GCSE

Biology A

Twenty First Century Science Suite

General Certificate of Secondary Education **J243**

OCR Report to Centres

January 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.

CONTENTS

General Certificate of Secondary Education

Biology A (Twenty First Century Science) (J243)

OCR REPORT TO CENTRES

Overview

The units assessed this session were A161 and A162. Note that this is the last time this specification will be assessed in a winter series; henceforth, assessments for this specification will be offered in the summer series only. Unit A163 will be assessed for the first time in summer 2013.

Most candidates this session performed well, and made valiant attempts at the new, longer, six-mark extended-writing questions. It was clear that centres have prepared their candidates well for writing more extended answers.

Candidates were much better prepared for the free-response questions than last year, but many still fail to answer the question actually set. In the pressure of an examination it is easy to make mistakes of interpretation, which can severely limit the number of marks available to the candidate. Centres are recommended to train candidates in strategies such as highlighting significant words in the question to enable them to structure their answer around those points.

Centres are also reminded that the six-mark extended-writing questions often demand that the candidate considers more than one aspect of a problem, and so examiners usually reserve the highest level marks for those candidates who clearly address all the required aspects.

Candidates should be reminded that if they wish to change their answer, the old answer should be crossed out and a new one written in its place. There were instances of alterations (e.g. from a 5 to a 6) that created a completely ambiguous response. Where a response is ambiguous, examiners have little option but to give zero credit.

With regard to objective tick-box questions, it is always worth reminding candidates that, irrespective of whether or not the number of ticks required is stated in the question, the number of marks allocated to the question does not necessarily equal the number of ticks required. This principle also applies to the number of lines drawn in a 'join the boxes' type question.

A161/01 Twenty First Century Science Biology A (B1, B2, B3) Foundation Tier

General Comments

There were significant strengths in the responses of many of the candidates, and it was pleasing to note a general trend to stronger responses to the six-mark extended-writing questions (1c, 2d and 7). Where there were weaknesses in these questions it was often through lack of detail or through concentrating on one narrow area of the mark scheme.

Where candidates were asked questions linked to Ideas About Science (e.g. 3cii, 4a) the responses were often inadequate because they failed to make a general point, such as that a single case does not imply a correlation, and instead concentrated on irrelevant detail about the scenario. If candidates were better able to recognise this type of question their performance would undoubtedly improve.

Rubric instructions were generally well followed, with the exception of one question (3ci).

Some broad areas of Biology seemed to be weakly grasped, such as how antibiotics work and how antibiotic resistance arises, the difference between organs and systems and indeed the difference between body structures and processes such as homeostasis.

Comments on Individual Questions

1 **(a)** Saw some surprising errors by some candidates who put XX instead of XY on the left hand side. Other common mistakes were to put only X or Y in the middle boxes, and while YX was not penalised it may be worth emphasising the normal convention of XY to future candidates.

   (b) Rarely scored 2 marks, the most frequent mark scored was for the idea that there is a 50-50 chance of having a boy or a girl, but few made the link to the preceding part (a) and made clear that they knew XX is a girl and XY is a boy.

   (c) Saw most candidates score some marks. Level 1 responses were often limited to references to genetic factors, and a number of candidates limited their marks by making clear their misconception that alleles are not genes. Many responses might have been much improved by giving examples such as genetic variation leading to variation in hair or eye colour.

2 **(a)** Was generally well answered. A number of responses were undermined by saying that "both or either Ali or Mary" were carriers. Such candidates might well benefit from being urged to form an unambiguous response to questions.

   (b) **(i)** Was often well answered, but an appreciable number of responses gave a list of letters rather than choosing one option.

   (ii) Was much better answered than 2bi, suggesting that candidates were clearer on the idea of what was a scientific question than they were on what was an ethical question.

   (c) **(i)** Looked for candidates to read an age of 38 or 39 from the graph. A majority of candidates were able to do this. The most frequent incorrect response was 40, which suggests that some need more practice in this skill in data handling.

      (ii) Was well answered; it was encouraging to see so many candidates link both factors in the correlation.

