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Examiners' Report

Principal Examiner Feedback

November 2020

Pearson Edexcel GCSE

In Biology (1BI0) Paper 2F

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Paper 1BI0/2F is taken by candidates who have followed the GCSE Biology 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 100 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 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 1BI0/2F assesses content from Topic 1 and Topics 6 - 9. The 2019 paper covered areas of the specification including the circulatory system, parasites and mutualists, root hair cell structure, decomposition, enzymes, endocrine glands, type 2 diabetes, respiration, kidney nephron function, kidney failure and transplant, urea, homeostasis, plant transport, the introduction of non-indigenous species, plant cell structure, the laboratory test for protein, and food security related to increased consumption of meat.

The extended open-response questions were based on the effect of light intensity on the rate of photosynthesis and skin structure related to thermal regulation

Questions assessing practical skills included ecological sampling and the effect of light intensity on the rate of photosynthesis.

Mathematical skills tested included interpretation of data from tables and graphs, rates, ratios, percentage difference, rounding up, probability and a BMI calculation.

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 from reading the stem carefully 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 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.

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

GCSE Biology 1BIO/2F

Question 1 (a) (i)

This question required candidates to add arrows to a diagram to show the path that blood takes through the left hand side of the heart. All candidates found this question accessible although some lost marks by drawing double headed arrows, a few drew two arrows correctly and a third in the opposite direction thus negating the mark.

Question 1 (a) (iii) required candidates to draw lines from the pulmonary vein and the left ventricle to each of their functions. Just under half of the candidates scored marks here with more knowing that the left ventricle forces blood towards body organs than knew that the pulmonary vein carried blood from the lungs to the heart, with most wrong answers being that it carries deoxygenated blood. A significant percentage of candidates drew more than one line from each of the pulmonary vein and the left ventricle thereby scoring no marks. As this is a common style of question candidates need to be trained into only drawing one line from each of the first boxes.

Question 1 (b) (i)

This question tested candidates' knowledge of how valves help low pressure blood flow towards the heart, and it was pleasing to see answers describing that they open and close. However none of the responses were extended to say that this stopped backflow / keeps the blood flowing in one direction. This was an explain question with two marks available and candidates should be encouraged to underline the command words in the question, and ensure that explain questions link at least two points together with words like 'because', 'as', 'so' or in this case 'to'.

Question 1 (b) (ii)

This question covered a safety precaution by asking candidates to state why dissection equipment was put into disinfectant. It was disappointing to see candidates state to clean it, as the question stated that the equipment was cleaned and then put into disinfectant. The majority of candidates gained the available marks with most of these stating to kill bacteria, or to stop someone else getting a disease from getting infected by bacteria on the equipment.

Question 2 (a) (i) and (ii)

Candidates were asked to select words from the box to complete sentences about ticks. This was well answered with the majority of candidates scoring both marks available. The few candidates that dropped a mark did so by stating that the ticks were classed as prey or producers.

Question 2 (c) (i)

This item required candidates to recall that the relationship where both organisms gain is termed mutualism. Less than half of the candidates could remember the correct term although some gained the mark by stating symbiosis. Those that did not score here described how the oxpecker and the zebra gained from the relationship.

Question 2 (c) (ii)

Candidates were instructed to complete a food chain by writing zebras, ticks, oxpeckers and grass in the correct order in the boxes. The majority of candidates scored here with a few candidates writing the food chain backwards. As there were arrows linking the boxes from left to right this was unexpected, but the candidates who did this were still awarded one mark as they had written the correct order and it did not state what the arrows meant.

Question 2 (d) (i)

Figure 5 showed a bar chart of the maximum numbers of oxpeckers seen on different types of herbivore at any one time. Candidates had to describe the difference between the maximum numbers on white rhinos and hippos, with a description gaining one mark and quantification gaining the second, for example, stating that there were 5 more oxpeckers on the rhino than the hippo to gain both marks. Candidates scoring 1 mark did not quantify how many more oxpeckers were on the rhino compared to the hippo. A few candidates compared the wrong pair of animals and it is recommended that candidates are trained to underline the key words in the question to help them focus on which data to use.

