Pearson Edexcel

Examiners' Report
Principal Examiner Feedback

November 2024

Pearson Edexcel International GCSE
In Biology (4BI1) Paper 2B

Overall paper comments

The examiners were impressed with the high standard of many of the scripts. It is clear that candidates and centres are preparing well for the exams. Most candidates demonstrated detailed factual knowledge and used technical vocabulary confidently. A few candidates underestimated the level of technical knowledge required at GCSE – it is important that candidates have a full understanding of all terminology used in the specification. Mathematical skills and data interpretation were strong with most candidates being able to extract and interpret data from both tables and graphs. Practical skills were very good, although a few candidates did not fully understand the meaning of terms such as 'reliable' and 'dependent variable'. It is important that candidates understand the differences between terms such as, reliable and accurate and can identify the different types of variable. Most candidates are now very familiar with the command words used in questions but some could benefit from being clear about the distinction between 'explain' and 'describe'.

Question 1

Paper 2 always starts with a comprehension style question and the passage sets a context for the questions. This comprehension focused on the treatment of kidney disease by both dialysis and transplantation and had questions from the excretion and transport sections of the specification.

1(a) This question required candidates to state two waste products released by the kidney. Most candidates were able to gain at least one mark, typically identifying urea. Many went on to gain a second mark by stating that water or salts are also released. A common error was to suggest that carbon dioxide is an excretory product of the kidneys.

1(b) This question asked candidates to suggest two reasons why a transplant is a better solution for kidney failure than dialysis. Many candidates gained at least one mark, typically for stating that a transplant is permanent, will require fewer hospital

visits, or would mean that patients could have a more normal diet. A number of candidates restated the question stem, referring to convenience and time taken; candidates should make sure that they read all parts of the question - in this case, the question asked for 'other' reasons.

1(c) This question asked candidates to describe how the immune system responds to disease. The question was well answered by many candidates with most referring to at least one type of white blood cell. Many also correctly stated that disease could be caused by bacteria or viruses. Strong answers gave the specific functions of phagocytes and lymphocytes. Some candidates confused the roles of phagocytes and lymphocytes – it is important that candidates are fully familiar with all aspects of the specification.

1(d) Most candidates gained at least one mark for this question. Most correctly stated that relatives would have similar genotypes, but fewer went on to give a consequence of this, such as the presence of similar antigens. The command word used was 'explain' and this requires a reason so pure descriptions do not get full credit.

1(e)(i) This calculation required candidates to calculate two percentage changes and complete a subtraction. Many candidates demonstrated excellent mathematical skills and gained all three marks. The most common error was division by an incorrect number when calculating the percentage change. The calculation of percentages and of percentage changes are commonly used maths skills – candidates should be fully familiar to how to carry them out.

1(e)(ii) This question required candidates to use their knowledge to suggest why there are more transplant organs from deceased people rather than living people. Many candidates gained the mark, usually for stating that living people may not wish to undergo surgery, or that they still need one kidney to live.

1(f) Most candidates were able to correctly suggest what is meant by 'a suitable kidney'. Most stated that the kidney would be a good tissue match or would be fully healthy and functioning.

1(g) This last question required candidates to explain why there is a demand for kidneys from certain ethnic groups. Most candidates were able to gain at least one mark for correctly stating that these groups may be more prone to kidney disease and that there are currently fewer donors.

Question 2

This question focused on core practical 2.33B (investigate the energy content in a food sample) and the role of different nutrients in a balanced diet. Candidates should have a full understanding of all the core practicals listed in the specification along with full understanding generic practical skills.

2(a) Many candidates found this question challenging but a significant number gained all three marks. Most recognised that the change in temperature of the water would need to be calculated. Good answers went on to state that the temperature change is multiplied by the specific heat capacity of water and the volume of water. Some candidates incorrectly suggested multiplication by the mass of the grain. Many candidates gained all three marks by giving the correct formula. A common error was for candidates to describe the method – the question asked for how the *measurements* would be used, not how the apparatus would be used.

2(b) Most candidates correctly stated that the experiment would need repeating to improve reliability. A few candidates incorrectly referred to the use of different thermometers and / or methods that would improve accuracy. Candidates should also be careful not to suggest repeats with other values of the independent variable, e.g. repeat with other types of grain – this would not improve reliability.

2(c)(i) Many candidates found this question challenging. The strongest answers correctly referred to the large surface area of the coiled tubing and the improved transfer of heat from the tube into the water. A common error was for candidates to refer to diffusion of gas from the tube into the water. Candidates should look at experimental designs carefully and give answers relevant to the question.

2(c)(ii) Many candidates were able to correctly state that the addition of oxygen would ensure that combustion was complete. Common errors included simply stating that oxygen allows burning rather than the idea that the grain is completely burnt.

2(d)(i) This question assessed candidates' mathematical skills and asked them to calculate the mass of protein in 65 g of rice. Most candidates gained both marks. Where candidates lost marks, it was typically for not multiplying by 65.

2(d)(ii) This extended answer was generally well answered. The question asked candidates to comment on the suitability of each type of grain for long distance running. To gain full marks, candidates had to make a comment about the suitability of each type of grain. Most candidates were able to identify one feature of at least two types of grain with many gaining all four marks. Some candidates did not recognise that the question asked for each type of grain and made general comments about the grains or simply ranked them in order of which was best.