      (iii) More commonly yielded one mark rather than two. A notably frequent wrong answer was "collect data for other genetic conditions". It was pleasing to see virtually all candidates place the correct number of ticks in the boxes even when they were selecting wrong options.

      (iv) Asked for a comment about the small chance of having a Down's syndrome and also a comment about the large consequence of having such a child. Very few candidates seemed to realise that this was a question about risk and consequence.

(d) Was common to the higher tier paper. Many responses were limited to references to risks of the procedure such as the chances of miscarriage. The most common route to Level 2 was mention of a decision to terminate. Level 3 responses were few, and were again characterised by being clear and detailed.

3 **(a)** Was very well answered, with many of those who did not gain both marks picking up at least 1 mark. This suggests that Centres have done a good job preparing candidates to use and interpret scientific models.

   (b) **(i)** Was in contrast very poorly answered. Only a small number of candidates were able to name homeostasis as the process, and many responses named an organ of the body rather than any process.

      (ii) Was also very poorly answered, with such marks as were scored being for nervous system; hormonal system was almost never mentioned. It was particularly disappointing to see so many candidates either fail to offer a response, or to offer the name of an organ or even two organs in response to a question that asked them to name systems, and perhaps the hierarchy of tissues, organs and systems needs to be emphasised to future candidates.

      (iii) Was not well answered, largely because candidates seemed to ignore the question about what the effect would be on the remaining kidney and give answers about the implications for Ranjit. Such credit as could be given was mainly for a generalisation that the kidney would need to work harder rather than making any of the specific points listed in the mark scheme.

   (c) **(i)** Very often had the correct response of the top left box joined to the bottom right box, and nearly as often did not score the mark since other boxes were joined by lines despite the clear instruction to draw **one** line. Candidates might be encouraged to read questions carefully for this type of instruction.

      (ii) Was looking for a generalisation that a single case is not evidence of a trend. This was very poorly answered as candidates made specific points rooted in the scenario e.g. "Ranjit's brother was 55 his age made him likely to have kidney failure."

4 **(a)** Again saw candidates largely fail to make the general point that a correlation is distinct from a cause e.g. there was no mechanism suggested. Such marks as were gained here were on the second marking point that other factors are involved in causing heart disease.

   (b) Was in contrast very well answered, with the majority of candidates able to list two factors which are important in causing heart disease.

5 **(a)** Called for candidates to recall that bacteria and fungi can cause disease and can also be treated by antibiotics. A number of responses offered viruses as a cause of pneumonia, ignoring the point about antibiotic treatment.

(b) Was generally well answered. It is worth stressing to candidates that there were examples of scoring 1 mark here for showing evidence of doubling in the working out even if the wrong box was ticked.

(c) Was even better answered than 5b, with the idea that the bacteria were reproducing rapidly being presented in a number of ways.

(d) Was however not so well answered as hardly any used the idea of bacteria developing resistance to the antibiotic; where a mark was scored it was almost always on the idea that remaining bacteria could multiply all over again and make Tony ill again.

(e) Revealed that few candidates appreciated the nature of resistance to antibiotics. There were many weak answers along the lines of "the first one was not powerful enough, the other two were stronger" etc. Another major misconception shown here was that Tony or Gordon became resistant to the antibiotics. Some candidates though that the bacteria became immune to the antibiotics and gave imaginative descriptions of how this affected their antibodies. This perhaps indicates a level of confusion about what antibiotics are and how they work.

6 **(a)** **(i)** Tended to be well answered, with just one tick in the top box.

(ii) Was also well answered, with most candidates choosing at least one of the two correct boxes for competitor and predator. It was pleasing to see that virtually all gave the correct number of ticks, the most common error being to offer only one tick.

(b) Was not well answered, and seemed to be another point where candidates missed the thrust of the question. There seemed to be a weak grasp of the idea of energy loss between trophic levels in the food web.

7 Was weakly answered on the whole. Candidates who were able to recall a significant amount of the carbon cycle were able to score well, but many gave poor answers which referred to either the water or nitrogen cycles, or indeed to recycling human waste. It was a little disappointing to find quite so many answers talking about trees "breathing in" carbon or carbon dioxide.