Question 2 (d) (ii)

This question followed on from the last and was still based on the bar chart, but here candidates had to give a reason as to why there were more oxpeckers on giraffes than on the zebras. This was well answered with the majority of candidates stating that there was more food / ticks on the giraffes with a few stating that it was because the giraffes were larger and so more could 'fit in', with a couple gaining the mark by suggesting that it was because giraffes live near trees so it was easier for the oxpeckers to fly to them.

Question 3 (a) (i)

Figure 6 showed a root hair cell and candidates were asked to label the vacuole. Roughly half the candidates did this correctly to gain the mark with about equal numbers labelling the nucleus or the mitochondrion.

Question 3 (a) (ii)

There were two ways to gain the two available marks to explain how the structure of the root hair cell increases water absorption from the soil. Most candidates that scored stated that the root hair cell had a long thin projection which goes into the soil, though few completed this by saying that this helped the absorption of water by increasing the surface area of the root hair cell. A few stated that the cell wall was thinner, although here also no candidates were able to state that this reduced the distance over which water had to travel to get into the cell.

Question 3 (b) (i)

To calculate the rate of growth of the fungus at 30 °C, candidates had to extract the relevant data from the table and divide the area of fungus: 72 by 5. Half of the candidates did this correctly scoring the two available marks with the other half multiplying the 72 by 5 or dividing 5 by 72 thereby gaining no marks. Candidates need to practice rate calculations as this is an area that still seems to one that causes candidates problems.

Question 3 (b) (ii)

Almost all candidates were able to state simply that as the temperature increases the growth of fungus also increases.

Question 4 (a)

In this question a diagram of a pitfall trap was shown and the stages of a plan on how to use a pitfall trap were given. Candidates had to put the last four stages in the correct order. Almost all candidates managed to do this correctly with a few getting stage 1 and 3 the wrong way round thus dropping one mark.

Question 4 (b) (i)

All candidates could complete the tally table correctly from the diagram, that showed the number and types of invertebrates caught.

Question 4 (b) (ii)

The majority of candidates correctly stated that thirty invertebrates were caught of which 6 were ants, although only half of these managed to give the answer in one of its acceptable lowest forms.

Some candidates cancelled 6 in 30 down to 3 in 15 or 2 in 10, but failed to take this to its lowest form of 1 in 5 thus gaining just one of the two marks available.

Question 4 (b) (iii)

There was one mark available here for showing an understanding that different invertebrates may be attracted to different types of food, which could affect the numbers of different species when 'baiting' a pitfall trap. Some candidates were not awarded the mark as comments that, for example, just stated that invertebrates eat different foods, were deemed to be insufficient as this did not go far enough to explain why some species would be overrepresented and others underrepresented.

Question 4 (c)

The final part of question 4 addressed part of core practical 9.5: calculating the average number of an organism found in a garden. Candidates were given the area of the garden and that a scientist counted the number of snails in four 1 m² areas. The candidates had to state how they would use

these figures to estimate the number of snails in the garden. Some comprehensive answers were seen gaining both available marks with some candidates just stating multiply the number of snails by 40 without finding an average number of snails for the four areas. Candidates who gained no marks commonly described how the scientist collected the data.

Question 5 (a) (ii)

Few candidates were able to recall a target organ for insulin. Those that could, gained the mark by stating the liver or a named muscle, for example, the heart. The common incorrect response was the pancreas. Candidates should ensure that they are answering the question rather than just writing a word that is linked to a key word used in it.

Question 5 (b) (i)

This question required candidates to calculate the BMI of a person by extracting relevant data from a table. The BMI formula was given. The majority of candidates were awarded full marks for their calculation, with a few of these rounding the answer up to 28. Rounding up was not requested but allowed here as the BMI for the other person in the table was stated as a whole number. A few candidates were awarded the evaluation mark if they had not squared the height but had evaluated $110 \div$ by 2.0 correctly.

Question 5 (b) (ii)

This question followed on from part (i) where candidates were asked to describe two lifestyle changes that should be made by a diabetic to control their blood glucose concentration. There were some good answers seen which reflected the BMI information in part (i), namely to lose weight and do more exercise.

