

GCSE

Biology B

Gateway Science Suite

General Certificate of Secondary Education **J263**

OCR Report to Centres June 2014

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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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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) Most candidates correctly matched the diseases with the pathogens.
- 1(b) Half the candidates gained at least one mark, though few gained two. The mark was most commonly awarded for the idea that high body temperatures may cause death through dehydration, although a few did correctly explain the effect on enzymes. No credit was given for vague answers such as 'organ failure'.

Question 2

- 2(a)(i) Most candidates correctly named either carbohydrates or fats as an energy source.
- 2(a)(ii) Most candidates correctly calculated the EAR as 7.2g.
- 2(a)(iii) Although a majority of candidates correctly chose 65%, all the other options were seen.
- 2(b) A minority of candidates knew that sickle cell anaemia is a genetic disorder. Most thought it was caused by bacteria or 'dirty water'.
- 2(c) Most candidates gained at least one mark, usually for the idea that there could be harmful side effects of a drug trial, although few gained two marks, for example by also saying that the treatment might not work.

Question 3

- 3(a) Similar numbers of candidates gained nought, one or two marks. Those who gained one mark usually did so for the idea that height or mass are influenced by environmental factors, or specifically referred to the boys having different diets. Those who gained two marks also explained that eye colour is controlled genetically. Those who did not gain any marks often just repeated facts from the question, for example that the boys were identical twins.
- 3(b) Around half the candidates made it clear that the boys had the same red-green colour blindness because they had the same genes.

Question 4

- 4(a) There were several valid trends allowed by the mark scheme. Candidates most commonly gained marks for there being more male deaths than female, and there being an overall decrease in deaths. Over half the candidates gained two marks.
- 4(b) Two thirds of candidates correctly chose 27 years. 22 years was a common error.
- 4(c) Most candidates gained one mark, and quite a few gained two, though few gained the full three marks. Candidates commonly gained credit for the ideas that the death rates from heart disease decreased due to better diet or better health care, although there were also other acceptable responses referring to reduced smoking, more exercise, or better health education.

Question 5

This six-mark extended answer question was targeted across low and standard demand. It differentiated well with all marks commonly seen, though fewer gained the full six marks than any of the other marks available. To gain full marks candidates had to explain that ethylene causes bananas to ripen, the reason why it is used just before bananas go on sale, and that ripe bananas release their own ethylene. Candidates who did not gain full marks either missed out one or more of these ideas, or did not explain the ideas fully and clearly. Among those candidates gaining higher marks, a common misunderstanding was that the ripe bananas had ethylene left on them from their earlier treatment, not that they released it themselves. Some thought that ethylene is a preservative.

Section B

Question 6

- 6(a)(i) Over two thirds of candidates correctly identified crabs as crustaceans. 'Arachnids' was a common error.
- 6(a)(ii) Just less than half the candidates correctly identified the crabs as being members of the same species.
- 6(b)(i) Most candidates correctly calculated the mean as 3, and chose the middle zone as being best for the crabs.
- 6(b)(ii) This was more challenging than part (i), with only half the candidates gaining marks, and that was usually just one, although there was a range of acceptable answers, most commonly 'fewer predators' or 'more food'.

Question 7

- 7(a)(i) Many candidates still confuse ozone damage with other forms of pollution, in particular, carbon dioxide and global warming. Around a third of candidates correctly linked ozone damage to the use of CFCs, although few explained where the CFCs come from.
- 7(a)(ii) Most candidates gained at least one mark for choosing South America, although far fewer could explain the effects of ozone loss in terms of increased exposure to UV radiation, or an increased risk of cancer.
- 7(b) Marks were evenly split between those who gained one or two. Carbon dioxide was correctly chosen more often than sulphur dioxide.

Question 8

To gain full marks, candidates have to address all parts of a question. In this case, a large number ignored the instruction to use their understanding of competition in their answer and so limited themselves to the mark they could gain. Of those candidates who gained any marks, most gained four marks, usually for explaining that Milva potatoes spaced 30cm apart gave the smallest percentage of small potatoes, or if grown at a spacing of 15cm then the Blazer variety was best.

Question 9

9(a) Around three quarters of candidates gained the full two marks for matching all the boxes correctly; most of the remainder gained one mark.

9(b)(i) Most candidates correctly chose the small fish or worms as being in the second trophic level of the food web.

9(b)(ii) Just over half the candidates could give a satisfactory definition of the term 'trophic level'. No credit was given for answers like 'what it eats'.

9(c) Most candidates gained one mark, for identifying the increase in eagle breeding pair numbers, or two marks, for pointing out that the increase was at a steady rate. Very few candidates went on to gain a third mark.