A161/02 Twenty First Century Science Biology A (B1, B2, B3) Higher Tier

General Comments

Most candidates were well prepared for this paper and made a good attempt at answering the questions. The three, six-mark extended-writing questions were also well attempted by the vast majority of candidates. The more confident approach shown by candidates this series resulted in almost all scoring some marks on these questions with a significant number managing to score five or six marks. Candidates would be well advised however to ensure that their writing is legible and contained within the space provided. Due to the fact that these scripts are marked electronically, examiners do not see the whole page by default and unless there is some indication that the candidate has written outside the allocated window, it is possible that the examiner will fail to spot additional text and the candidate could lose marks.

The paper was suitably challenging and differentiated well between candidates. There was a relatively few number of 'no-responses' to questions, suggesting that the paper was accessible to most candidates. The length of the paper is now sixty marks but there was no evidence that any of the candidates ran out of time.

Comments on Individual Questions

1 **(a)** Most candidates scored both marks on this question, with the majority of the remainder scoring at least one mark. It proved to be an accessible start to the paper whilst at the same time differentiating between the weakest and more able candidates.

(b) This proved to be a more taxing question. Credit for the first mark was given to those candidates who mentioned identical twins, or splitting of a fertilised egg, or even an example of asexual reproduction in animals. Although this was a relatively easy mark, most candidates failed to score it. The second marking point required candidates to say that a nucleus from an egg cell is removed and replaced with a nucleus from a body cell. Only the most able candidates scored this mark.

(c) This was the first of the six-mark extended-writing questions and was targeted at grades C to A. Good answers included a definition of what stem cells are, the differences between embryonic and adult stem cells, and a clear explanation of how these stem cells could be used to treat named diseases. Most candidates attempted the question well, with a significant number scoring full marks. Weaker candidates would be well advised to attempt the question rather than leave it blank, as they may well pick up one or two marks.

Question 2 was an overlap question with the foundation tier

2 **(a)** Most candidates scored this mark for correctly stating that both Ali and Mary were carriers. The most common errors were stating that either Ali or Mary was a carrier or providing an incorrect genotype.

(b) **(i)** This was well answered with most of candidates identifying the ethical issue.

(ii) This was also well answered with the vast majority of candidates correctly identifying the question which could be answered by science.

(c) (i) This question was also very well answered with very few candidates not scoring at least one of the two marks available. Good answers stated that as the age of the mother increased, so did the risk of having a child with Down's syndrome.

(ii) This question differentiated well with the most able candidates scoring both marks. Few candidates failed to score at least one of the marks. Candidates should be aware that examiners deduct one mark for each additional incorrect response. So candidates who ticked three boxes were limited to a maximum of one mark.

(iii) Candidates did not perform well on this question. The specification statement that was being tested was that even though the risk may be small, the consequences may be high. Many candidates failed to appreciate the nature of this question.

(d) This was the second six-mark extended-writing question and was targeted at grades D to C. Examiners were looking for candidate responses that covered three different areas; implications of having the test, decisions parents may have to make, and implications of having the child. Good answers referred to reliability and risk of having the test, whether or not to terminate, ethical considerations, and the stress, cost and problems of bringing up a disabled child. The question performed well with most candidates scoring three or four marks.

3 (a) Most candidates found this a difficult question with a lot of candidates scoring no points. Candidates who incorrectly transposed the left hand side with the right hand side, but were otherwise correct, were awarded one mark.

(b) This proved to be a more challenging question than expected with few candidates scoring any marks at all. One mark was awarded for all the alcohol lines being correct and another mark for all the ecstasy lines being correct. It is clear that this is an area of the specification that candidates would be well advised to spend more time revising.

(c) This question required the candidates to suggest solutions to a problem. Only the most able candidates scored full marks on this question. Most candidates managed to score one or two marks. Good answers included getting water from food, producing more ADH, water from respiration, not sweating, producing more concentrated urine, or staying in the cool (underground) during the day.

