

Biology B

Gateway Science Suite

General Certificate of Secondary Education **J263**

OCR Report to Centres

January 2013

J263/R/13J

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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.

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Overview

General Comments

This has been the third set of examination papers for B731/01 and 02 for the new specification, but this is the last time that there will be a January session, with the papers only being offered in June from now on. (In June 2013, B732/01 and 02 will also be offered for the first time.) Around half the candidates were re-sitting from June 2012.

In general, candidates seemed to have been well prepared for the examination, usually writing at sufficient length for the longer answer questions, including the six-mark questions.

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. When doing calculations, candidates should be made aware of the importance of the correct rounding of answers.

Comments on Individual Questions

- 1 (a) Most candidates correctly identified the root in part (i), although slightly fewer were able to correctly explain why roots grow downwards in part (ii). Common correct answers referred to gravity, or to gaining water or minerals. A very small number of candidates correctly referred to geotropism by name. Non-scoring responses were often descriptions of growing downwards, into the soil, but with no reason given.
- (b) This question discriminated well. Many answers referred to gaining light and the better ones also explained that this is needed for photosynthesis. No credit was given for 'growing towards the sun' with no mention of light. As in part (a), some candidates gained credit for correct reference to tropisms, although this was not necessary to gain full marks as the questions were all targeted at low demand.
- (c) Although part (i) was simply testing if candidates could explain what chromosomes are needed for, the context of broad beans made it a more challenging question. In part (ii), a minority were able to work out that there are 6 chromosomes in a broad bean gamete. Common errors were 12 (the same as other cells), 24 (double other cells) or 23 or 46 (i.e. human).
- 2 (a) This question was testing aspects of 'How Science Works'. A majority of candidates correctly explained that the explanation given was not scientific and gained a mark for suggesting a more likely explanation, commonly mutation. Only a small minority also explained that a scientific explanation would require some evidence.
- (b) In part (i) very few candidates chose the two correct answers, and a wide variety of responses were seen. In part (ii), very few candidates correctly identified sensory neurones.
- (c) Although many candidates appreciated that mucus has a role to play in protecting the lungs, vague answers such as 'clean the lungs' did not gain credit in part (i). One mark was awarded for the idea of protection from disease or pathogens, but only a few gained two marks for explaining that mucus traps pathogens. Some candidates didn't answer the question but described problems caused by excessive mucus blocking airways or causing coughing. Part (ii) was much more straightforward and most candidates gained both marks.
- 3 (a) The majority of marks in this 6-mark extended writing answer were targeted at low demand, and as such it was designed to be accessible to the majority of candidates. So it proved, with nearly half gaining full marks for correctly linking some of the health risks to their causes. Lower scoring answers gave some health risks but did not clearly link them, or incorrectly linked them, to their causes. Non-scoring answers sometimes described how the diet should change but not why.