Section C

Question 10

10(a) The majority of candidates gained at least one mark for explaining the importance of DNA for living things, though far fewer gained the full two marks. Marks were available, for example, for the ideas that DNA carries information in the form of genes, and that this information controls cell activity or determines an organism's characteristics. No credit was given for vague answers such as 'makes us who we are'. Nor was credit given for the role of DNA in DNA finger-printing or 'catching criminals'.

10(b) Almost two thirds of candidates could correctly explain what is meant by a double helix. Candidates who followed the advice in the question and used a diagram usually found it easier to gain the marks.

10(c)(i) Around half the candidates could give a valid explanation of why we should not describe the structure of DNA as the Watson and Crick model, by citing the contribution of other scientists like Franklin.

10(c)(ii) A little more than half the candidates could give a valid explanation of why we should describe the structure of DNA as the Watson and Crick model. Some mistakenly stated that Watson and Crick discovered DNA or even that they invented it.

Question 11

11(a)(i) Around half the candidates realised that the graph should be a U shape and most of these drew the line appropriately. Some candidates lost marks by continuing the line, e.g. through the origin.

11(a)(ii) Only just over half the candidates appreciated that the optimum temperature was between 35 and 40 °C. The common mistake was to choose the highest temperature shown, i.e. 45 °C.

11(b) Less than half the candidates correctly chose the second option.

Question 12

12(a) All possible marks were seen in this six mark question about selective breeding. Most candidates could describe a suitable characteristic for selection, e.g. quality or yield of milk, and describe which individuals would be selected for breeding. The most common mark was four, which meant that these candidates had not made it clear that the selection process has to be repeated over many generations. The oft seen phrase 'do it again' is not enough as this could refer to simply breeding the same parents over and over again.

12(b)(i) Most candidates gained at least one mark, and half of these gained two. Marks were available for identifying white blood cells as being responsible for fighting infection, as well as describing their role either in phagocytosis or in antibody production.

12(b)(ii) Most candidates gained the mark, usually for the idea that the milk would need to be tested to make sure it wasn't harmful.

Question 13

13(a) Most candidates knew that Tom and Jennifer could not be identical twins as they were of different gender.

13(b) Candidates found this question challenging with only a third gaining any marks. Good answers explained that the twins were genetically similar but not identical, because, for example, they were produced from two different egg cells and two different sperm cells. Poor answers simply repeated information from the stem of the question, or in some cases, contradicted it.

13(c) Most candidates failed to score on this question, usually because they described non-identical twins forming from a single egg or embryo dividing.

13(d) Over half the candidates chose 'multicellular' as the only word correctly describing the two twins. 'Unicellular' was a common error.

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 consider the full extent of the question to their response, often only responding to certain parts of the question. This often limited the access to the higher marks in this type of question. Very few of these questions were no response answers.
- No artistic embellishments were 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 genetic crosses and the effect of temperature on reactions controlled by enzyme action. Fewer candidates were able to apply their knowledge accurately to experimental observations of phototropic responses. Encouragingly, most candidates could calculate EAR, produce an accurate pyramid of biomass and also calculate the percentages of bases in DNA in Q.10 (a).
- Candidates, as in previous exam seasons 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.

Comments on Individual Questions:

Question No.

Q1ai. Generally candidates got off to a confident start apart from a few random errors.

Q1aii. Again, this was a well answered question.

Q1aiii. Many candidates referred to difference in growth, commonly stating 'the larger the mass the more protein you need'. Very few got the second marking point - i.e. they didn't specifically make a link between body mass and EAR. They struggled with relating the EAR equation to the answer. Most candidates found it difficult to differentiate body mass/age concept for the EAR calculation.

Q1b. Most candidates were able to develop their response, although some struggled with composing a genetic cross.

Q2ai. Candidates found it difficult to achieve the first marking point, as they simply discussed how it was passed on, rather than how it was collected in the first place. Blood or infected person was missed by most and often reference to 'biting' on its own was made without any indication of sucking on or feeding on the blood. Many lost marks due to the misconception of thinking malaria is the pathogen instead of plasmodium. Many just referred to malaria or disease.

Q2aii. Most gained marks by saying 'it kills mosquitoes'. Many just said 'lives near water' or responses about insecticide keeping mosquitoes away/ preventing egg laying.