4 (a) Many candidates found what should have been a relatively easy question quite difficult. All that was required for candidates to score both marks was an answer that referred to a perceived risk as being based on what Jake thought and a calculated risk based on data or evidence. Most candidates however failed to do this.

(b) Most candidates scored at least one mark on this question but only the more able scored both marks. Good answers included that the risk was small and it was something that he wanted to do. An answer that included the 'benefits outweigh the risks' scored both marks.

(c) This question was not well answered with most candidates failing to score any marks. Credit was given for realising that 32 needed to be multiplied by 3600 and that this answer needed to be divided by 11. Full credit was given for any correct way of showing the chances e.g. 1 in 104727, or 0.0000095 or 0.00095%.

(d) Candidates gave some very good answers to this question which included the risk was small, the consequences were high, and more commonly described ways of reducing the risk including training and rehydration.

5 **(a)** This was quite a difficult question, as candidates were not informed of the number of correct responses. Only the most able had the confidence and understanding to realise that there were four correct responses and scored full marks. Most candidates scored two marks on this question with very few failing to score at least one mark.

(b) This question was not answered well. Good responses included the idea that organisms would be entering and leaving the food web. The most common error was that candidates failed to do as instructed and did not relate their answer to the diagram provided.

(c) **(i)** This should have been a simple mathematical problem however almost half of the candidates failed to score. This was even though examiners credited one mark for answers of 256 or 1024. Correct answers of 512 scored two marks.

(ii) Correct answers here included speeding up the rate of decomposition, or that microorganisms are very small in comparison to the organisms that they decay. Weaker candidates failed to relate their answer to decomposition.

(iii) This should have been an easy recall question. However it was clear that candidates had failed to learn the four standard answers to this question, namely mutation, environmental change, natural selection, or isolation. All too often answers referred to artificial selection or reproduction.

6 **(a)** This was the last of the six-mark extended-writing questions and targeted grades B to A*. It proved as expected, to be a difficult question with approximately half of candidates failing to score. This was mainly due to a complete lack of understanding about what living and non-living indicators are. Good answers gave good examples of both living and non-living indicators, clearly described the environment in which they were found, and went on to explain how they were used. The most common examples credited for living indicators were lichens and May fly larvae, and pH, carbon dioxide and size of ice caps, for non-living indicators. Incorrect answers often referred in vague terms to evolution in a changing environment and referred to the fossil record.

(b) This also proved to be a challenging question. The main reason for this was that most candidates failed to do as instructed and relate their answer to the data provided. Instead they gave standard answers such as take more measurements or simply repeated the question and said it should be done over a greater number of years. Good answers recognised that the data provided had very small changes and that there was variation rather than a clear trend. Answers that referred to outliers were also credited.

A162/01 Twenty First Century Science Biology A (B4, B5, B6) Foundation Tier

General Comments

This was the second time that the new style exam could be sat by candidates and included the three six-mark extended-writing questions set to give candidates the opportunity to show their knowledge of a subject in a piece of extended writing. These free response type questions proved a challenge to some candidates, however, it was encouraging to see that many had understood the importance of addressing all sections of the questions set and were able to structure their answers in a clear and logical way. Most candidates limited their response to the space provided, again demonstrating a good understanding what a good answer involved.

Candidates appeared to be well prepared for this paper and attempted most of the questions set with very few nil responses on the paper. There was no evidence of candidates running out of time and all the performance of the candidates seemed broadly equal across each of the units B4, B5 and B6.

Comments on Individual Questions

1 **(a)** This question was well attempted and those who knew the equation for photosynthesis knew both answers. Candidates who attempted this but failed to score tended to write the answers the wrong way around.

   (b) **(i)** This question was attempted by most candidates with most correctly calculating the mean value as 10.8

   (ii) Most candidates were able to correctly identify the species as C.

   (iii) In this question there were 2 marks available for 2 reasons as to why the candidate would be confident or not about their answer to 1b(ii). Most candidates gave only one reason in their answer limiting their mark to 1.

