Examiners' Report

Principal Examiner Feedback

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Pearson Edexcel Combined GCSE

In Biology (1SC0) Paper 1BF

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The paper consists of 60 marks assessed by a mixture of different question styles, including multiple-choice, short answer, calculations and one extended open-response question. All questions should be answered in the allowed time of 1 hour 45 minutes. The extended open-response questions are identified by an asterisk (*) in the question paper to indicate that marks are also awarded for the ability to structure a response logically.

The Biology papers assess aspects of working scientifically and mathematical skills, the requirements of which are given in the specification.

There are eight core practicals in the Biology content which must be completed prior to sitting the examination.

Paper 1SC0 1BF assesses content from Topic 1 to 5 of the specification. The 2021 paper covered areas of the specification including cells, mitosis and microscopy, genetic crosses and selective breeding, enzymes and enzyme dynamics, neurones and the reflex arc as well as communicable diseases.

Questions assessing practical skills included an osmosis investigation, controlling temperature in an enzyme investigation, comparing reaction times and constructing a table.

Mathematical skills tested included a magnification calculation, calculating percentage change, plotting points and drawing a line of best fit on a graph and interpreting the trends shown in the data.

There were several questions that tested candidates' ability to apply their knowledge to different situations but in these cases, all the information needed to lead candidates to the required responses was supplied in the stems of the questions. The mistakes shown, indicate that candidates should practice identifying the key parts of the stems of questions that should lead the candidates to different parts of the subject content as well as the key skills that are outlined in the specification. It was again pleasing to see some examples where candidates had underlined the command words as well as key words to help them make their answers more salient and germane.

The more straightforward questions where marks could be gained by interpreting given information were answered reasonably well, and it was pleasing to see a few examples of good, coherent answers that covered the main points outlined in the mark scheme.

Overall answers were written concisely with the use of scientific terminology being the difference between low and good marks on the items worth 2 or more points with evidence that some candidates used the scaffolding provided to target the correct areas to use in their responses. The proportion of candidates using the scaffolding and key points in the stems of the questions was concordant with the past few years. The confusion between the requirements for a 'describe' question and an 'explain' question again caused concern. Once again, some candidates confused the requirements for describe with the requirements for explain. Explain items were often partly answered as the candidate had only included a description in their response. It was also not uncommon to see a question using the command word describe being extended to include an explanation.

The proportion of poorly answered questions was concordant with that shown last year. Again, we suggest that this was possibly due to candidates not having covered all of the specification. It was however pleasing to see that almost all questions were accessible to candidates, and it was pleasing

to see no evidence where candidates had 'given up' with no candidate leaving the last few whole questions unanswered.

Question 1 (a) (i) required candidates to identify a chromosome in a cell in late anaphase of a dividing plant cell.

Question 1 (a) (ii) followed on from 1 (a) asking candidates give two reasons why mitosis is important to living things. Some candidates repeated information from the stem of the question saying that new cells were made by it dividing. With growth and repair of tissues being creditable responses most commonly seen. A few responses were not credited as, for example, they stated that mitosis was repairing damaged cells rather than making more cells to repair damaged cells rather than make new cells to replace damaged ones.

Question 1 (a) (iii) required candidates to draw lines from two stages of the cell cycle to a correct part of a description of each stage. Only a few candidates managed to score here with an above average proportion of candidates drawing multiple lines from each box thus disqualifying any marks. It is suggested again this lack of examination technique for these candidates could be due to lack of preparation caused by the disruption to the education system over these past two years.

Question 1 (b) (i) asked candidates to recall that a stain was used to make cells more visible for microscopic examination. Whilst some candidates misunderstood what was required writing about, for example, the need of glass slide on which to place the specimen. It was pleasing to see that a significant number of candidates used the term 'stain' or named a stain, for example iodine, thereby the available mark.

1 (b) (ii)required candidates to multiply the magnifications of the eyepiece and the objective lenses to find the overall magnification of the image for the microscope being used.

Question 1 (c) was correctly answered by the majority of candidates who stated that image was made clear by using the focussing wheel or by moving the stage / objective lens closer or further away from the specimen being observed.

Question 2 (a) (i) required candidates to complete a Punnett square to show the genotypes of the offspring of two parents that had genotypes that were Dd and Dd which was successfully completed by the majority of candidates. Either Dd and dD was deemed creditable for the heterozygous genotype.

Question 2 (a) (ii) followed on from part with candidates having to use the genotypes in the Punnet square to state the percentage of the offspring that were likely to have the condition: sickle cell anaemia. As a percentage was asked for in the stem of the question, ¼ and 0.25 were not credited.