- Q2b. Most candidates mentioned enzymes denaturing, but didn't put the relatively simpler answers of heat stroke and dehydration. Many high level answers explained enzymes' function.
- Q3a. Candidates who correctly identified the type of diabetes usually went on to give the correct reason. There were a few that just repeated the stem of the question and were not credited.
- Q3b. Most marks were gained from the 'less needed' marking point. Many candidates failed to gain credit because they did not say sugar in **blood** decreases.
- Q4. This question was very good at differentiating candidates, as knowledgeable candidates wrote clearly and concisely, whereas others gave unclear statements such as "they will both need glasses to fix their eye sight" or "the benefit of surgery is that it will fix their problem". There were many good explanations of condition but many missed the cause or correction. Candidates occasionally applied short- and long-sightedness to the wrong person and/or the lens correction applied to the wrong type of eyesight.
- Q5a. Many candidates failed to get the mark as they either didn't specifically say where auxin was made, or they didn't justify this in relation to the results. On the whole, this was poorly done as many candidates missed the "explain" command word in the question and simply stated where auxin is made or how it moves. If candidates did try to explain, many left out the idea of the response to light.
- Q5b. Many candidates did not link diffusion to evidence.
- Q5c. Many just reworded the question and so did not score.
- Q6ai. Generally well answered with a few random errors.
- Q6aii. Very few responses covered the continuous spectrum idea covered in the specification. Most marks came from look same but from different groups. Many did get the mark as they explained themselves clearly enough to be covered by an idea in the guidance section of the mark scheme.
- Q6b. Most errors came from getting it the wrong way round or just guessing using the word natural and artificial. Other candidates didn't seem to be aware of classification systems at all.
- Q7ai. Whilst most candidates mentioned CFCs, many were restricted to one mark as they also thought that global warming and greenhouse gases were linked to ozone depletion. Many recognised CFCs but then failed to identify the source of CFCs such as refrigeration or aerosols.
- Q7aii. In the main, most gained the South America mark and usually followed it up with the idea of increased risk of cancer.
- Q7b. Generally this level of response question was well done with many candidates identifying the correct types of competition, but less identifying the competition for smaller land mass. Many candidates tried to argue that interspecific competition would increase as polar bears would have to spend more time in the sea with the killer whales. There was quite a lot of discussion about ecological niches and competition without directly relating this to the loss of land area due to ice cap melt. Lack of detail for the ice caps melting often limited the level awarded.
- Q8ai. The majority of marks lost were for making the cormorant bar of the pyramid too large. The pyramid was well done and virtually all candidates at least labelled the bars.

- Q8a.ii. The vast majority of marks came from references to killing of humans and the ethical issues this presents. It was rare to achieve both marks for this question. The marking point less likely to be mentioned was the fact that humans are involved in other food chains.
- Q8b. Nearly all candidates got the 'numbers are very low' mark. Many got the 'high enough so not at risk' mark. However, too many candidates simply re-stated the data. Many failed to gain marks because they didn't say anything about how protection has allowed numbers to recover.
- Q9a. The majority of candidates didn't get this mark. Instead many related it to the parent penguin sitting on the egg. Correct responses included antifreeze protein. The question was usually answered with behavioural response even though the question identified that the egg would not freeze until well below zero °C. Behavioural responses are inappropriate responses.
- Q9b. The vast majority of candidates identified leg B. Most got at least two marks for away from the surface. Many candidates correctly identified the vessels being close and then discussed the transfer of heat.
- Q10a. There were very few errors in this calculation.
- Q10b. Most candidates who scored 1 mark did so with the idea of base pair. There were a number of vague responses about A and T and C and G which often didn't give the impression that A linked or paired with T.
- Q10ci. Many candidates failed to gain credit because they often simply stated 'he found base pairs'.
- Q10cii. Many candidates said 'because he was dead' or 'his discovery was not important' and did not gain credit.
- Q11ai. This was generally very well answered although there were some errors interpreting data.
- Q11a.ii. Most candidates got 2 marks from longer time and enzymes denature. Some gained the 'reaction stops' marking point. There were some good descriptions of enzymes denaturing. The mark most likely to be lost was the second on the mark scheme, with many not directly stating that the reaction would no longer take place.
- Q11bi. There were only a few errors on this question.
- Q11b.ii. Most candidates got a mark for mentioning growth/repair, but it was less common to give the other functions of proteins. There were plenty of examples given without the function so did not gain credit.
- Q12a. A well answered question in the main.
- Q12b. This level of response question was a good discriminator, especially for full marks. There were a few excellent answers, but some candidates mixed up cloning techniques with genetic engineering. Some thought that DNA was transferred into an embryo, rather than a nucleus into an enucleated egg. Most candidates who mentioned the electric shock also explained that the shock was for stimulating cell division. A few very good answers failed to get the last point by not making it clear which sheep had been cloned in the process. Many candidates who didn't score well only failed to score high marks because their answers lacked sufficient detail. Many candidates who achieved 1 or 0 had the correct process, but didn't identify types of cells used or didn't link the clone produced to its origins.

