Pearson
Edexcel

Examiners' Report
Principal Examiner Feedback

January 2022

Pearson Edexcel International GCSE
In Biology (4BI1) Paper 1BR and Science
(Double Award) (4SD0) Paper 1BR

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

January 2022
Publications Code 4BI1_1BR_2201_ER

General Comments

The examiners were impressed by the high standard of many scripts. Many students had clearly prepared very thoroughly for the examinations and demonstrated impressive, detailed knowledge and understanding of most topic areas. Many centres have come to terms with the requirements of the new specification and are preparing the students carefully. Some students did, however, not provide sufficient depth and detail for some topic areas. Students should ensure that they cover all aspects of the specification thoroughly and be confident in the use of scientific terminology and vocabulary. Mathematical skills were generally very good, although some students found it difficult to calculate a mean rate of increase from data. Graph skills are a strength of many students, although a number of weaker students did not label graphs, selected non-linear scales, and/or only plotted one data series. Experimental planning was often very strong with most students being able to gain some credit when asked to plan an investigation. Some students find the longer questions that often require discussion or evaluation of data challenging. When approaching this style of question, students should try to explore all aspects of the data and the design of the experiment. It is often important to identify data patterns that both support and do not support a conclusion.

Question 1

(a) (i) Most students were able to correctly identify that there were two secondary consumers in the food web. Some students incorrectly stated that there were three.

(ii) This question asked students to identify the longest food chain. Most were able to identify the longest chain that had five organisms. Some students drew a food web or gave a food chain with only four organisms.

(iii) This question tested the students' knowledge of how energy is lost along food chains. Many were able to correctly give at least two ways in which energy is lost, most commonly through matter that is not consumed, indigestible parts and respiratory losses. A significant number of students incorrectly referred to the excretion of faeces and others incorrectly stated that energy used in growth is lost from food chains.

(b) Many students gained at least three marks on this question with a significant number gaining all four. The question assessed understanding of the process of natural selection. Only stronger students recognised that the shape of the ears and body would increase the surface to volume ratio. Many referred to improved survival and reproduction, but some students did not read the context of the question and assumed that the body shape would enable the fennecs to escape predators. Many students recognised that mutations would lead to genetic variation and that alleles are passed on to offspring. Students should be careful to give detail in answers; for example, they should refer to genetic variation rather than just variation and should refer to the passing on of alleles rather than characteristics.

Question 2

(a) (i) Most students were able to correctly identify the labelled structure as the cornea although a few thought it was the conjunctiva.

(ii) This question was well answered with many students recognising that when looking at close objects, the ciliary muscles contract and the suspensory ligaments are slack. A significant number of students incorrectly recognised that the ciliary muscles would contract but thought that the ligaments would go tight.

(iii) Many students correctly stated that the pupil would dilate. Only stronger students went on to correctly state that the circular muscles would relax and the radial muscles dilate. A significant number of students referred to the structure Y as dilating – Y was labelling the iris rather than the pupil.

(b) (i) This question required students to calculate the difference in impulse speed between a person with MS and a person without MS. Many students showed an excellent understanding of how to do the calculation with many gaining all three marks. Most were able to calculate the speed. The main error seen was not converting the distance unit that was given in centimetres into metres.

(ii) This question was found to be very challenging by many students. A significant number did not recognise that the synapses would cause a delay due to the chemical diffusion of neurotransmitters. Many stronger candidates did give excellent answers and gained both marks.

Question 3

(a)(i) Most students were able to correctly identify the mitochondria as the sites of aerobic respiration. A few students stated that ribosomes were responsible for aerobic respiration.

(ii) It was pleasing to see that most students correctly identified chitin as the substance found in fungal cell walls. The most frequent incorrect answer given was cellulose.

(iii) Most students recognised that the cell membrane is found in both prokaryotes and eukaryotes although a significant number of students suggested that mitochondria are found in both.

(b)(i) This question required students to calculate the percentage increase in height of dough in a measuring cylinder. Most were able to complete the calculation and correctly state an increase of 80%. The most common error seen was to divide 20 by the wrong number.

(ii) Many students showed an excellent understanding of the process of bread making with many gaining both marks. Most understood that yeast respiration releases carbon dioxide gas which becomes stuck in the dough. Weaker students often gave vague answers about enzymes being active and/or referred to the production of oxygen gas.

(iii) This question was well answered by many students. Most recognised that the yeast would respire at a faster rate due to an increase in kinetic energy and collision frequency of particles. Some students gave vague answers about enzyme activity but did not go on to explain how temperature would affect the enzymes.

(iv) Similarly, to part (iii), this question was well answered by many students. Good answers referred to denaturation of enzymes and the effect on the shape of the active sites. Weaker answers often referred to the denaturation of yeast or the death of enzymes – students should be careful to use terminology accurately.