   (iv) Here candidates were asked to suggest 2 improvements to the experiment. Most failed to follow the rubric command explaining one improvement in detail rather than 2 and therefore limiting their answer to 1 mark.

   (c) This was a well answered question with most candidates scoring at least 1 mark. Most knew that the cell membrane allowed oxygen to pass out of the cell.

   (d) This question involved the candidates in completing the sentence about osmosis. Most knew that the first word was water; however, few knew that the 2nd space needed 2 words, 'partially permeable' and therefore failed to score.

2 **(a)** Many candidates failed to read the rubric properly on this question and many had circled glucose and starch.

   (b) **(i)** This question was aiming to get candidates to describe the results in the table and was worth 3 marks. Centres would be advised to practise this type of question with their candidates as many explained the results rather than describing them.

   (ii) This was a particularly challenging question and many failed to score.

(c) This question required candidates to choose the appropriate word from the list given to complete the sentences. Most scored at least 1 mark with most correctly completing the last 2 sentences.

3 **(a)** This question was worth 2 marks and candidates tended to score either 2 or 0 marks. Where candidates scored 0 marks it was evident that they had attempted the question but had copied the original strand information onto the new strand.

(b) **(i)** Some candidates who had understood question 3a knew that the percentage of C bases was 36% as C pairs with G, however many thought that the percentage of type C bases was 64% as the total percentage would be 100%.

(ii) This was not a particularly well answered question.

(c) This question required candidates to complete the sentences by choosing words from the list. Most candidates were able to correctly use the word "nucleus" but only half were able to correctly identify both words.

(d) This was the first of the six-mark extended-writing answers on this paper. It was also the overlap six-mark extended-writing question. Candidates were asked to explain the differences between the cells produced by processes A & B. Many candidates scored one or two marks. Many candidates however, identified one of the processes as meiosis and the other as mitosis and therefore failed to score higher level marks.

(e) For this question candidates were asked to discuss 2 ethical issues. Just under half of the candidates were able to discuss one ethical issue.

4 **(a)** This was a well answered question where candidates were asked to circle 3 correct features of a reflex action. It was pleasing to see that few were not able to answer this question and over half knew all three correct features.

(b) Most candidates found the labelling of the diagram difficult. Some had mixed up what A & E were and had therefore labelled up the neurones incorrectly too. Candidates would be advised to look at the direction of the arrows as this indicates the direction of the impulse and gives a clue to which should be the receptor and the effector.

(c) This question was the second six-mark extended-writing question on this particular paper and required candidates to use their knowledge of the Pavlov's dogs experiment to relate to the Little Albert experiment. Many candidates were able to talk about what happened in the Pavlov's dogs experiment and it was good to see that many could relate this in terms of association and reflexes to the little Albert experiment. Where candidates failed to score it was apparent that they were not familiar with Pavlov's dogs as many talked in general terms about training dogs to perform a particular trick.

5 **(a)** Approximately half of the candidates sitting this paper knew that the answer was the central nervous system.

(b) This section proved more challenging with less than 15% answering correctly.

(c) **(i)** In this section candidates were asked to describe a correlation from the data and to suggest a reason for this. Many candidates scoring 1 mark had given a reason relating to the ability to be able to concentrate in a quiet room compared to a noisy one. Many had written a conclusion to the experiment rather than a correlation and failed to achieve the second mark.

(ii) This section was not particularly well answered. Candidates did not take into consideration the bold "not" on the paper and talked about factors already discussed in the experiment in more depth rather than considering 2 new factors.

(iii) This was the third six-mark extended-writing answer that many candidates could suggest a range of learning techniques. There was however, some candidates who continued to discuss the benefits of a quiet room compared to a noisy room and failed to score.

A162/02 Twenty First Century Science Biology A (B4, B5, B6) Higher Tier

General Comments

This paper was appropriate for the ability range of the entry and most questions were accessible to candidates across that range. The spread of marks across the whole paper suggested that it differentiated well across the grades. Most questions were attempted by all candidates including the six-mark extended-writing questions and those requiring longer, more developed answers.

