Pearson Edexcel

Examiners' Report

Principal Examiner Feedback

January 2021

Pearson Edexcel International GCSE

In Biology (4BI1) Paper 2BR

Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications are awarded by Pearson, the UK's largest awarding body. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information visit our qualifications websites at www.edexcel.com or www.btec.co.uk. Alternatively, you can get in touch with us using the details on our contact us page at www.edexcel.com/contactus.

Pearson: helping people progress, everywhere

Pearson aspires to be the world's leading learning company. Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: www.pearson.com/uk

Grade Boundaries

Grade boundaries for all papers can be found on the website at: https://qualifications.pearson.com/en/support/support-topics/results-certification/grade-boundaries.html

January 2021
Publications Code 4BI1_2BR_2101_ER

Introduction

This January series was the fourth opportunity for students to take the new reformed Edexcel International 9-1 GCSE.

The examining team commented on the knowledge and understanding shown by many of the students on this January's papers. Some students were able to apply their knowledge and understanding of biology to analyse and evaluate data and information from unfamiliar contexts and experiments. Schools have worked hard to prepare students for the examination, and this was reflected in the responses of these students. There was little evidence of students being short of time on this paper. A small proportion of students did, however, leave some items unanswered.

Question 1 provided students with a passage about haemolytic disease. Haemolysis is the term used to describe the bursting of red blood cells. Haemolytic disease occurs when the red blood cells burst in the body of a foetus in a pregnant woman.

In Q1(a) students were asked to explain why bursting of red blood cells affects the development of a foetus. Many students were able to explain that less oxygen could be carried so less energy would be released by respiration.

In Q1(b) students were required to describe how the dominant allele leads to the production of RNA during protein synthesis. Many students were familiar with this specification content and could describe how the DNA unzips and one strand is used as a template and is copied into mRNA during transcription.

In Q1(c) most students could give the reason why proteins cannot be made by red blood cells stating the absence of a nucleus or ribosomes.

In Q1(d) students could often give the reference to antibodies being able to pass across the placenta as the evidence from the passage that shows that antibodies are smaller than red blood cells.

In Q1(e) most students were able to give the genotypes of the mother, the father, their gametes and the possible genotypes of the child and the probability that the child will be rhesus positive. Some students failed to gain full credit by not clearly showing the gametes in their answers.

In Q1(f) students were asked to explain why the concentration of the rhesus antibody in the mother's blood rises quickly to harmful levels if she has a second child who is Rhesus positive. The many good responses explained that memory cells would remain in the mother's blood and bind with the antigen leading to a secondary immune response in which large quantities of antibodies are quickly produced.

In Q1(g) many students could correctly suggest what is meant by the term *in utero.*

Finally, in Q1(h) many students could identify the correct blood group of the source of the cells used for a transfusion.

Question 2 described an experiment in which a student investigates the rate of evaporation from a clay pot and the rate of transpiration by a plant. The results of the investigation were given in a table.

In Q2(a)(i) students were asked to explain the changes in the rate of evaporation from the clay pot. The best responses explained that increasing temperature during the day would increase the rate of evaporation by increasing the kinetic energy of the water molecules and making it more likely that they will change from liquid to gas. In Q2(a)(ii) students were required to suggest how the student could measure the rate of evaporation from the clay pot. The method would be similar to that used in a bubble potometer, one of the required practicals in the specification. Students could describe how the distance moved by a bubble could be read from a scale or the volume of water lost from the beaker could be measured in a specific time and used to calculate the rate of water loss.

In Q2(b)(i) the better responses could explain one factor that affects transpiration from the plant that does not affect evaporation from the clay pot. Suitable factors were light intensity or carbon dioxide concentration as these would affect stomatal opening. In Q2(b)(ii) students had to draw a labelled diagram of the apparatus the student could use to determine the rate of transpiration by a plant. As this is a required practical experiment from the specification, some excellent labelled diagrams of a potometer were seen. Some students failed to earn credit by not labelling their diagrams. Examples of both bubble potometer and mass potometer were seen.

Question 3 concerned the hormones FSH and LH, involved in the regulation of the menstrual cycle.

In Q3(a) most students were able to identify the pituitary as the correct source of the hormones.