Question 4

(a)(i) Many students correctly stated that food passes down the oesophagus by the process of peristalsis and that this occurs due to muscle contractions. Where students did not gain credit, it was frequently for describing the physical breakdown of food and production of saliva. It is important for students to read questions carefully so that they give answers that are fully relevant.

(ii) Most students correctly stated that the liver is the site of bile production. The most frequent incorrect answer chosen was the gall bladder.

(iii) This question was generally answered well with many students correctly referring to the roles of bile in the emulsification of fats, and the neutralisation of acid to create an optimal pH for enzymes. Students should be careful to give answers that are precise. Many referred to optimal conditions rather than an optimal pH for enzymes. A significant number of students also referred to bile reducing the surface area rather than increasing it.

(b)(i) Many students found this calculation very challenging with only the strongest gaining both marks. A significant number calculated the mean pH rather than the change in pH and few divided the change in pH by 20 minutes.

(ii) A surprising number of students did not state that lipase digests fats into fatty acids and glycerol. Stronger answers referred to the digestion of fats and how the fatty acids produced would neutralise the alkali. Many students just quoted numbers in their answers – students should be careful to describe data patterns rather than simply quoting numbers.

(iii) Many students found this longer, discussion question challenging, although most gained at least one mark, with many going on to gain four or five. The question required students to recognise that the lipase inhibitors did seem to reduce blood lipid concentrations although there was an increase in abdominal pain. Stronger answers recognised that one person had abdominal pain without the inhibitors so the pain may be due to the oil. Strong answers also considered the experimental design as well as the data, often stating the low sample size and lack of information about the people involved (e.g. mass, age, health state). When answering these longer questions students should be careful to explore all data patterns and aspects of experimental design.

Question 5

(a)(i) This question was well answered by many students with a significant number stating that oxygen would be needed for respiration. Some students simply stated that the air is needed for respiration – students should be careful to give precise and accurate answers.

(ii) Many students gained both marks for this question. Most correctly stated that the fermenter is cleaned with steam to kill off other microbes which would cause contamination or compete for nutrients. Only a few recognised that steam condenses to water which would not have toxins that would contaminate the product. Weaker answers gave vague references to removing other organisms rather than microorganisms.

(b) (i) Graph drawing skills were generally excellent with many gaining all five marks. Common mistakes included: not selecting linear scales that used at least half of the grid, not labelling axes, not adding a key, and not joining points with straight lines.

(ii) Stronger answers to this question described the time periods that the GM fungus produced a higher yield and went on to state when the non-GM fungus produced a higher yield after 20-30 minutes. Students should use precise data points in their answers and identify turning points, or points at which data patterns change.

(iii) This question generated many excellent answers with many students gaining all five marks. Many students correctly identified the reduced fat and cholesterol in mycoprotein would lead to reduced heart disease and obesity. Most also recognised that less protein would reduce growth. Many also correctly stated that more fibre would reduce constipation and that more calcium would improve bone strength. Fewer students explained how less iron would reduce haemoglobin production – students should be careful to refer to 'red blood cells' in this context rather than just 'blood cells.' Weaker answers simply quoted data or did not give a health implication of having more or less of a nutrient.

Question 6

(a)(i) Many students correctly identified the ovary (B) as the site of ovulation. A few students suggested that the oviduct (A) is where ovulation occurs.

(ii) Most students recognised that the oviduct (A) is where fertilisation usually occurs, although a number of students referred to the uterus (C).

(b) (i) Most stronger answers correctly identified the hormones as oestrogen and progesterone. A significant number of students referred to FSH and LH – the question stated that both hormones were released from the ovary. Students should also note that FSH and LH are emboldened on the specification and so are not assessed on paper one.

(ii) Few answers gained both marks although many correctly referred to the role of oestrogen in repairing the uterus lining. A significant number incorrectly referred to the maturation of egg cells and the maintenance of the uterine lining. Some students did not read the question carefully and discussed the role of oestrogen in producing secondary sexual characteristics.

(c) This question required students to look at the diagram of the developing embryo and placenta and explain how its structure enables efficient exchange. Many students gave a description without stating how the structure enables efficient exchange. Strong answers related the villi to a large surface area, the good blood supply with the maintenance of a diffusion gradient, and the thin wall with a short diffusion path. Students should take into account the requirements of command words such as describe and explain.

Question 7

(a)(i) This question required students to use their knowledge of heart function to explain why cats with less elastic heart ventricle walls are unable to run quickly. Strong answers referred to reduced pumping of blood, lower transfer of oxygen to muscles, and reduced respiration. Students should be careful to give precise answers, for example, the context of the question required them to state that there would be reduced oxygen supply to muscles rather than just to the body.