- Q13a. This question was reasonably well answered, with many candidates identifying the need for materials around the body. Rate was not often referred to. Some gained a mark for identifying fainting as an outcome.
- Q13b. Some candidates thought that the extra sugars/glucose in the coconut juice triggered the production of lactic acid. Some candidates made the link back to anaerobic respiration but few identified that this was due to a lack of red blood cells or haemoglobin. Many failed to link anaerobic respiration to less oxygen.

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

General Comments:

As is often the case, the entry for this foundation tier paper was very low in comparison to the higher tier paper. A wide spread of marks were obtained but it appeared that the majority of candidates were entered for the correct tier.

The standard of numeracy in the papers continues to improve but many candidates are still hindered by their ability to express themselves clearly. They also need to appreciate the difference between the command words 'describe' and 'explain'.

Comments on Individual Questions:

Question No.

- Q1(a) This question was generally well answered with the most common errors being water and oxygen the wrong way round or energy instead of oxygen.
- Q1(b) Many candidates appreciated the importance of stomata (sometimes referred to as pores). Reference to diffusion was less frequently seen.
- Q1(c) Most candidates identified the reduction in light as being important but only the best answers linked this to chlorophyll content of the leaves.
- Q2(a) This was well answered.
- Q2(b) Many answers either referred to compost providing minerals or the fact that it takes a long time to break down. Only the best answers linked these two points.
- Q3 The context of this question was difficult to grasp for many candidates, many referring to respiration and photosynthesis and not to transpiration. Although many answers included changes to fan settings, distance, repeats etc, there were few references to the idea of measuring a difference in mass. Many answers simply stated 'put it on the balance'.
- Q4(a) The main issues in part (i) and (ii) involved candidates looking at the wrong graphs. In (i) some were looking at both graphs. In (ii) a number of candidates simply repeated their answer from (i). Better answers clearly appreciated the idea of predator-prey fluctuations.
- Q4(b) It was clear that some candidates had not experienced the different methods of collection listed in the question. For those who had, both parts were well answered.
- Q5(a) The most common error in part (i) was referring to menstruation as the menstrual cycle.
Fewer candidates correctly identified the pituitary gland in part (ii) and spellings were varied.
- Q5(b) This was well answered.

- Q5(c) Most candidates could identify the sample size in part (i) and calculations in part (ii) were often correct. Interpreting the graph in part (iii) proved more challenging. It was generally appreciated that the answer involved age and FSH levels, although some suggested treating older women with high levels of FSH or even women that were already pregnant.
- Q6(a) By far the most common error here was to confuse urea with urine.
- Q6(b) Many candidates correctly referred to various diseases that may affect the kidneys although some answers were too vague. There were fewer references to trauma / injuries.
- Q7 Many candidates could correctly calculate the volume of urine lost. They could also make a prediction for changes on the day of the race such as an increase in sweating. Only the better answers included a linked explanation for changes on the day of the race.
- Q8(a) Part (i) was more frequently answered correctly than part (ii). The most common incorrect answer in part (ii) was the gall bladder.
- Q8(b) Many candidates correctly identified the small intestine but few could correctly explain the increase, many just referring to the concentration of glucose in the intestine.
- Q9(a) The most simply stated answers to this question were most likely to score. Many candidates tried to assign roles to all the labelled parts of the machine thereby confusing their answers.
- Q9(b) A large number of candidates confused anticoagulant with anaesthetic and therefore there were many references to candidates waking up too early or not at all.
- Q10(a) This question was well answered with only a small number of candidates being distracted by the option, 'sugars'.
- Q10(b) Many candidates could outline the steps needed in part (i) to test the urine. However, in part (ii), the vast majority thought that a medium level of sugar in the urine was perfectly normal. There were very few references to diabetes.
- Q11(a) The most common error that candidates made here was to fail to appreciate that answers such as microbes, decomposers, sand etc were all eliminated by the stem of the question.
- Q11(b) Part (i) was well answered with more answers referring to weight rather than density but still scoring the marks. The ability to read off from the diagram and perform the calculation was more problematic.
- Q12(a) Candidates seem to be using the term germs less often and so were scoring quite regularly on the question. There are still however vague references to stopping microbes.
- Q12(b) Many candidates contradicted themselves when describing the graph making statements such as one batch produced more alcohol than the other then saying that the percentage in both reached 14%. Descriptions of the conditions needed for fermentation were often incorrect or very limited.
- Q13(a) Very few candidates could complete the table correctly.

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- Q13(b) Many candidates correctly referred to asexual reproduction but binary fission was a common incorrect answer.
- Q13(c) Disc A was identified by most candidates however a number did not score the second marking point by failing to make a comparative statement.
- Q14(a) Many candidates could perform the calculation correctly and identify the animal kingdom in part (ii). Answers to part (iii) were less often correct.
- Q14(b) Many candidates gave accurate comparisons in part (i) however they found it very difficult to give possible explanations in part (ii), often just repeating the differences.
- Q14(c) The implications and meaning of the word 'prove' was not picked up by the majority of candidates even though the word was highlighted. The best answers referred to the difference between correlation and cause.

