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Examiners' Report

Principal Examiner Feedback

November 2020

Pearson Edexcel Combined GCSE

In Biology (1SC0) Paper 1BF

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Paper 1SC0/1BF is taken by candidates who have followed the GCSE Combined Science specification.

Please remember that the comments made on the November 2020 sitting are based on relatively low numbers of candidates' papers and that the cohort may not necessarily be comparable with previous years.

The paper consists of 60 marks assessed by a mixture of different question styles, including multiple-choice questions, short answer questions, calculations and one extended open-response question.

All questions should be answered in the allowed time of 1 hour 10 minutes. The extended open-response question is identified by an asterisk (*) in the question paper to indicate that marks are also awarded for the ability to structure a response logically.

The Combined Science Biology papers assess aspects of working scientifically and mathematical skills, the requirements of which are given in the specification. There are six core practicals in the biology content which must be completed prior to sitting the examination.

Paper 1SC0 1BF assesses content from Topic 1 and Topics 2 - 5. The 2020 paper covered areas of the specification including cell structure, movement of substances, selective breeding, mitosis and meiosis, the genome, enzyme structure and function, biological molecules, communicable diseases, meristems and plant cell structures

The extended open-response question was based on the structure of DNA and how it can be extracted from fruit.

Questions assessing practical skills included preparing a microscope slide and the extraction of DNA.

Mathematical skills tested included interpretation of data from tables, graphs and pie charts, rate, magnification and number of people with measles.

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. Candidates could still benefit from practising reading the stem and considering which parts are key to stimulate the connections to areas of the specification covered. It was pleasing to see examples where candidates had underlined the command words and key words as well as writing key words by the question for extended prose responses.

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.

It was encouraging that some candidates used the scaffolding provided to guide their responses. Even when candidates scored low or no marks there was clear use by a reasonable number of candidates of using the diagrams, graphs and information in the stem of the question to guide their responses. As in past years some candidates confused the requirements for describe and requirements for explain. Explain items were often partly answered as the candidate had only included a description in their response, and it was also not uncommon to see a question using the command word describe being extended to include an explanation.

There was a higher proportion of poorly answered responses seen than in previous years 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.

GCSE Combined Science 1SC0/1BF

Question 1 (a) (ii)

This question required candidates to state the function of the flagellum which was shown in figure 1.

A significant number of candidates correctly answered this with incorrect responses including protection from pathogens.

Question 1 (a) (iii) required candidates to give another difference between the bacterial cell and the animal cell shown in figure 1. Only one response seen stated flagellum, and candidates should be guided to note the word 'other' in this context and not state the difference already covered in the previous item. Most candidates that scored the available mark here stated that the animal cell had a nucleus, and some evidence of using the diagram was shown here with, for example, a candidate describing the bacterial DNA as a 'scribble'. The other correct response seen was that the bacterial cell has a cell wall.

Question 1 (c)

This question was based on the first biology core practical which includes magnification calculations. Use of the 'equation rearranging triangle' was seen, and a reasonable number of candidates correctly substituted the values into the formula and correctly multiplied 500 by 0.4 to give the answer 20 (mm). The majority of candidates scored on this question with most of these obtaining both marks available. The most common error seen was to divide instead of multiply with one candidate taking the 0.04 from the 500.

Question 2 (a) (i)

This was another calculation question with candidates interpreting data supplied to calculate the distance the acid had diffused in one second. The majority of candidates found calculating the rate more difficult than the calculation in 1 (c) and failed to score here with many dividing the 120 by 3 thus giving the answer as 4 mm. As the total distance diffused in 120 seconds was 3 mm, 4mm in one second should have stood out as impossible, and candidates should be trained to think if their answer reasonable, and if not, recalculate their answer.

Question 2 (a) (ii)

Candidates were asked what the student should do to confirm their results detailed in this question. Answers suggest that they had been trained to give standard ways to improve many investigations, as many suggested using a greater range of either cube sizes or acid concentrations. About one third of candidates correctly gave the required answer which was to repeat the investigation or compare their results with those from other groups.

Question 2 (b)

This item required candidates to devise a plan to see how temperature effects the rate of diffusion. It was pleasing to see some good responses that clearly understood the basic ideas behind a scientific plan covering more than three of the marking points in the mark scheme. Those candidates that scored two marks tended to miss out the marking points which covered factors that should be kept the same to make the results comparable. It was pleasing to see that some candidates that scored well here underlined key words in the question. It was, however, disappointing that the majority of candidates could not state the basic requirement of doing the investigation with acids at different temperatures, and candidates need to be reminded to identify the independent variable so that they can base their plan around changing this factor.