There were a number of questions on the paper that tested direct recall of the specification statements and it was clear that some candidates had not learnt these key scientific ideas. This was disappointing. That said, candidates seem to be improving their ability to form conclusions and evaluate data and many performed well on these sorts of questions.

As in previous sessions, some candidates lost marks because of misreading or ignoring the rubric. Examples included ticking more boxes than candidates were asked to or including in their answer something that had already been stated in the stem or which they were specifically told not to include. There were a number of examples of this occurring across the paper and they are detailed below.

A pleasing number of candidates made substantial attempts at the extended answers and the six-mark extended-writing questions. Candidates appear to be more confident about answering these questions and there were some responses which were well structured and of an extremely high standard. However, for many candidates, answers to the free response questions lack appropriate scientific detail and clarity. For example, words such as 'it' and 'they' are often used rather than candidates stating exactly what they are referring to. It was also apparent that a significant number of candidates still only address one part of a six-mark extended-writing question and as a consequence are likely to be restricted to the lower levels. Only a candidate who addresses the question as a whole will be able to achieve maximum marks on these types of question.

Question 1

(a) Many candidates were able to correctly recall the balanced symbol equation for photosynthesis. Some were clearly confused between photosynthesis and respiration and the weakest candidates wrote a word equation instead of a symbol equation.

(b) **(i)** The vast majority of candidates correctly identified the species that was used by Jason as C. A few candidates incorrectly selected A, presumably because they had only looked at the number of bubbles produced at low light intensity.

(ii) Most candidates obtained one mark here for correctly identifying that the mean of Jason's results in Table 1 and the mean number of bubbles of species C were the same (or very close). Fewer candidates achieved a second mark. Some recognised that Jason repeated his experiment allowed them to be more confident in their conclusion. A few candidates identified the problems associated with counting bubbles and used this to suggest why they could not be fully confident in their conclusion.

(iii) In order to score a mark here, candidates had to suggest two improvements. Unfortunately some candidates only suggested one so they were unable to score straight away. A significant number of candidates suggested repeating the

experiment which was given in the stem and could therefore not be credited. However, some candidates were able to recognise that the experiment would be better if a range of light intensities were used, or if the volume of the oxygen produced was measured accurately. These were probably the most common points that gained credit.

(c) Many candidates scored a mark here. Those that did not score the mark usually wrote ' cytoplasm' instead of 'chloroplast'.

(d) **(i)** A significant number of candidates scored a mark here. The most common error was to suggest that active transport requires energy from photosynthesis. A few wrote 'cell' instead of 'cell membrane' and there were some descriptions of active transport given in the first gap, e.g. 'movement from a low concentration to a high concentration'.

(ii) Overall this question was not very well answered. Many candidates did not pick up on the idea that there is a lack of oxygen in the water-logged roots, despite it being clearly expressed in the question. Instead they proceeded to talk about the concentration of nitrogen and how that would affect the uptake. There were also frequent references to a lack of photosynthesis in the absence of oxygen. However, a significant number of candidates were able to identify that there would be less respiration but few referred specifically to less <u>aerobic</u> respiration or more <u>anaerobic</u> respiration. Only the very best candidates could then link this to a lack of energy released and make it clear that they understood that energy was required for active transport. This highlighted itself as being an area of the specification about which many candidates are very confused.

Question 2

(a) Generally this was well answered with most candidates scoring the mark. A few candidates incorrectly suggested that oxygen was produced.

(b) This was also well answered and most candidates could correctly describe the production of lactic acid in animal cells.

(c) **(i)** The majority of candidates correctly calculated this as 1500. Other answers were seen and on occasions this question was not answered at all. It was unclear whether candidates could not answer the question or whether they had missed it because it was at the bottom of the page and did not have a clear 'space' to write the answer. Candidates needs to be reminded to read all of the paper so that they don't miss questions which may ask them to label something or write somewhere other than in the usual lined space.