Question 2 (a) (iii) was an 'explain' question. Candidates who scored on this item tended to gain one mark by saying that the offspring will all be Dd or heterozygous. However few could extend this answer to explain why the offspring would be this genotype.

Question 2 (b) required how selective breeding could be used in the specific case of producing good temperature tolerance and good meat production from information regarding two cattle types presented in a table. Although some excellent answers were seen including an increased proportion

of responses that stated 'for many generations', there were also too many candidates who just described breeding cattle rather than relate the response to selective breeding. Using information from the table.

Question 2 (c) required candidates to state benefits of breeding wheat plants so that they were resistant to fungal diseases. All marking points on the mark scheme were seen, however, only a few candidates could give two benefits with some candidates repeating themselves, make more profit and get more money and others talking again about the process of selective breeding rather than the benefits of the outcomes of the process.

Question 3 (a) required candidates to correctly state that 'phenotype' is the genetic term used to describe the physical characteristics of a carrot.

Question 3 (b) Figure 4 showed 6 carrot sticks and the candidates were told that a student chose three carrot sticks at random, weighed them, placed them in distilled water for two hours and then weighed the carrot sticks again. Figure 5 then showed the results.

Question 3b(i) asked candidate why three sticks were used rathe than just one. Most candidates that scored the mark here said to calculate a mean. Candidates that did not score here tended to say to make it a fair test or to make it more accurate although a significant number said to compare the results. However, to gain the mark the candidate had to state more than just compare e.g. they could have said compare the results for the three carrot sticks and see if they were the same.

Question 3 (b) (ii) required the candidate to suggest two improvements to the method. The majority of candidates scored one mark here with common accredited responses being, cut sticks form the same carrot, make the carrots the same starting mass / length / shape, and use more than three carrots. Candidates who did not gain credit often gave vague answers such as measure the carrots better, more accurately with some saying keep the carrots the same temperature which was already the case as the carrot sticks were in the same tube.

Question 3 (b) (iii) required candidates to calculate the percentage change for carrot stick Q. This mathematical task was completed well by the candidates with a few dropping the 2 significant figures part of the question. Percentage change has been a stumbling block for many candidates in the past and it was pleasing to see so many candidates gaining marks on this item.

Question 3 (b) (iv) required candidates to explain the change in mass of the carrot sticks. Candidates found this question accessible with marks were awarded for stating that the masses had increased, because water had entered the cells. Use of the term osmosis also could be credited. It should be noted, however, that there was no mark given for simply stating the masses from the table.

Question 4 (a) This item asked candidates to link enzymes to speeding up biological processes to explain why they can be referred to as biological catalysts.

Question 4 (b) (i) It was disappointing that too many candidates missed the word control (temperature) in the stem of this practical based item and stated use a thermometer with only a few stating, or describing, the use of a water bath.

Question 4 (b) (ii) asked candidates to explain why temperature needs to be controlled in this investigation. Some candidates did not carry forward the enzyme aspect of this investigation and so missed the marking points regarding enzymes are temperature sensitive and optimum temperature.

There were some good answers seen for this item which covered the listed four main marking points.

Question 4 (b) (iii) It was pleasing to see that most candidates could draw the graph to the accuracy required with a few dropping one of the available marks by being out of tolerance when plotting the points. Overall lines to show the trend were well drawn.

Question 4 (b) (iv) The interpretation of the graph was accessible to students with marks being dropped by a few candidates for just quoting data and some candidates only stating that the time taken to collect 20cm^3 of oxygen decreased as concentration increases. Candidates need to be reminded to look at the number of points available and if, as is the case for this item, there are three marks available, further comments, eg on the way the time decreases need to be made.

Question 5 (a) (i) required candidates to draw the direction of the electrical impulse along the motor neurone in figure 8. Not all candidates attempted this question. Those that did were roughly split in half with arrows to the right and the other half to the left. Some candidates drew their arrows on the darkly shaded myelin sheath which made it hard to see the intended direction.

Question 5 (a) (ii) required candidates to name the two structures labelled K and L on figure 8. Few candidates scored marks here with the first item that had a significant number of blank answers. More candidates correctly identified myelin sheath (K) than axon (L).

Question 5 (b) (i) This item, describing how the impulse passes from the relay neurone to the motor neurone was again poorly answered. Figure 9 showed a cross section of the spinal cord with a clear gap between the two neurones but candidates found it hard to equate this to a synapse. Possibly they were familiar with the higher resolution diagram showing the synapse. Most of the candidates that attempted a response wrote an electrical impulse with only a few getting as far as chemicals moving across the gap and only one referring to the synapse.