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

General Comments

Most candidates made a good attempt at the paper, producing answers for most questions. They did not appear to run out of time.

Candidates often wrote at an appropriate length, although an increasing number did go well beyond the lines provided, some writing far too much, e.g. a candidate should know that a ten line answer for a one mark question is clearly not appropriate. Some candidates didn't seem to feel they could stop answering a question until they had filled the answer lines plus any available space below. In addition to this, evidence from examiners suggests that up to a quarter of candidates used supplementary answer sheets. In future, Centres should try to encourage candidates to write more sharply focused answers. Although there will always be times when it is appropriate to use supplementary answer sheets, it should also be noted that some candidates felt the need to use a supplementary writing sheet even when they only needed to add a single word to an answer. 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. When they do use supplementary sheets, they must make sure that they clearly number the questions, and not leave it to the examiner to work out which question is which.

The quality of candidates' spelling, punctuation and grammar was generally good overall, although there was a 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.

There appeared to be a noticeable number of candidates who would have been better served by being entered for the Foundation tier.

Comments on Individual Questions

Section A

Question 1

- 1(a)(i) Most candidates gained at least one mark for describing the relationship between the numbers of aphids and lacewings, although weaker answers simply quoted numbers from the graph without describing the trends. Far fewer answered the second part of the question by explaining the graph in terms of a predator-prey or feeding relationship.
- 1(a)(ii) Again, a common shortcoming was not answering the question fully. Candidates generally answered well in terms of the evidence for buckwheat attracting lacewings but far fewer discussed whether there was any evidence that crop yield would be increased. Those that did, usually suggested that a decrease in aphid numbers would increase crop yield. Not many pointed out that the graph actually provided no direct evidence about crop yield at all.
- 1(b) No marks were given for the commonly expressed idea that increasing the number of samples made the results more reliable, nor that it would make them more accurate (as that was in the question). However a third of candidates correctly explained that it would reduce the impact of anomalous results e.g. by allowing them to be identified more clearly.

Question 2

To gain full marks candidates must answer every part of a question, in this case by describing the expected results in both flasks and explaining each. Although all possible marks were frequently seen, the most common score was four, which was gained by correctly describing the results and giving a limited explanation, e.g. that water was being lost from the plant by evaporation. To gain full marks a more detailed explanation was needed in terms of the fan lowering the water concentration of the air, so increasing loss by the plant. A minority wrote about water loss from the leaves being by osmosis. Some candidates said that the readings would change, but did not go on to say how.

Question 3

3(a)(i) Only about a third of candidates appreciated that low oxygen levels would mean that few decomposers could survive and therefore the rate of decay would be low. Some candidates clearly thought that 'nutrients' were a type of organism that needed oxygen to survive. Some thought that a lack of oxygen would reduce photosynthesis.

3(a)(ii) Less than half the candidates knew that respiration was needed to release energy. Very few were able to link this to the context and explain that the energy would be needed to absorb minerals by active transport. Weaker answers commonly explained that respiration was needed to bring in oxygen, or that respiration was needed for photosynthesis.

3(b) Many candidates explained the high levels of salt in the mangrove roots simply in terms of it passing into the roots with sea water; this gained no credit. Very few appreciated that having a higher salt concentration than sea water allows the roots to absorb water by osmosis.

3(c)(i) Just over half the candidates correctly explained that there are different species in the different zones of the forest because of the different environmental conditions, e.g. salinities, mineral levels and so on.

3(c)(ii) Around half the candidates correctly explained the low plant biodiversity in mangrove forests being due to other plants not being able or adapted to survive there. No credit was given for simply explaining that a small biodiversity meant there would be fewer species.

Question 4

4(a) Half the candidates knew that plants get the element carbon from carbon dioxide.

4(b) Two thirds of candidates knew that plants get the element hydrogen from water.

4(c) This question was targeted at A* and accordingly very few candidates correctly stated that plants get the element oxygen from carbon dioxide. The majority thought it came from water, not realising that the oxygen in water is what is released from the plant as oxygen gas.

4(d) Just less than half the candidates knew that plants get the element nitrogen from nitrates.