Question 2 (d) (ii)

As with previous calculation questions the main errors seen were to divide / multiply incorrectly. As this was a percentage question based on 7% extracted from the pie chart, the candidates could answer it by dividing the number of cases of cancer given in the question by 100 and then multiplying by 7 to gain the first mark. The second mark was for rounding the answer to the nearest whole number. This second mark was deemed to be a separate skill and so could be awarded for correctly rounding an answer to an incorrect calculation. Most candidates that scored just one of the two marks available, did so in this way.

Question 3 (a) (i)

In question 3ai, candidates needed to explain how farmers could selectively breed chickens to produce larger birds. Some good answers were seen explaining that the farmers should select the larger chickens and breed these with each other which gained the first two marks available. The third mark was for showing an understanding that the process has to be repeated (many times) before the whole flock would be composed of larger chickens. A common error was to simply state that you get larger chickens by giving them more food. This was possibly from looking at Figure 4 which showed a small chicken, a medium chicken and a large chicken and not interpreting the question correctly which included the biological term selective breeding.

Question 3 (a) (ii)

This item follows on from question 3 (a) (i) and candidates had to state a benefit and a risk of selective breeding to gain credit. Candidates found it easier to gain the benefit mark stating that the farmer would get more meat or more money from the resultant chickens. Produce larger chickens was stated as the aim of selectively breeding the chickens in part (i) so was not credited and so that the farmers get what they need was considered to vague for credit.

Question 3 (b) (i)

Over half of the candidates correctly stated that the number of chromosomes in a sex cell of a chicken was 39, half the number of chromosomes given in the question. The common error was to state that chromosomes come in pairs.

Question 3 (b) (ii)

Few candidates could state that the type of cell division that creates sex cells was meiosis with most candidates giving reproduction as their answer.

Question 3 (c) (ii)

This question asked candidates to state two benefits of discovering the sequence of bases for all plants and animals. This tested an area of the specification that candidates find hard to relate to and it was pleasing to see a few answers that showed a good use of biological terminology and understanding that if the new the base sequences you can identify genes useful for genetic engineering, classifying organisms and use the information to predict and cure diseases. Few candidates tried to address the last marking point linking the knowledge of bases sequences to understanding how species cope with environmental change.

Question 4 (a) (i)

Candidates showed a good understanding of what is required to describe the trend shown in a graph with the vast majority of candidates accessing the marks available. To gain both available marks, reference to points on the graph needed to be made. Those that did so referred to the optimum temperature of 40 °C or the maximum mass of 300g. Some candidates just described part of the graph stating, for example, that the mass of product increased. Candidates should be reminded to look at the question that here says describe the trend in the Figure 5, which means that all of the graph needs to be covered, and also the number of marks available which suggest that more than one statement is required for both to be awarded. Some candidates continued to explain why the trend changed rather than just describe. Candidates still need to be trained in the different requirements for these two command words.

Question 4 (a) (ii)

This question continues from part (i) with candidates being asked to explain the change in results for the last part of the graph, from 40 °C to 60 °C. Candidates found this hard to do which was surprising as the introduction states that this was an enzyme-controlled reaction and in previous years candidates could clearly state that the rate goes down because the enzyme /active site was changing shape / being denatured. A few lost the mark by wrongly stating that the enzyme was denatured at 40 °C. It was pleasing to see that no candidate referred to the enzyme being killed.

Question 4 (b) (i)

This was a join the boxes exercise and although the majority of candidates could link carbohydrate with glucose, few managed to link fat with fatty acids and glycerol with most linking fat to amino acids, with a few linking it to ethanol.

Question 4 (c)

Some candidates lost marks here because they were not precise enough in their explanation for why no product was formed when the enzyme was mixed with substrate Q. Marks were awarded for candidates stating that Q had a different pattern of triangles, ovals and rectangles to fit into the enzymes, or that the enzyme would work with substrate P because the triangle, rectangle and oval would fit, but many just stated vaguely that the substrates were different shapes. Some candidates

gained their second mark by stating that it was the active site of the enzyme (that would not match substrate (Q) with very few hitting marking point three.

Question 5 (a) (ii)

This item, which was the first of the crossover questions scored well with most candidates correctly stating why measles is described as a communicable disease as it can be caught / spread to other people / you can catch it from other people.

