assessed. The original research may not be the candidate's work as it may have been done at home or in a group. The original research need not and, indeed, should not be included in the sample nor may it be taken, by the candidate into the final (part 3) session.

To gain higher marks candidates must 'select' 'appropriate' information/sources. The only acceptable way to demonstrate this is to ensure that the information presented in the notes is relevant to the bullet points in Stimulus 2 and covers them thoroughly. In addition, there should be a reference in the text of the notes to show the information sources.

Moderators frequently saw the work of candidates who had wrongly been given high marks for extensive notes (often copied straight from sources) which were not focussed on or entirely pertinent to the questions posed in the Stimulus sheet.

Planning:

Take care when deciding if a plan is repeatable. As a science teacher you will know what the candidate intends but to score 4 or more the plan should have sufficient detail for it to be carried out by a non-scientist. This includes how apparatus should be set up, a range of values to be investigated and the number of replicates. For the higher marks a more detailed treatment of variables, ensuring accuracy and avoidance of errors is needed.

A significant number of candidates explained the control of variables in great detail and explained how accuracy would be ensured and errors avoided but then let themselves down by writing a very sketchy plan. This work was not worthy of the high marks given because of the lack of sufficient detail to allow it to be repeated.

It should also be noted that a plan should not be written in the past tense. This gives the impression (sometimes justified) that the plan was written after the investigation had been carried out. This is not what the Controlled Assessment task demands.

In Additional Science and the separate sciences this Skill quality also involves the writing of a hypothesis. For higher marks, the hypothesis should be justified with correct science which is clearly understood by the candidate.

However, the hypothesis is only part of this skill quality and an excellent hypothesis with justification cannot, alone, lead to a high mark. Equally a poor, unjustified hypothesis does not necessarily mean a very poor mark.

Collecting data:

This Skill quality should mean a high mark for most candidates if they have been properly instructed. It was sometimes under-marked in some centres. If data are tabulated with correct headings and units for columns and values are to an appropriate number of decimal places, there is no reason why a mark of 6 should not be given.

However, raw data should be recorded and this was not always the case. For example if a temperature change was being measured, the initial and final temperatures should be recorded not just the change. Mixed units eg minutes and seconds are also not appropriate. Time should be recorded as minutes or as seconds. Examples of both these types of error were seen this year.

Managing risk:

Evidence for this skill should be found in the plan and also in the answer to question 4 in part 3. However, the first part of the statement in the criteria is only really addressed by a risk assessment in the plan. Only this is an analysis of the risk before activity starts.

A simple statement of general safety rules can, as clearly shown in the criteria, only be awarded 2 marks. If risks specific to the task are identified and suitable responses suggested then 3 or 4 marks are available. To gain the higher marks 'significant risks must be evaluated'. There should be mention of how likely it is that that risk will occur and of the consequences if it does together with appropriate procedures to avoid/minimise it.

If an activity is 'low risk' then this should be stated. Little credit can be given for risks which have been 'invented' so that the candidate has something to write about.

Processing data:

Processing involves the use of 'mathematical techniques'; at least two for marks above 2. One of these may be a technique concerned with graphing (plotting or constructing an appropriate scale). It is, of course necessary for these techniques to be used accurately. Wrong averages, wrong plotting or scales which are too small or non-linear will not do.

There is no need for the candidate to undertake 'complex mathematical techniques' unless they form part of the task undertaken. However, for the highest marks some treatment of the uncertainty of data is essential (the easiest way to accomplish this is by the use of range bars).

A graph deserving of six marks should have axes labelled with quantities and units. Axes should be constructed so that the graph occupies at least half of the A4 sheet. A best fit straight line or curve as appropriate should complete the graph together with range bars if used.

Analysing and interpreting:

Candidates should be informed that a scientific explanation of the trends is necessary and explicit in the criteria. Credit can be given for an explanation given later in the conclusion section. Centres sometimes gave lower marks than necessary for this skill quality because they did not take into account explanations which the candidate later gave in answer to the final two questions.

Where comparison with secondary data is merely a statement that data from other groups was much the same, little credit can be given. What is expected for higher marks is a comparison between two sets of data; the candidate's and those of another candidate. The secondary data used should be included as part of the sample. This was rarely seen in the samples moderated.

Evaluating:

Evaluation is, perhaps, the most difficult Skill quality for candidates. Many candidates attempt this by explaining in some detail what they did and stating how successfully they followed their plan and how good their results were. This deserves very little credit especially when it is clear from their raw data and from their graph that their data was anything but good. The statement 'my data is good because it is primary data' was not uncommon.

Both the quality of the data in terms of accuracy and repeatability and the weaknesses in the method which led to any problems need to be addressed. Suggestions for improvement were often made but an explanation of why that would make the data better was seldom seen.

Candidates should be encouraged to start their evaluation by looking at their data to find any inconsistencies (there almost always are some) and then describe how the method could have led to these. Conclude by explaining how the method could be improved to get better data. Simply stating I would repeat it 5 times rather than 3 is worth little.

Justifying a conclusion:

This Skill quality was usually marked accurately by centres. Candidates should be advised that some science is needed in answer to questions 5 and 6. In question 5 the words 'explain your answer' should be taken to mean reference to their data and the scientific explanation of the trend observed. In question 6 the requirement for science is stated more clearly and reference needs to be made to their research notes also.

Good candidates often find the space allowed in the answer booklet rather too small. Candidates can use continuation sheets if necessary. These should be clearly labelled with candidate name and number together with an indication of the question number.

Another, perhaps better, solution is for centres to create their own answer booklet. As long as the first page is kept and the wording of the questions is not changed this does not count as a writing frame. It allows centres to provide more space for their candidates to give answers to the questions posed.

There are a number of documents available to assist centres with the application and administration of these tasks.

- **The specifications for the Gateway Science Suite**
- **Gateway Science Suite Guide to Controlled Assessment**
- **Exemplar tasks with marked candidate's work on the OCR website**
- **Candidate guidelines for controlled assessment** (section H of the guide to controlled assessment) also available separately from the website. These guidelines may be used by candidates in all parts of the controlled assessment
- **The assessment criteria.** These may be given to candidates but the wording may **not** be simplified or changed in any way. Issuing the additional guidance to candidates is strictly forbidden.

Centres are thanked for the many hours of work put into running the assessments, marking the assessments and preparing the sample for submission. In the majority of centres this work resulted in a moderation process which was accomplished without too much trouble.

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