Section B

Question 5

- 5(a)(i) Over half the candidates knew that FSH is released by the pituitary, although the spellings of that were very variable. Answers were credited if they were phonetically correct. The common error was ovary.
- 5(a)(ii) Just less than half the candidates could name negative feedback. The common incorrect answer was menstrual cycle.
- 5(b)(i) Around a quarter of candidates gained both marks by identifying that the clinic would increase the percentage of women becoming pregnant by treating younger women and those with low FSH levels.
- 5(b)(ii) There was a variety of acceptable reasons why the clinic may not treat certain women, e.g. that some women may not be able to carry a baby to full term, or they may have health disorders or an unhealthy lifestyle. Around a third of candidates gave a valid answer.

Question 6

- 6(a)(i) A third of candidates could name the ureter or cortex in the cross section of a kidney, and half of these could name both. Common errors were to name the cortex as the medulla, and the ureter as the urethra. Although misspelt words are usually credited if they are phonetically correct, if an answer was somewhere in between ureter and urethra, and could have been either, it was not given the mark.
- 6(a)(ii) Over a third of candidates correctly explained that the high blood pressure in the kidney is needed to filter the blood. It was not enough to simply say so that the kidney could work.
- 6(b) There were two patterns to be described in the graph, but despite there being two marks many candidates only described one pattern. Candidates need to be as clear as possible in their answers. For example, a mark was gained for saying that the lower the point score, the longer a kidney would last. However a mark was not awarded if candidates referred to a lower grade, as it is not clear which letter is 'lower'. When asked to describe a pattern in a graph, candidates should include the variables in their answer and not say something like 'the lines go down'. Most candidates gained one mark, and a quarter gained two.
- 6(c) Over half the candidates gained at least one mark by working out the percentage chance for each person, but only a third worked out the difference between these as being 7%. Although some incorrectly calculated the difference, there were many who did not attempt to work out the difference at all.

Question 7

To gain the full six marks candidates had to fully answer the whole question, i.e. describe the range of movement in Norman's hip joint, and explain why this was reduced in Arthur. Although few candidates gained no marks, there were also few who gained six. Commonly candidates described the joint as a ball and socket joint but did not then always describe clearly the range of movement. Candidates commonly explained that Arthur's cartilage was damaged or reduced, or that he had less synovial fluid, but usually did not go on to explain that therefore there would be more friction or less lubrication.

Question 8

8(a)(i) Two thirds of candidates correctly worked out the diameter as 1 cm. Common errors included 4 cm and 16 cm.

8(a)(ii) Most candidates gained two marks for working out the surface area as being in the range 1727-1728 cm². (The reason for the range was that some candidates used the value of π as 3.14 which was given on the paper, and some used the value on their calculator.) The principle of 'error carried forward' allowed those who had worked out the wrong answer to part (i) to still get full marks in part (ii).

8(a)(iii) A third of candidates gained at least one mark, although relatively few gained both, usually for explaining that a human intestine has a higher surface area due to the presence of villi. There were also marks available for mentioning microvilli or folding, though not for the commonly expressed idea that the intestine increases its surface area by stretching or expanding.

8(b) Less than half the candidates gained a mark, often because they simply made the statement that the intestine of breast-feeding rats had a greater surface area without explaining why, either in terms of there being more villi or microvilli, or in terms of the reason, i.e. that this allows food to be absorbed more quickly, the food being needed to produce milk. Few candidates gained two marks.

Section C

Question 9

9(a) Most candidates correctly joined the boxes to gain two marks.

9(b) Half the candidates gained at least one mark, though relatively few gained the second. What was required was that the bacteria are similar to plants in that they both make food, but they differ in their energy source, the bacteria gaining energy from chemical reactions, the plants from light. Candidates most commonly gained a mark by saying that plants photosynthesize but bacteria do not.

Question 10

10(a) No credit was given for compost or detritus. A third of candidates correctly named humus.

10(b)(i) Over half the candidates scored, the marks being fairly evenly split between one and two marks. To gain full marks candidates had to say that the particles of greater density or mass would sink more quickly. It was not enough to simply repeat information that had already been given in the question, e.g. to simply say that sand sinks more quickly than the other particles, or that sand particles are the biggest.

10(b)(ii) Nearly two thirds of candidates correctly worked out the percentage of sand as an answer in the range 36-38%. Those that did not score usually did not measure the height of the sand layer accurately.

10(b)(iii) Most candidates correctly identified the soil as loam.

Question 11

- 11(a) Marks were fairly evenly divided between those gaining one and those gaining two. To gain the full two marks candidates had to explain that sterilising the equipment would kill the microorganisms so they couldn't spoil the wine or cause other harm.
- 11(b) To gain full marks on this six mark question, candidates had to compare the production of alcohol in the two batches (i.e. the batch with added sugar produces alcohol more quickly, but that both batches produce the same final percentage of alcohol) as well as provide explanations (i.e. that the added sugar allows fermentation / anaerobic respiration to happen more quickly, but that both batches produce the same final percentage because that percentage of alcohol kills the yeast). All possible marks were seen, with most candidates gaining marks in the middle of the range, i.e. two, three or four marks. Candidates lost marks either by missing out some of the points identified above, or by not explaining them very clearly. A common misconception was that the sugar was a catalyst.