In Q3(b) students had to calculate the percentage increase in the concentration of LH in the blood from when the woman is unlikely to become pregnant to when the woman is likely to become pregnant. As is often the case with percentage calculations, some students did not realise that an eightfold increase would represent an increase of 800%.

In Q3(c) many students could correctly describe the roles of the hormones FSH and LH.

Question 4 provided a diagram of the nitrogen cycle.

In Q4(a)(i-iii) most students could correctly identify the processes labelled in the diagram. Also, in Q4(a)(iv) most responses could name a type of organism that carries out process C.

In Q4(b) an investigation was described to determine if nitrate ions are required for plant growth. In Q4(b)(i) some students could correctly explain why the control solution contains all the mineral ions the plant requires but the test solution contains all the mineral ions the plant requires except nitrate. In Q4(b)(ii) many students could state the purpose of step 5 to remove any nitrates from the cylinder. In Q4(b)(ii) many students could explain that light is excluded from the tubes to prevent algal growth. In Q4(b)(iv) students could often explain the measurements that the student could make to determine if nitrate ions are required for plant growth. Suitable correct answers included measuring the height of the seedlings in the control and test solutions using a ruler.

Question 5 provided information about cloning.

In Q5(a) almost all students could correctly calculate how many attempts would have been needed to produce 50 cloned sheep.

In Q5(b) students were required to describe the stages used to clone a male dog. Those students that were familiar with the specification content could easily apply their knowledge to this context and obtain full marks. Some responses confused the process used to clone Dolly with the context here.

In Q5(c) students were given information about how pet owners can now pay scientists to use cells from their pet to produce a clone. The students were asked to use the information in the question and their own knowledge to comment on whether cloning of pets is a good idea. The best answers included comments that cloning can produce a genetically identical clone that will have similar appearance. Cloning can be used before the pet dies so may stop the owner grieving. However, the process is very expensive, and the clone may behave differently as environment affects the phenotype. The clone may also have a shorter life expectancy than a normally produced animal.

Question 6 gave students diagrams showing pyramids of biomass for a crop field ecosystem and for a coral reef ecosystem.

In Q6(a)(i) most students could correctly calculate the efficiency of the transfer of biomass from producers (P) to primary consumers (C1) in the coral reef. Also, in Q6(a)(ii), most students could calculate the biomass of the secondary consumers in the crop field in g per m^2. In Q6(a)(iii) many students could correctly suggest why the biomass transfer is different in the coral reef compared to the crop field with reasons such as less heat is lost in an aquatic food chain.

In Q6(b) diagrams of pyramids of biomass for an ocean and a lake were given. In Q6(b) students were asked to explain the shape of the pyramid of biomass for the ocean. Most responses explained that the biomass of the producers was less than the consumers but only the best could offer a reason why. The best answers explained that each producer may have a low biomass but that their rate of reproduction means they are continually being replaced.

In Q6(c) many students could suggest how scientists could estimate the energy of the producers in 1 m^2 of the crop field. The best answers suggested using quadrats and burning the plants to release their energy using calorimetry.

Question 7 gave information about human kidney function.

In Q7(a) many students could use the information and the formula provided to calculate the minimum volume of urine that must be produced each day.

In Q7(b) almost all students could name another organ that carries out excretion in the human body.

Finally, in Q7(c) students were asked to explain the role of the nephron in osmoregulation. Some excellent answers gained full credit for explaining how osmoreceptors in the hypothalamus detect an increase in blood concentration and this leads to the pituitary glands secreting ADH. The ADH increases the permeability of the collecting duct wall so more water is reabsorbed into the blood. This means that a smaller volume of more concentrated urine is excreted, reducing blood concentration and through negative feedback stopping ADH production.

Summary

- Based on their performance on this paper, students are offered the following advice:
- ensure that you read the questions carefully and include sufficient points to gain full credit.
- in discuss and comment items include as many points as there are marks available and remember to use all the information in the question and your own knowledge.
- make sure you have practiced calculations especially percentage calculations and know the relationship between units.
- show all stages of working in calculations, so that if the final answer is incorrect some credit can still be gained.
- write in detail and use correct and precise biological terminology.
- ensure that you are familiar with all the content, including the practicals included in the specification.

Pearson Education Limited. Registered company number 872828
with its registered office at 80 Strand, London, WC2R 0RL, United Kingdom