Examiners' Report
Principal Examiner Feedback

Summer 2019

Pearson Edexcel Advanced Subsidiary In Biology (8BN0) Paper 01 Lifestyle, Transport, Genes And Health

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Introduction:

This paper was the fourth cycle of the new specification and tested the knowledge, understanding and application of material from the topics 'Lifestyle, health and risk' and 'Genes and health'.

The range of questions provided ample opportunity for students to demonstrate their grasp of these topics and apply their knowledge to novel contexts.

The questions on this paper yielded a wide range of responses and some very good answers were seen. The paper appears to have worked very well with all questions achieving the full spread of marks. Very few questions were left blank, apart from the standard deviation calculation, and there was no evidence in the vast majority of papers that students had insufficient time to complete the paper. For example, nearly all students wrote lengthy answers to the last question on the paper, utilising the second page to continue their detailed answers.

There were some straightforward questions that yielded high marks across the ability range and some more challenging questions that discriminated well. It was very pleasing to see so many excellent responses which were clear and comprehensive, showing a good use of appropriate biological terminology. The responses to 7bii and 8b in particular, were very well strcutured, used the correct terminology and were therefore high scoring.

It as clear that centres have been working hard to ensure their students read the command words more carefully and tailor their answers appropriately. The 'compare and contrast' type answers in particular showed a significant increase in the quality of comparative answers as opposed to separate paragraphs about each. More students utilised the data they were provided with in some of the questions.
As previously, questions that demanded recall were generally well answered, as were the majority of the calculation questions.

However, when asked to analyse and explain data and apply their knowledge to unfamiliar contexts, many students found the marks harder to obtain. The application of knowledge regarding how the partially permeable cell surface membrane in a couple of the questions proved more challenging for some students. The practical skills questions were also more challenging for some students than in previous years.

Question 1(a)(iii)

This question asked students to give one structural difference between amylose and amylopectin. The majority of students were able to give at least one difference between these two molecules correctly. However there was a small number of students who did not know that these were both polysaccharide molecules and gave incorrect answers relating to amino acid R groups or kinks in fatty acid chains.

Question 1(b)

This question asked students to explain how the structures of amylopectin and glycogen make them suitable for storing energy. The most common reason for students to not gain full marks was that they described the structures but did not go on to explain how the described feature aided energy storage. For example 'because the molecules are compact' without explaining that this would result in more energy (or glucose) being stored in the cell.
The most commonly awarded marking point was mp1, although there was a significant minority of students who referred to 'easily broken down' instead of rapidly and therefore were not awarded the mark.

Question 2(a)(i)

This question required students to extract data from the table and then calculate a ratio. There was a significant minority of students who did not know how to work out a ratio. Where a ratio was calculated, most common reason why students did not gain full marks was due to the ratio being the wrong way round.

Question 2(b)

Students were required to explain why a diet containing high levels of sugars could lead to obesity. This was a very good differentiator as some students just gave answers referring to the excess sugars being stored as fat. They did not link this to weight gain or the obesity context in the question. Many students attempted to describe an energy imbalance but their answers were too vague. There were some high quality responses seen where the student referred to the BMI of obesity.

Question 2(c)

This question provided students with the structures of two molecules. Students were required to analyse the diagrams to identify the differences in structure and then apply their knowledge of enzyme specificity to this context. This was a very good differentiator as a surprising number of students did not analyse the diagrams for differences and therefore could not access the first marking point. Surprisingly many students did not recognise that if a molecule cannot be broken down by an enzyme then then an enzyme-substrate complex could not have been formed. A significant number of responses lacked required terminology such as active sites or enzyme-substrate complexes.

Question 3(b)(i)

This question was also tested in a previous paper. It was pleasing to see a large improvement in the quality of students' responses to this recall question. However, there were a minority of responses which confused a gene with either mRNA or a primary structure of a polypeptide.

Question 3(b)(ii)

This question gave students information about a mutated allele for the haemoglobin protein. Students were then asked to use a genetic cross to determine the probability of a child of two heterozygous parents being homozygous for the mutated allele.

Generally this question was answered very well with the majority of students scoring full marks. However, where this was no the case it was for the same few reasons. Some students did not use a genetic diagram and were therefore limited to one mark. Some students completed the genetic cross incorrectly. Some students gave the probability of being homozygous and not just homozygous for the mutated allele.