Question 12

- 12(a) Half the candidates did not gain a mark, usually because they described what a virus does not have, e.g. 'they do not have a nucleus'. Those who did score, by describing the protein coat or the genetic material within, were evenly split between gaining one and two marks.
- 12(b)(i) Marks were fairly evenly distributed between two, one and zero. Candidates were expected to see that points could be made for and against the graph showing the true numbers of people with salmonella and flu.
- 12(b)(ii) Candidates needed to go beyond the information given in the question. For example, there was no credit for saying that salmonella is spread through food that is stored at incorrect temperatures, but there were marks for saying that salmonella is more common in summer months when food may not be kept cold enough. Marks were fairly evenly distributed from three to zero.

Section D

Question 13

- 13(a)(i) Half the candidates correctly identified the fungi and worked out the percentage of species discovered as 7%, although many incorrectly rounded their answer to 7.03 (as opposed to 7.04) and so lost a mark.
- 13(b)(ii) A third of candidates gave a valid suggestion why the prokaryote estimate may be incorrect, common valid answers being that some species have been counted more than once, that some species have gone extinct, or that new species have evolved.
- 13(b) Over half the candidates gained at least one mark for a valid suggestion why the graphs were different, the most common correct answer being that birds are bigger or easier to spot than beetles. Some candidates misread the question and described how the graphs were different. Some misread the graphs and thought they were showing population sizes, saying for example that the bird graph stopped rising because of hunting. Others tried to explain in terms of a predator-prey relationship between birds and beetles.
- 13(c)(i) On this challenging question a third of candidates gained at least one mark, though few gained two. The most common error was to say that yes the graph did prove a link between the growth of the human population and the number of species becoming extinct. The most common scoring answers pointed out that it just showed a correlation, not causation.

13(c)(ii) The majority of candidates gained one mark, usually for the idea that the vertical scales were chosen as they are because the two sets of data involve very different numbers, or that this makes it easier to compare them.

13(c)(iii) Most candidates gave a valid example of the kind of evidence that could support the idea, e.g. habitat destruction.

B733 Controlled Assessment

General Comments:

Controlled assessment in its present form has now reached the half way point. This is the third year of its life and there are three more to go.

The addition of 'Extended Science' to the range of options available proved popular with some centres.

Centres are, in general, coping more efficiently with the system and some excellent work accurately marked was seen particularly in the separate sciences.

There were, of course, some exceptions and a number of centres used tasks from last year or from next year in error. This mistake will not disadvantage candidates but the centres concerned will be forbidden to use the same tasks for next year's assessment.

There seemed to be fewer large adjustments to the marks given by Centres as a result of moderation though, of course, there were still some which marked over-generously.

Most centres annotated candidates' work to show/explain where marks had been awarded. This aided the process of moderation and Centres are thanked for the efforts involved in this annotation.

Most centres also submitted samples of work which were well organised and securely fastened together. Moderators are grateful for this as, again, it makes the process of moderation more straightforward.

Centres are reminded that in signing the CCS160 (Centre Authentication) form they are guaranteeing that the work submitted is the candidate's own unaided work.

There were a small but significant number of centres where too much assistance had clearly been given to candidates. In a few cases two or more candidates were found to have completely identical work.

In previous years, comments on individual Skill Qualities have concentrated on how centres could avoid common errors in the interpretation of the criteria. Centres which feel the need for such guidance should consult the reports written in 2012 and 2013.

This year the report will deal with strategies to ensure that candidates score well in each Skill Quality. Some of the points made will, of course, be the same.

Research

Candidates should focus on the bullet points from Stimulus Sheet 1. They should deal with each of these points separately and ensure that each question posed is answered fully. It should be clear from references within the text where the information was sourced from.

It is not necessary to produce extensive research notes. The inclusion of material which is not relevant to the Bullet Points reduces the mark available as the candidate has not demonstrated their ability to 'select' the information which is relevant. Quality is much more important than Quantity.

Planning

A hypothesis, where appropriate, should start with the prediction and follow it with a scientific explanation of the reasons for making it. It need not be unnecessarily long.

Whilst not being essential, it is helpful if the variables which are part of the task are listed and an explanation of each including control where possible is given.

It is also helpful if apparatus to be used is listed and the reasons for choosing are given. This allows candidates to fulfil the criteria of 'ensuring accuracy' and 'avoiding errors'.

A plan should be detailed and step by step. Details of how to set up apparatus should be given where appropriate (a diagram can be helpful here).