Question 5 (b) (ii) was answered more fully by candidates with marking points 1, a response to danger and marking point 3 faster being seen although the former usually was written as an example, e.g., touching a hot object although a few candidates included that the reflex arc does not involve thinking about what to do and that the process protected you from getting hurt.

Question 5 (c) (i) was a mathematical task to state the median reaction time from the table of results. This was well answered with the majority of candidates gaining the available mark.

Question 5 (c) (ii) was a relatively complicated task requiring candidates to extend the process given to generate the reaction times in response to a blue square that changed to a yellow square on a computer screen in figure 10 so that these times could be compared to the reaction times for a red square turning yellow. This was accessible to candidates with some good responses to generate the data. However, a significant number of these did not include any variables to be kept the same, or repeating the investigation and a way of comparing the sets of data, eg the medians, or calculating means thereby dropping a mark.

Question 6 (a) was a recall question asking candidates to state that the World Health Organisation / WHO is the group responsible for definitions, in this case that of 'health'. Again, this was accessible to candidates with no blank responses seen, although a significant proportion thought that it was

the NHS, which is not surprising considering how much it has been in the news in the two years prior to the exam being sat and some sating that it was the British Health organisation.

Question 6 (b) (i) It was pleasing to see this item, which required candidates to state two differences between communicable and non-communicable diseases, was attempted by all candidates with the majority scoring 1 or 2 marks. Some of those that did not gain a mark had difficulty in expressing 'being passed from person to person'. An example of this was where responses just said that communicable diseases 'spread'. Spread on its own was deemed insufficient as some non-communicable diseases e.g. cancers spread (within the body).

Question 6 (b) (ii) asked how the spread of TB, which was stated as a communicable disease, could be reduced or prevented. Candidates were good at answering this with most scoring one point for stating a way to reduce the spread of TB. This was an explain question and so for the second mark to be awarded, the response had to state how the method would reduce the spread of TB. Although most candidates attempted to do this, most had problems with expressing how, for example, avoiding close contact with other people, or, vaccination actually helped to reduce the transmission of the disease. Keep clean and good hygiene were not credited here as they were deemed to be too vague.

6 (b) (iii) required candidates to present data written in a random order on a notepad to be put into a table. This is a part of the working scientifically tasks listed in the specification. All candidates scored here with the majority gaining both available marks. Candidates gaining just one mark tended to omit the table headings: country and number of people (with TB) or just put people instead of number of people (with TB).

6 (c)* was the extended open response question for this paper. Candidates were required to describe how the physical and chemical defences of the body provide protection from disease. This task was less well answered than expected with a significant number of candidates getting no further than stating that the skin stops bacteria getting. Some referred to skin stopping diseases getting in which was the minimum required to access level 1. Physical defences were addressed more fully than chemical defences with different candidates achieving level 2, (accessing 3 or 4 marks) by referring to a selection from: skin, mucus, nasal hairs, tears and blood clots. A few candidates also include a chemical defence, mainly hydrochloric acid in the stomach with a couple of candidates also stating enzymes destroy pathogens accessing level 3. To gain 2 marks (level 1), 4 marks (level 2) or 6 marks (level 3), candidates had to explain how the defence systems stooped or reduced the disease. The majority of level 1 candidates just stated the defence, whilst level 2 and 3 candidates were more likely to explain how the defence mechanism, reduced disease.

Paper Summary

Based on their performance on this paper, candidates should take care to:

Recognise that 'describe' requires candidates to give an account of something or to compare or say how information in a diagram, a table or graph changes.

When describing a trend in a graph, refer to how the trend changes e.g. levelling off and also to key points where changes occur.

Recognise that the word 'explain' means that a description should usually be stated and then additional scientific information is needed that is linked to the answer giving a justification or reason.

Use all the information given in the question to help them construct their answer. However, avoid repeating the information which has already been given and avoid giving vague responses which will not gain credit.

Candidates need to learn the structures required by the specification points so that they can apply them to the start of their responses as this then allows them to develop their answer more easily.

Consider the context of the question to ensure they apply their scientific knowledge to the question being asked.

Develop their practical skills knowledge to ensure they can answer questions in detail on all the practical activities outlined in the specification.

Check the number of marks given for the question and ensure that they have included enough facts to match the marks available.

Think about the structure of the answer before starting to write when tackling the extended open response answers, and ensure that all parts of the question have been addressed.