(ii) This question was poorly answered with only the very best candidates able to pick out the important points and present them in a logical sequence. It was a question that demanded the candidate to make comparisons between A and B and therefore comments about only one fermenter was not sufficient to gain credit. The first mark point looked for the link between oxygen and respiration. It was common to see candidates refer to oxygen being present in B and then identify more respiration here. But, as with Q1(d)(ii), it was rare to see a specific reference to aerobic and/or anaerobic respiration which made it difficult to be certain that candidates were describing the correct process in the correct fermenter. It was also necessary for the description of respiration to be comparative. This raised the demand of the question so that only the very best candidates scored. The second mark point linked energy and reproduction and was an easier mark to get. However, many candidates fell down by simply repeating the information in the stem of the question, the idea that

the yeast in B reproduces faster. For the second mark, candidates were expected to write more than this – and to link the energy with the process of cell division or growth.

(iii) This was the first six-mark extended-writing question on the paper. Candidates generally made a good attempt at this question with most scoring at least a Level 1 answer. The majority of candidates correctly identified that the adriamycin would slow down the reproduction of the yeast. Some candidates developed this further and described how the number of cells would be likely to level off for a while and then decrease, as more cells would die than be produced. Some also made reference to the fast-acting nature of the adriamycin. A very small number of candidates believed that the adriamycin would speed up the rate of reproduction in the yeast cells. With regards to an explanation, the majority of the candidates recognised that the adriamycin would stop the cells dividing but their reason was very commonly that which was given in the stem, i.e. the idea that the chromosomes would not be able to copy themselves. A significant number of candidates continually repeated this point as their explanation without developing it at all. This meant that they were unable to move beyond Level 1. To move to Level 2 or 3, candidates needed to make some reference to the events in the cell cycle. Many candidates correctly stated mitosis as the process that was occurring and it was pleasing to see some extremely detailed and accurate descriptions of this process, with reference to DNA replication, the chromosomes separating and the formation of two new daughter cells. Candidates need to learn the importance of sequencing their answers as it was very common to see lots of points just randomly scattered throughout the response and it was difficult to credit these responses with maximum marks. A small but significant number of candidates confused mitosis with meiosis.

(d) Most candidates scored at least one mark here, with 'fuel' and 'oxygen' being the most frequent correct answers.

Question 3

(a) The vast majority of candidates scored two marks here and seemed confident about interpreting the triplet code. Where marks were lost, it was usually for careless errors.

(b) **(i)** The majority of candidates also scored two marks here and were able to state that G pairs with C. A few realised that G paired with C but then thought that these two bases should total 100% so incorrectly calculated the number of C bases as 64%.

(ii) Again, most candidates scored at least one mark here, and more commonly two marks, by stating that different genes code for different proteins.

(c) A pleasing number of candidates got this answer correct and so many scored a mark here. The most common incorrect response was 'clone'.

(d) A number of candidates did not gain any credit here because they did not refer to amino acids. Many of those who did refer to amino acids stated that they were made by the code which was not credited. There were also a significant number of candidates who just repeated the information given in the question and wrote something like 'if another base is added it will change the protein produced'. This also did not gain any credit. However some of the best answers very clearly explained the impact of the mutation on the coding for the amino acids, with some candidates even using the code to explain that the amino acids would change to be 9 and 7 instead of 1 and 5. The second mark point was given if it was clear that the sequence of amino acids had changed, leading to the production of a different protein. A few candidates gained two marks for one sentence, e.g. 'a different triplet codes for a different amino acid, which changes the order of the amino acids and the protein that is made'.

(e) This was the second six-mark extended-writing question on the paper. Candidates generally performed well on this question and it was rare to award less than Level 2. The simplest answers used the information in the diagram to correctly state the differences in the cells produced from processes A and B. These responses were awarded Level 1. However, the majority of responses did more than that and either referred to mitosis or began to give examples of ways that the different cells could be used. Many candidates also made reference to the 8-cell stage and realised that this is the point where cells become specialised. It was also pleasing to see many of the candidates with some understanding of the genetic control of specialisation and, although most didn't have a detailed understanding, they correctly made reference to genes switching on and off and the best candidates were also able to link this to the production of different proteins by the different specialised cells. A few candidates tried to name processes A and B which led to some confusion and some incorrectly naming one as mitosis and one as meiosis. Some candidates also failed to comment on both processes which limited them to the lower marks.