Question 3

This question focused on the areas of specification about stem cells and the functions of blood cells.

3(a) In this first part of the question, candidates had to describe how stem cells differ from other body cells. Many candidates gained at least one mark with a significant number gaining both marks. Most correctly stated that stem cells are

undifferentiated and that they can divide by mitosis to produce specialised cells. A few candidates confused the terms differentiated and undifferentiated.

3(b) This question asked candidates to describe the function of platelets. Many candidates correctly stated that platelets clot blood, prevent further infection, and prevent further blood loss. Where candidates did not gain at least two marks it was typically for confusing platelets with red blood cells. Some candidates did not use precise vocabulary – for example the specification refers to blood clots rather than scabs, and preventing entry of infectious microbes is a more precise answer than referring to preventing disease.

3(c) This question was well answered by many candidates although some candidates did not use enough specific detail. Strong answers referred to the presence of attenuated viruses, dead bacteria or antigens in a vaccine, stated that memory cells are formed by lymphocytes and went on to describe the secondary immune response producing more antibodies. Some candidates confused the terms antigen and antibody. Some candidates incorrectly only referred to a primary immune response and some referred to antibody release but did not state that they would be released faster or in more quantities.

3(d) This question was found to be quite demanding by many candidates. Candidates were given information about sickle cell anaemia and leukaemia and asked how the use of stem cells could treat these diseases. Strong answers stated that the stem cells could be used to produce a variety of named blood cells and went on to give the functions of those blood cells. Weaker answers often gained one mark for suggesting that different blood cells could be produced but then simply restated the question stem by stating that the cells could be used to treat the diseases.

Question 4

This question focused on thermoregulation in the coordination section of the specification. Candidates were asked for factual information about thermoregulation and presented with data about the rates of sweating during exercise.

4(a)(i) and **(ii)** These two multiple choice questions required candidates to identify a sweat gland and a capillary – most candidates gained both marks.

4(a)(iii) This question asked candidates to describe the changes that take place in the blood vessels in the skin when moving into a hot environment. Many candidates gave excellent answers that referred to and described vasodilation and the increased blood flow to the skin surface. Common errors included: referring to vasoconstriction and suggesting that the blood vessels move to the surface rather than the flow of blood.

4(b)(i) This question asked candidates to identify the dependent variable in the investigation. Most correctly stated that the rate of sweating was the dependent variable. The most common error was to give the independent variable – the speed of running.

4(b)(ii) This calculation required candidates to identify a point on a graph and use it to produce the volume of sweat produced in 15 minutes. Most candidates were able to use the graph and complete the calculation to gain all three marks.

4(b)(iii) This longer, extended answer required candidates to look at the results of the investigation and discuss the findings. In discussion questions candidates should explore all aspects of the data. Strong answers recognised that increased running speed increased sweating and that sweating was also faster in the hot, humid conditions. The strongest answers also recognised that the gradient of the increase in sweating was similar for both conditions. Strong answers also went on

to suggest explanations for differences in sweating, such as the increased heat from muscle contraction and the reduced evaporation of sweat in humid conditions. Many candidates also gained a mark for considering the experimental design, e.g. the lack of replicates.

Question 5

This question was a gap fill exercise focused on mammalian cloning. Most candidates gained at least four marks with many gaining all seven. Common errors included referring to a zygote rather than an embryo and just referring to genes rather than nuclei. Candidates should be fully familiar with all the detail in the specification.

Question 6

This question focused on Topic 4 (Ecology and the environment) from the specification and required candidates to discuss the effects of overapplication of fertilisers and the effects of carbon monoxide gas.

6(a)(i) This question asked candidates to explain why adding extra fertiliser does not always increase crop yield. Strong answers stated that the crop was already taking in the maximum amount or that other factors would be limiting the growth. Weaker answers gave vague statements that often restated the question stem about fertilisers not always increasing growth.

6(a)(ii) This extended answer question required candidates to explain the biological consequences of applying excess fertiliser and water. Many excellent answers were seen that gave outstanding detail and it is clear that many candidates have an excellent understanding of the process of eutrophication. The best answers considered the impact of waterlogged soil on oxygen levels, respiration and active transport and then went on to explain how run-off of fertiliser into water bodies would lead to eutrophication and its consequences. Many answers included

excellent, detailed description of algal blooms, over competition for light, decomposition and loss of oxygen.

6(b) This question asked candidates to describe the effect of carbon monoxide poisoning on humans. Strong answers correctly referred to the formation of carboxyhaemoglobin and went on to explain that oxygen carriage would be reduced. Weaker answers tended to simply refer to carbon monoxide being a poisonous gas and gave no specific details.

6(c) This multiple-choice question required candidates to identify a gas that is not a greenhouse gas. Most candidates correctly identified nitrogen with the most common incorrect answer being nitrous oxide.

Summary comments

In future series candidates should:

- Make sure that they are fully familiar with all core practicals listed in the specification
- Be fully familiar with all practical terminology, such as accuracy and reliability
- Understand what each of the command words listed in the specification requires
- Ensure that they use detailed vocabulary precisely and accurately
- Explore all aspects of data when presented with data for extended answer questions.