- (b)** Less than half the candidates gained marks for the calculation, but for those who did, marks were fairly evenly distributed between each of the marks 1 to 4. There were a variety of routes to the correct answer and all were creditable. For those candidates gaining some marks, but not full marks, marks were commonly lost for incorrect rounding and not giving the final answer to an appropriate number of decimal places.
- 4 (a)** Few candidates explained that predators like foxes have eyes at the front of their heads so they can judge distance. Most candidates gave non-scoring answers, such as 'to focus on their prey' or 'see prey better'.
- (b)** In part (i) a majority gained the mark, usually for the idea that the foxes would take the quolls' food. Some ignored the instruction to give 'one other way' and simply reworded the idea that foxes might hunt or kill the quolls. In part (ii) it appeared that candidates had taken notice of similar questions in the past, and a majority gave one of several acceptable answers as to how the quolls could be saved.
- 5 (a)** Nearly half of candidates gained at least a mark for part (i), although a few gained two. Marks were commonly awarded for the idea of carbon recycling or for specific examples, such as for being used for photosynthesis. One common misunderstanding was that carbon can be changed to oxygen. Another was that carbon has to be released to allow decomposition. In part (ii), a minority of candidates correctly identified bacteria or fungi as decomposers.
- (b)** Some candidates are under the misapprehension that 'sustainable' means non-polluting and so did not gain credit. Around half the candidates did however appreciate that peat is not sustainable because it could run out or that it takes a long time to form. Some candidates were confused as to the relative amounts of time peat and fossil fuels take to form.
- 6 (a)** Very few candidates could either explain what 'trophic level' means or give an example from the food web. Perhaps the most common incorrect answer was that it refers to the top predators in a food web.
- (b)** The most common scoring answer was that there would be fewer mice eaten by badgers so the mice population would increase. In questions like these, credit is not given for 'absolute' ideas such as 'there were no badgers left' or that 'no mice were eaten'. A very few candidates also gained credit for the idea that there would be more food from the beech trees. Some candidates misinterpreted the food web and thought that mice eat badgers.
- (c)** The majority of candidates gained at least one mark, and many gained two, for explaining that the hooks help the ticks hold on to the deer hair.
- (d)** Broadly similar numbers gained none, one or two marks in part (i). Candidates could gain full marks either for explaining that the graphs show a link or that they don't, as long as they made both qualitative and quantitative points. They could also gain full marks for giving evidence both for and against there being a link. In part (ii), more candidates described a link rather than give an explanation.
- 7 (a)** Most candidates correctly identified that crickets are insects.
- (b)** Most candidates gained the mark in part (i). Very few gained full marks in part (ii) although around a third gained four marks, usually for explaining the advantage of the crickets being silent and how this makes them more likely to survive. Relatively few referred to the genetic aspects of natural selection. No credit was given to the frequently expressed idea that the crickets 'learned' or 'realised' they should be quiet.

- 8** (a) Over half the candidates gained both marks.
- (b) Most candidates could describe the role of red blood cells in part (i). 'Carry blood' or 'carry food', were misunderstandings seen a few times. A very small minority knew in part (ii) that it is DNA that codes for haemoglobin.
- (c) Although the question was in the context of white blood cells, it was testing whether candidates knew that the formation of new cells involves both cell division and differentiation. Very few candidates appreciated this. Some misinterpreted the question, and wrote about why new white blood cells need to be made.
- 9** (a) Just less than half of the candidates correctly completed the word equation for aerobic respiration.
- (b) The majority of candidates correctly calculated the RQ value for the pea and some correctly linked the pea to carbohydrate. Fewer correctly calculated the RQ for the peanut and very few appreciated that the figure of 0.8 for peanuts showed that they contain a mix of protein and fat.
- (c) The common mistake was to repeat information from the question and simply say that enzymes break down food. Only a minority explained that enzymes are catalysts.
- 10** (a) Most candidates were able to calculate 180 for part (i) and chose Miracle for part (ii). In part (iii) a majority correctly chose Fleet and Miracle, but not all made it explicit that they should be bred together. An answer such as 'breed Fleet and Miracle' was not interpreted as necessarily meaning breed them together. Very few candidates described the later stages of selective breeding, such as selecting the best offspring and then repeating this over subsequent generations.
- (b) Both parts (i) and (ii) were challenging and only a minority of candidates gained the marks. In part (i) no credit was given for saying that genetic engineering means improving or altering genes, which many candidates thought was the definition. In part (ii) very few appreciated why genes may need to be identified.
- (c) No credit was given for the commonly expressed idea that genetically engineered corn may somehow spread disease. A minority of candidates gained the mark, usually for the idea that the corn may somehow become harmful to anything or anyone that might eat it. No credit was given for the idea that genetic engineering may be unethical.

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, particularly when the demand of the question was at low level. Very few of these questions were no response answers. The rubric of most questions was interpreted correctly.

Candidates continue to find difficulty in questions which test their ability to apply their knowledge and understanding. Marks ranging from low teens to low fifties were seen but it would be encouraging to see higher marks obtained by the more able candidates. Most candidates were able to apply their knowledge of inheritance of sex to genotypes and also the chemical symbol equation for respiration. Fewer candidates were able to explain how haemoglobin can be made in the cytoplasm from information stored in the nucleus. Encouragingly, many candidates could calculate RQ in Q9(b) but it was very rare to see a completely correct response to calculating mass in Q3(a), as some candidates were 'estimating' rather than calculating their answer, or because of inaccurate rounding.