Candidates scored marks where they stated the needed to control the sugar content of the diet. Candidates did not gain marks if they simply said have a healthy diet as this should be advice for anyone and therefore deemed to be too vague for credit.

Question 5 (c) (ii) required candidates to explain why the respiration rate changed with different activities. This question was a classic example where some candidates confused the command word, explain with describe. By just stating what the table showed and quoting figures from the table led to zero marks, with a maximum of one mark for MP1 if they managed to link the increase in speed to an increase in the respiration rate. The best answers developed this last point to more speed meant more muscle movement which required more energy.

Question 6 (a) (ii)

Figure 13 showed a diagram of a nephron and 6 (a) (ii) required candidates to explain why the glucose concentration of the filtrate changed from 6 to 0 millimoles per litre. As with many explain questions the first mark can be gained by stating what has happened, and here it was disappointing that candidates did not start with stating that 'the glucose concentration of the filtrate decreased' or 'all of the glucose had gone from the filtrate'. It was pleasing to see answers that developed this to 'where could the glucose have gone?' with the sensible next step of back into the blood / body. With a couple of responses seen saying it was reabsorbed back into the blood which covered marking points 2 and 3. Common errors were to say it had left the body as urine or that it had disappeared.

Question 6 (a) (iii)

This recall question asked candidates to name the structure that carries urine to the bladder. This question was left blank by a few candidates with the rest naming a wide variety of body parts none of which were correct the closest being kidney.

Question 6 (b)

Candidates that scored here gave good clear answers, describing the differences between the two sets of data, with the majority of candidates scoring both marks available mainly covering marking points 1, 2 and 3, with a significant number of candidates scoring 1 mark. This latter group tended to gain their mark by covering marking point 2.

Question 6 (c)

This item required candidates to explain why a twin sister would be a suitable donor for a kidney transplant. This question was well answered with almost all candidates scoring marks by showing a good understanding of the need for tissues to match to reduce rejection, and that the sister would have similar / identical DNA. Some good answers were also seen that were credited as they answered the question, for example, the kidney will be about the same size and that the sister could donate a kidney as they were able to survive as well on just one kidney.

Question 7 (a) (i)

This question required candidates to extract data from the table and calculate the ratio of urea in the sweat of patient A to that of patient B. Those candidates who could express the data as a ratio were mainly able to reduce it to its simplest form to gain the second mark. A few candidates expressed the ratio as patient B to patient A. These lost the first mark but were still able to gain the second mark if they cancelled the numbers down to their lowest form.

Question 7 (a) (ii)

It was disappointing that very few candidates could score on this question with it being rare to find creditable material in responses. Those that did do so gave a good account, with all three marking points in the mark scheme being seen.

Question 7 (b) (ii)

This was the first of the two extended open response questions and asked candidates to explain how structures in the skin helped to reduce body temperature during hot weather. Figure 17 had the salient structures shown and labelled. There were a few good answers that included three germane structures, which gave them access to the higher levels. These candidates, however showed less ability in being able to explain how these responses cooled the body resulting in few candidates gaining the higher mark available within a level.

Question 8 (a)

Some candidates related water lilies having stomata on the top of the leaf to photosynthesis with some suggesting that this was how light or the sun got into the leaf. The majority of candidates who scored here correctly stated that if they were on the underside they would be in contact with water, with a few extending this to say that therefore there would not be gas exchange, often as simply as saying that the water would stop carbon dioxide from getting in.

Question 8 (b) (iii)

Candidates were asked here to describe how sugar is transported from the leaves of the water lily to its flowers. It was deemed that through the stem was a reasonable alternative in the phloem as it answered the question which is where most of the candidates, who score here gained their mark. Other candidates gave a good account covering in the phloem, by translocation with one candidate adding by active transport as well.

Question 8 (c) (i)

Candidates were able to access this question more fully with an understanding that the water lilies now covered much of the lakes surface through growth, with many of them stating asexual and sexual reproduction, explaining that the water lily seeds would be spread over the large distances. Some candidates extended this to this was because the conditions in the lake supplied what they required to grow, and that there were not many things there to eat it.