The plan should give details of the range of values to be investigated and of the number of replicates to be attempted.

It is not necessary to introduce a moderation, though if the planned method is changed the reason for this should be given.

The plan should always be designed to produce numerical data which can be displayed as a graph (see Processing).

Collecting Data

Structure is more important than neatness. A very neat table which is confusing or incomplete is not worth the highest marks. A table laid out logically with appropriate headings and units where it is easy to understand how the data relates to the task and where all the raw data is included is worth high marks even if it is not very neat.

If all the data is there, well organised, easy to understand and with correct headings and units, centres should not be afraid to give full marks.

Managing Risk

The criteria for 5/6 marks state 'All **significant** risks in the plan **evaluated**'. The risk of having a heart attack whilst squeezing a clothes peg is not significant. Too many times candidates invent spurious risks. Evaluated means that the candidate needs to appreciate and state whether it is a low risk or a serious risk.

The criteria also state '**Reasoned** judgements are made to reduce risks by **appropriate specific** responses'. The highlighted words speak for themselves.

Processing data

To gain the higher marks a graph is essential and all tasks are designed so that they produce data suitable for graphing. Key words in the 5/6 criteria are 'scales and axes selected' These should be selected so that the correct data is accurately plotted to produce a graph which fills at least half of an A4 sheet of graph paper (this is the graph not the grid which it is plotted on). A line of 'best fit' is usually a straight line or a smooth curve. Neither should be artificially forced to go through the origin, which is not usually a point.

A treatment of uncertainty such as range bars is essential for 6 marks.

If a plan does not aim to collect a sufficient range of data then a suitable graph cannot be drawn and the higher marks are not accessible.

Analysing and Interpreting data

A correct description of the trend is required; the one shown by the data, not the one predicted by the hypothesis (though they should be the same). This should be linked to data (or the graph). Some scientific explanation for the trend is required though this could be credited if it present in the Conclusion.

Secondary data should not merely be mentioned but 'links between primary and secondary data evaluated' Reasons for any differences should be explored. There should also be an analysis of 'the treatment of uncertainty'. Scoring 6 marks here is not straightforward and additional space may be required (see comments below).

Evaluating

A relevant comment about the data is essential. No data is perfect, candidates should refer to their range bars if present. They should comment on differences between replicates and how the points drawn relate to their best fit lines. Too many candidates seem to think that they gain marks from having accurate data, not in this skill quality.

Once weaknesses in the data have been identified remedies need to be suggested. It is not sufficient to say what went wrong. How to do it better next time is what is needed.

A simple statement such as use a video camera or use a data logger is not sufficient. Why would this be better?

Consider the words 'detailed and critical consideration' and 'suggestions for improvements justified'.

Justifying a Conclusion

Here the words 'critical analysis of the data' make it clear that a simple statement of "my results support the hypothesis" is not sufficient. Is there any doubt? Could they be interpreted differently? Please note also the words 'from research and investigation' this is where the answer to Q6 comes in.

However the most important words are 'clearly linked to relevant scientific knowledge and understanding'. The science used in the explanations in questions 5 and 6 must be known and understood not just half remembered from an earlier lesson. Good focussed research notes help here.

Comments

Candidates should not feel constrained by the space allocated in the Part 3 answer booklet. They can, of course continue on additional sheets which they should label unambiguously.

However, candidates are pre-programmed to write sufficient to fill the space provided and so a better solution is to create a Centre version of the booklet.

As long as the front page is retained and the wording of the questions are identical, the space allowed for answers can be as large or as small as you wish.

Such an answer booklet does not count as a writing frame as no guidance as to what to write is given.

Problems with Individual Candidates

If a candidate is absent for the research section of the task and there is no time for the task to be completed before part 3 is undertaken then the candidate will have to work without research notes and will be disadvantaged particularly in answering question 6.

If the candidate is absent for the planning stage then they may be given the plan of another candidate (but not a teacher plan). They will score zero for planning but can access all other marks.

If a candidate's plan is so poor that it will not work or is dangerous, they can again be given the plan of another candidate. Their own plan should be marked and they keep that mark for planning but, thereafter, marks may be based on the alternative plan.

Much the same applies to a candidate whose results are very poor. They should be given a mark for their own results under collecting data but can then be given the results of another candidate to use for processing etc. It is recommended that such candidates use their own results for the Evaluation section.

If a candidate is absent for the session where the investigation is carried out then they can be given the results of another candidate (but not teacher results). They will score zero for collecting data but can still access all other marks.

Candidates requiring the assistance of a scribe or amanuensis or with other access problems can receive help. For further details contact OCR.

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

- **The specification for Gateway Science**
- **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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