As in previous exam series, candidates need to be more aware of making comparisons to avoid losing marks. Candidates should also be more alert to applying their knowledge to given situations in questions. They often failed to gain credit in questions such as 2(b)(i) and 7(a) because they answered in a generalised way rather than applying knowledge specifically to the context of the question.

Comments on Individual Questions:

Module B1

- 1 (a) Most candidates had the idea that blood was involved, but there were a lot of responses that mentioned the 'feeding/drinking/inserting' of blood, which were ignored, as opposed to biting or injecting, which were the allowable responses. It was the method of feeding that was important in the response.
- (b) Many candidates were able to score here, referring to eggs/larvae being destroyed. Some candidates were not specific enough, simply referring to it being the mosquito's habitat, and so did not gain credit.
- (c) The idea of "the gas can get through the net/net stopped mosquito" was the usual scoring response.
- (d) Generally well answered. Where candidates gave generic muscle/gland responses they didn't score. These needed to be linked to the wings to gain credit. The stimulus was more often correct, but common errors were nose, humans and blood.
- (e) (i) Often candidates got the 'brain' mark but did not score on the idea of it monitoring the blood. Many responses just referred to body temperature.
- (e) (ii) The most common reason why candidates did not score on the first marking point was because they described blood vessels as 'moving closer to the surface', this often negating earlier references to widening blood vessels. A number of the candidates who did not understand the process did gain a mark

for the idea that heat was lost, although they often incorrectly linked it to sweating.

- 2 (a) This was well answered by the majority of candidates.
- (b) (i) Almost universally incorrect. Most did not apply their knowledge to the question and gave 24 as the incorrect response.
- (b) (ii) Generally this was correct.
- 3 (a) This question demonstrated a necessity to emphasise the skill of 'rounding'; many candidates failed to score full marks because of inaccurate rounding.
- (b) Some candidates were able to gain credit at Level 2 and score either 3 or 4 marks. However, Level 3 responses were very limited because very few candidates referred to 'coronary arteries' being blocked, or to the heart muscle being prevented from receiving oxygen. Many just referred to blocked arteries/vessels. A small number of candidates were given Level 1 because, although their responses referred to narrowed blood vessels etc., they only gave vague links to the heart. A small number gained 0 for giving no references to the heart.

Module B2

- 4 (a) Most candidates gained credit for responses that included checking their DNA.
- (b) (i) Most candidates referred to competing for food. Simply referring to intraspecific competition alone was not enough, but saying it was 'stronger than interspecific' was sufficient.
- (b) (ii) Often the mark was gained for preventing damage to food chains, but medical uses / attracting tourist responses were also seen.
- 5 (a) Candidates rarely scored more than 1 mark here. Once they had identified lack of oxygen as the factor they did not link this to **respiration** in the decomposers.
- (b) (i) Responses to this question were very confused. If names of bacteria were used they were often incorrectly linked to processes. Very few candidates referred to decomposing **bacteria** – just generic decomposers. Many candidates simply described all they knew about the nitrogen cycle and listed all possible bacteria. Many described denitrifying processes and nitrogen fixing in root nodules.
- (b) (ii) Poorly answered with a lot of responses mentioning less land-fill waste and recycles unused waste products. Very few candidates recognised the idea of coconuts being produced at a faster rate than peat so they will not run out.
- 6 (a) (i) Generally a well answered question. Occasionally candidates drew a pyramid that was inconsistent with the information on trophic levels and this was not credited if the diagram was the only response to the question.
- (a) (ii) Again this was a well answered question.