Question 5 (c)

Some excellent responses were seen with candidates referring to antibodies and lymphocytes in the correct context. Marking point 5 was awarded, though rarely, with candidates stating that it meant that you could make cells that remembered so that you knew how to make white blood cells quickly to fight the disease if you got it again, although none used the terminology of a secondary response.

A significant number of those candidates that did not score here accessed the question but did not gain marks because of vague answers eg just referring to white blood cells which was not creditable as it was the answer to part (b).

Question 5 (d) (i)

There were two marks available for the calculation component of this question and one mark for giving the answer to three significant figures. Again, candidates lost marks for dividing or taking away the figures extracted from the table instead of multiplying them. The third marking point could be awarded if the figures from the table were incorrectly used, but the answer was correctly given to three significant figures.

Question 5 (d) (ii)

This question was surprisingly poorly answered with few candidates scoring the available mark. The majority of candidates stated that the reason why the number of people with the disease was reported as numbers of people per million of the population was either to make it more accurate or to make the numbers look less bad to reduce panic and worry in the population. The creditable responses of 'because the size of the population of different countries are different' was rarely seen with the idea that allowed comparisons between countries to be made more easily was not seen at all.

Question 5 (d) (iii)

Candidates that scored here gave good answers that mainly covered the idea that the health care could be different in the different countries, with some being very specific about the number of people in the population being inoculated. In some ways this was not surprising as the news had been full of effect of mass inoculations for Covid-19 would have on limiting the spread of corona. It was pleasing to see that some candidates used the information in the table and related the fact that Norway had the lowest number of people per million with measles, and suggested that this could be because the other countries were closer to each other, or that they were warmer so the measles pathogen spread quicker.

Question 6 (a) (i)

This item required candidates to describe the function of the meristem in the growth of the plant. Disappointingly many candidates suggested that it helped the plant to grow, or this is the part that makes the bananas. Some foundation candidates find it harder to use terms and facts about plant

biology than other parts of the specification, and it is important for teachers to reinforce these areas so that more candidates can access this recall type of question.

Question 6 (a) (ii)

This question addressed part of core practical 1.6, with candidates having to describe how to prepare a microscope slide. This was accessed well by candidates although some marks were not awarded due to vague statements. Basic answers usually gained marks for saying put the cells on a slide, although some hit the idea of using a thin section or a few cells, as well as add a stain. Candidates that score marking point 3 rarely used the term cover slip but gained the mark by stating cover the cells with a small thin bit of glass. A significant number of candidates described how to focus a microscope although the question clearly stated that they had to describe how the student would prepare a micro slide. Some candidates, who scored well, again underlined key words in the questions and it is suggested that teachers train their students to do this as it helps them to focus on the required task.

Question 6 (b) (i)

This question required candidates to name the structure that was labelled structure Z in figure 9.

Some candidates correctly stated it was chloroplast, and it was disappointing that others stated it was a mitochondrion, although it was significantly different to a labelled mitochondrion on the diagram. The other common incorrect structures stated were the vacuole and the nucleus.

Question 6 (b) (ii)

This question also related to figure 9 and asked candidates to give the function of the mitochondrion. It was pleasing to see answers that gave respiration and providing energy for the cell though none of the candidates stated aerobic respiration. Incorrect responses included vague references to move the cell, move around the cell or protect the cell. The last two possible ways of gaining the marks listed in the additional guidance column were not seen.

Question 6 (c)*

This extended open response question addressed the structure of DNA as well as the practical aspect of specification statement 3.6 explain how DNA can be extracted from fruit. There were some excellent answers seen with a clear understanding of DNA structure as well as why steps in the extraction of DNA from fruit are used for example "add detergent to break down the membranes so the DNA can be released". Some candidates only addressed half of the question, either describing the structure or the process of DNA extraction. A common error described using a microscope and very fine 'tweezers' to pull the DNA out of cells. This may suggest that these candidates had not completed 3.6 as a practical and although it is not designated as a core practical is better learnt through experiencing it or at least observing it.

Paper Summary

Based on their performance on this paper, candidates should:

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 key points where changes occur.

Recognise that the word 'explain' means 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 but avoid repeating the information which has already been given and giving vague responses which will not gain credit.

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.

Use scientific terminology accurately where possible in responses.

Always show the working when doing calculations as a mark can be awarded for errors carried forward.

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