Question 4

(a) It was perhaps surprising to see many candidates perform quite badly on this question. Very few seemed able to give two features of a reflex action, with many giving examples of a reflex, e.g. blinking, sneezing, or describing the same feature in two ways, e.g. 'involuntary' and 'without thinking'.

(b) **(i)** In general, this was well-answered. Most candidates scored at least two marks, with many scoring all three. The most common error was to state 'CNS' instead of 'relay neurone'. However, it was clear that a small but significant number of candidates did not know what the question was asking and they were unable to even attempt it.

(ii) The majority of candidates correctly ticked the top box, identifying the advantage of the fixed pathway as 'no processing is required'.

(c) Many candidates scored one mark here but it was rare to award all three. Candidates understood the idea that 'little Albert' became scared of the rat because of the association with the loud noise and responses that correctly described this idea scored one mark. However, candidates commonly confused the primary and secondary stimulus, assuming that the noise was the secondary stimulus as it was exposed to 'little Albert' after the rat.

Question 5

(a) This question either seemed to gain two marks or zero marks. Some candidates clearly described the process of neurotransmitter release from the first neurone and the presence of receptors on the second. Other responses were very confused and it was often unclear as to how many neurones candidates were talking about. Some candidates gave detailed and correct information about nerve impulses and neurones but failed to answer the question and focus on how the neurones and synapses ensure that the impulse only moves in one direction. A few candidates even described neurones travelling.

(b) Most candidates scored one mark here, usually for two correct responses. The most common correct answers were 'blocks' for the first gap and 'increases' in one of the last two gaps. Candidates still seem reluctant to put the same answer more than once in their response, despite the instructions clearly stating that they could use the words more than once.

(c) The majority of candidates correctly named the 'cerebral cortex' as the part of the brain most likely to be affected by the early stages of Alzheimer's disease.

(d) This question caused candidates some difficulties for a number of reasons. There was a lot of information to read and data to process. Some candidates really struggled to fully understand what the data was telling them. Candidates were confused by 'conclusion' and 'correlation'. The scientists were effectively concluding that there was no correlation but some candidates seemed to think that the conclusion was that there was a correlation. A significant number of candidates also failed to state clearly in their answer whether they were supporting or challenging the conclusion, so their response could not be credited. This was a shame as there were often good use of the data but it was not clear which side of the argument they were describing. In questions of this nature, where two sides of an argument are needed, candidates may find it helpful to head up their response with 'support' and 'challenge' so that it is explicitly clear to markers what they are describing. Alternatively, they could arrange their answer in a table with two columns. A number of candidates just stated data from the table with no clear idea of how this related to the conclusion. Having said all that, there were some candidates who very clearly spotted a correlation and recognised that this challenged the conclusion. Equally, it was common to see reference to the results from the '5 or fewer numbers correctly recalled and in the correct order' row where all the results are the same in all rooms, and this was given as evidence to support the conclusion.

(e) This was the third and final six-mark extended-writing question on the paper. It was pleasing to see most candidates attempt this question although there were some 'Nil Responses' which may be because it was the last question and candidates were short of time. Most candidates gained some credit for their description of the features of the model, with the most common features being short-term memory and long-term memory. Candidates also knew that repetition moves things from the short-term to the long-term memory. Fewer candidates made reference to information being lost or the idea that information can be retrieved. Those that did refer to all the features, whether in their text or in a diagram, scored at Level 2 and it was not uncommon to award 4 marks just to a very good diagram with no text. Fewer candidates successfully linked the model to the results of the experiment, so Level 3 marks were rare. However, some did refer to the idea that it would have been easier to repeat information in the quiet room, which is likely to have made it easier to remember and recall the information. This question did appear to differentiate well across all levels. It was clear that a small number of candidates had never heard of the 'multi-store model' of memory.

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