- (b) This question produced a varied response. Although reasonably well answered, there were a number of incorrect responses, usually by responding that they were arachnids.
 - (c) (i) Most candidates were able to identify a qualitative and quantitative link.
 - (c) (ii) Where candidates scored it was usually for 'warmer weather then more people go for walks in the country'.
- 7
- (a) Very few candidates gained credit as they did not complete the link between more water loss having a cooling effect. They often just said that higher temperatures increased water loss, without giving an explanation.
 - (b) (i) Generally well answered.
 - (b) (ii) Many candidates were able to give a good description of natural selection linked to the crickets. Although the candidates did not need to refer to genes for a Level 2 answer, when they attempted to describe the changes in terms of adaptations, it was sometimes difficult to decipher whether they were referring to behavioural or genetic changes as they did not express their answers clearly. Occasionally, these candidates were awarded 3 marks for written responses that partly impeded communication. Few mentioned the unlikely chance of the two types of crickets mating and the idea of speciation in general was poorly understood. The most common incorrect reference to developing a new species was to describe natural selection and then state that because there were more silent crickets, the singing crickets would die out and the silent crickets would eventually become a new species. Only a very small number of more able candidates correctly referred to ideas of reproductive or geographical isolation and further genetic changes to develop a new species which would be unable to breed with the original species to produce fertile offspring.

Module B3

- 8
- (a) The parts of the heart were quite well known but all combinations were seen. The most common error was to reverse boxes 1 and 5. This illustrates that many candidates are still not aware that diagrams are mirror images of the body to identify right and left sides.
 - (b) (i) Many candidates gained credit for the idea that red blood cells can squeeze through capillaries. Only a very small number gained the mark for a large surface area to volume ratio. The most common errors were 'more of them can travel in blood vessels' or 'they can travel faster'.
 - (b) (ii) This question did differentiate and only a few candidates knew about mRNA and the ribosomes in the cytoplasm. There were many vague, incorrect answers stating that 'the cytoplasm is where chemical reactions take place' or 'the nucleus is in the cytoplasm'.
 - (b) (iii) The majority of answers failed to mention oxyhaemoglobin at all, even though candidates did state that oxygen combined with haemoglobin. Most attempts at the second marking point simply stated that, in the tissues, oxygen passed / diffused into the cells, with no reference to any reverse reaction or release from the combined molecule.
 - (c) A reasonable number of candidates knew about stem cells, but few went on to gain a second mark. The most common error was to repeat the question and

say 'and so they can produce both types of cell'. Other candidates said that stem cells had the potential to become red and white blood cells, without explaining how (e.g. by having the genes). Some candidates gave unrelated answers (e.g. bone marrow is for keeping the body healthy, essential for growth or helps fight off disease).

- 9 (a) Generally well answered. The equation for aerobic respiration was reasonably well known.
- (b) This was well answered, although for a number of candidates it was the calculation which let them down, with either incorrect maths or incorrect rounding for their numbers. The pea and its link to carbohydrate were usually correct. Peanut was a little more difficult for some as they struggled to explain that the intermediate RQ could arise from using a combination of fat **and** protein. Their answers were usually that the peanut contains fat **or** protein or that the peanuts are between fat and protein. Some candidates correctly calculated the two RQs but then gave explanations referring to oxygen and carbon dioxide, rather than linking seeds to foods.
- (c) Most candidates were aware of the effects of high temperatures on the structure of enzymes and were awarded the second marking point. There were still a very small number of candidates who incorrectly stated that the enzyme was killed.
- 10 (a) Most candidates were able to correctly describe at least two phases of the graph and give a correct numerical reference from the graph. The most common error was a failure to read the graph correctly; these candidates gave inaccurate figures for the second mark.
- (b) This procedure was not well understood and very few candidates gained marks here. For the first marking point candidates failed to identify the specific **human tissue type** gene. Only vague references to finding the specific gene were seen. A few candidates did gain a mark for the idea of isolating a human gene, although often the context in which they did so was dubious. Some candidates did try to insert human genes but, more often than not, into pigs rather than pig embryos or gametes. One or two candidates gained a mark for the idea of replicating the cell. The last marking point was not seen. The most common errors were to describe cloning or transplanting human organs into pigs.
- (c) The majority of candidates were able to gain one mark for saying 'yes' or 'no' and giving a valid argument. Having given their answer, most candidates did not go on to consider the idea that there are pros and cons; only a handful went as far as to weigh up the two arguments.

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