Question 8 (c) (ii)

This question followed on from part (i) and asked how the water lilies will have affected the biodiversity of the lake. It was disappointing that a large proportion of the cohort did not say that the biodiversity had increased or decreased. This is an area where teachers can help candidates to understand that if a question asks about how something is affected then a mark is probably going to be awarded by stating that the quality will go up, go down, or stay the same. This will help the candidate to be able to then explain why their chosen alternative happens. Candidates who stated that the biodiversity increased were credited with a mark if they gave a valid reason why the increase occurs.

Question 9 (a) (i)

The majority of candidates correctly calculated the mean number of starch grains in potato cells P, Q and R to gain the available mark.

Question 9 (b) (i)

This calculation where candidates were asked to calculate the percentage difference in the mean length of starch grains was more challenging, with most unable to extract and find the difference ($50 - 30 = 20$) from the relevant data in the table. About half of those that did, then stated 20%, as their answer, instead of the correct 40% not noticing that the 20 μm change needed to be compared to 50 μm .

Question 9 (b) (ii)

Candidates tend to be good at which variables to control in an investigation, and plenty of good answers were seen mainly covering temperature and mass / size of potato. A few suggested light intensity which was not credited as the question stated twice that the potatoes were stored in the dark. Time was also not accepted as this was the independent variable.

Question 9 (b) (iii)

This question informed the candidates that the starch was converted to glucose by the potatoes. Candidates were then asked to state why the potatoes needed glucose. Whilst a few candidates stated for respiration / energy most candidates said to grow which was deemed to be secondary point and thereby not creditworthy.

Question 9 (c)

Again there was a large disparity between the responses seen with an answer that clearly showed an excellent understanding of core practical 6.5 (investigate the effect of light intensity on the rate of photosynthesis) on which this question was based. Candidates were given a diagram of the equipment they could use with the pondweed already under an inverted funnel with bubbles being collected. Candidates were asked to devise a plan to investigate the effect of light intensity on photosynthesis and state variables that need to be controlled. It was disappointing therefore that a significant proportion of candidates simply described the equipment in the diagram, with a few of these just accessing marks by stating that the light should be put at a distance away from the pondweed. Good answers included a basic account of moving the light to different distance from the pondweed and counting the bubbles produced in a minute for each distance. With differing degrees of success in controlling variables, which mainly covered controlling the ambient light, controlling the temperature, or using the same amount of pondweed.

Question 10 (a)

This question is related to the growing problem of the increase in the world human population. Candidates were required to read data for the year 2015 from the graph supplied and then calculate the number of people that are classified as malnourished. Candidates were told that 13% of the world population are classified as malnourished.

The majority of candidates correctly read the number of people from the graph but some of these got no further giving all 7 billion as undernourished. A few candidates converted their answer of 0.91 billion to 910 000 000 correctly, but then wrote it on the answer line thus saying that 910 000 000 billion were undernourished and so only gained one of the two marks available.

Question 10 (b)

Candidates were asked to describe the laboratory test for protein. The majority described either the test for reducing sugar or starch with a small percentage gaining marks by stating that food is added to Biuret solution, and if there is protein in the food the biuret turns purple.

Question 10 (c)

This was the final calculation of the paper and asked the candidates to calculate the rate of increase in the mass of meat eaten in the world from 2000 to 2010. Many candidates could state the increase in the mass (50 million tonnes) by reading amounts within the tolerance allowed from the graph and subtracting the 2000 figure from the 2010 figure. However, only a few were able to then convert this into a rate for the ten-year period by dividing by 10.

Question 10 (d) (i)

This question was not answered as well as we expected with candidates only gaining a mark by stating that the cattle ate the plants. Candidates were not able to access ideas about the cattle having less energy than the plants and as such could not access the reasons why this is the case.

Question 10 (d) (ii)

This question was also poorly answered. Candidates had to explain how the increase in the amount of meat eaten will decrease food security in the future. Most candidates stated that if we eat all the meat now there will not be any left for people in the future. This is a later specification statement and therefore it is possible that it was not covered in sufficient detail if at all in the year when schools had seen considerable disruption.

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.

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.

Spend more time practising the different types of calculations that are set eg rates and percentages. A full list of the types of mathematical skills expected is listed in appendix 1 in the specification.

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 answers, and ensure that all parts of the question have been addressed.