(ii) This question drew a wide range of responses. Correct answers stated that dominant alleles are always expressed or that only one copy is needed. Many vague answers were seen, with many stating that dominant alleles can be expressed rather than stating that they are always expressed.

(iii) Many students produced accurate, well set out genetic diagrams. A significant number of students did not give the final phenotypes – students should always indicate the phenotypes of all the offspring. Students should also be encouraged to set out diagrams neatly and to give a key for the alleles. They should also clearly indicate the parental phenotypes and the gametes. The examiners also noted that a significant number of students presented crosses that indicated sex linkage – this is not a topic that is covered by this specification.

(iv) Many students correctly calculated the probability of producing a male cat with hypertrophic myopathy. Some students did not multiply the probability of producing a cat with hypertrophic myopathy with the probability of producing a male cat.

(b) This challenging question generated some excellent answers. Many students explained that dominant alleles will always be identified by examining the phenotypes but that recessive alleles can be present but not expressed. Weaker answers often referred to the numbers of the two alleles in populations.

Question 8

(a) (i) Most students were able to correctly write down the balanced chemical equation for photosynthesis. Where students did not gain both marks, it was often for giving the equation for respiration, giving a word equation, or for giving an incorrect formula for glucose.

(ii) Most students recognised that reliability would be improved by carrying out more repeats and / or calculating means.

(iii) This question asking students to identify the dependent variable was found to be surprisingly challenging by many students. A significant number gave control variables and others referred to the distance of the lamp (which was the independent variable). Students should be familiar with the terms 'independent variable', 'dependent variable' and 'control variable'.

(c) Many students found this question challenging, but most were able to gain at least one mark with the strongest gaining three or four. The question asked for an explanation of why moving a lamp further from pondweed increased the time taken for leaf discs to rise to the top of a syringe. Many students just gave a description of the graph rather than explaining the pattern seen. Strong answers explained that as distance increased, the light intensity decreased and so the photosynthesis rate and oxygen production would decrease. The strongest answers recognised that other factors must have been limiting the rate when the lamp was closest. The graph clearly had two phases – students should try to explain all aspects of data in their answers.

(d) This question asked for a description of how to test a leaf disc for the presence of starch. Most students gained at least one mark with many gaining all three. Students are now very familiar with this method and it is clear that many centres are preparing practical skills thoroughly. A few students gave incorrect colour changes for iodine.

Question 9

(a) This calculation question was well answered with many students gaining at least one mark. A significant number did not gain the second mark as they gave their answer to three significant figures. Students should be careful to appreciate the difference between significant figures and decimal places.

(b) This question required students to evaluate the environmental impact of anaerobic digesters compared with other methods of waste disposal when presented with data about the gases produced. The question asked for students to use the data and also their own knowledge. Many excellent answers that gained four or five marks were seen. Strong answers identified that the digesters produced less carbon dioxide, methane, and carbon monoxide and went on to explain the benefits of this. Strong answers also discussed the impact of increased sulfur dioxide from the digesters on acid rain production. Weaker answers simply stated the masses of gases produced without any explanation. There was some confusion regarding which of the gases were greenhouse gases and which caused acid rain.

Question 10

(a)(i) Most students were correctly able to identify Q and R as the trachea and bronchus respectively. Some students confused bronchioles with the bronchus.

(ii) This question required students to explain how the diaphragm enables people to exhale. Stronger answers referred to the relaxation of the diaphragm, its movement upwards causing a reduction in volume, and an increase in pressure. Weaker answers confused exhalation with inhalation or gave vague references about the diaphragm contracting and relaxing but with no indication as to which one occurs during exhalation.

(b) In this question, students were presented with a graph to show the volume of air exhaled over time by people with lung disease compared with unaffected people. Strong answers identified that the lung disease reduced the volume of air exhaled and the speed at which it was exhaled. Many answers went on to explain that less oxygen would be taken into the blood and delivered to muscles resulting in lower respiration rates. Many also correctly stated that carbon dioxide would not be removed as rapidly. Weaker answers often gave descriptions of different types of lung disease.

Question 11

This experimental planning question generated many excellent answers that gained more than four marks. Strong answers gave full descriptions of how light intensity would be varied, gave factors about the woodlice that would be kept constant, referred to repetitions and explained how rate of movement would be determined. Correct relevant abiotic factors that were listed as control variables included temperature, food and humidity. Students should be reminded that, although it is excellent exam practice to plan the investigation using CORMS, they should write out the experiment as well.

Paper Summary

In future series, students should try to:

- ensure that scientific language and key terms are used accurately
- understand what each command word requires
- ensure that they have a knowledge of every topic area in the specification
- discuss all data patterns and experimental design when answering longer discuss and evaluate questions
- give clear details when answering six-mark experimental planning questions.

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