Question 3(b)(iii)

This question required students to explain how a change of one amino acid could lead to a change in the structure **and** properties of the haemoglobin protein. The most commonly awarded marking points were the change in secondary/tertiary/quaternary structure and the change in the named bond. Few responses gave responses detailing the change in a property of the haemoglobin protein.

Question 4(a)

This question required students to calculate a percentage change in lipid content. The majority of students were able to do this successfully and give a correctly rounded number. However, a significant number of students divided by the incorrect number or rounded down to 316%

Question 4(b)

This question required students to apply their knowledge of the vitamin C core practical to a novel context. It was disappointing that few students gained full marks here. A significant number of students did not refer to at least five samples of milk being tested, often it was just one, which did not answer the question. Many students did not describe a titration and just described the use of a dropping pipette and counting how many drops were needed to cause a colour change which was not sufficient for marking point two.

It was pleasing to see an improvement in the description of the use of DCPIP and the correct colour change that would be used for either method.

The standardisation of titration technique marking point was the most commonly awarded marking point.

It was pleasing to see that some students considered how the vitamin C content would be determined using a calibration curve.

Question 4(c)(i)

This question required students to analyse a graph in order to describe the relationship between the number of months breastfeeding an childhood obesity. Nearly all students were able to correctly describe the relationship in order to gain the first marking point. However, fewer students recognised the large drop between the 2 month bar and the 3-5 month bar.

Question 4(c)(ii)

This question required students to calculate the mass of a six-year old child to one decimal place. The students needed to rearrange the given equation. As there were no units provided on the answer line, students were also expected to give the relevant unit. The units for BMI was provided in the stem of the question to help students recognise that they needed to convert the height into metres and to give their answer in kg.

However, many answers did not give their answer to one decimal place and/or did not give the unit. Another common mistake was not using 1.15^2.

Question 5(a)(i)

This question required students to analyse the given information in the question and explain one way in which the investigation could be improved. It was disappointing that the majority of students did not recognise the use of the command word **explain**. Therefore the responses often were awarded just one mark for stating an acceptable improvement.

The most common non-creditworthy response described using equal sized increments for the sodium chloride solution and the removal of the 2.5% concentration.

Question 5(a)(ii)

This question was the first time that standard deviation calculations have been tested on this paper. It was pleasing to see that a significant minority of students were able to correctly use the given equation and gave a correct answer. However, many students were not able to do this and a significant number of blank responses were seen. Where students had attempted this the most common error was not knowing what the symbol 'n' referred to.

Question 5(a)(iii)

This question asked students to deduce the effect of increasing the concentration of sodium chloride on the change in mass of the onion tissue. It was disappointing that few students gave high scoring responses. The most common incorrect answer was 'as the concentration of sodium chloride increases, the mass decreases', ignoring that there was an increase in mass for the 2.5% sodium chloride solution.

The most commonly awarded marking point was for the movement of water by osmosis.

Question 5(b)

This question related to the beetroot core practical. Students were expected to apply their knowledge of membrane structure and permeability to this new context in order to explain why pickling in vinegar would result in anthocyanin pigments leaving the onion cells. It was disappointing that few students referred to an increased permeability of the cell surface membrane and this limited the number of marks they could then access.

A common error was referring to pigments moving due to osmosis or concentration gradients.

For example:

'As the vinegar solution would not contain anthocyanin pigments intitially, the concentration would be lower relative to the onion. This means the pigments would diffuse across the onion's membrane, and thereby leave the onion cells, as to equalise the concentrations'

Vague answers referring to the membrane being disrupted or damaged were insufficient.

Question 6(a)(i)

This question required students to circle an amine group on the supplied amino acid diagram. Many students were able to do this correctly, but others circled the R group or the carboxylic acid group.

Question 6(a)(ii)

This questioned required students to name one of the two elements than can be found in a R group of an amino acid that would not be present in a carbohydrate.

The majority of students were able to do this successfully.

Question 6(b)(i)

It was disappointing that the majority of students were not able to describe one function of a glycoprotein. A significant number of responses gave the function of either a carrier or channel protein.

Question 6(b)(ii)

This question asked the students to explain how the structure of a phospholipid molecule contributes to the partial permeability of a cell surface membrane. The majority of students were able to correctly describe the structure of a phospholipid. However a significant minority of students misread the question and just described the fluid mosaic structure of a phospholipid bilayer or referred to the role of the intrinsic proteins.

Where students did explain how the structure of the phospholipid molecule contributes to the partial permeability of a cell surface membrane, marking point three was more commonly awarded than marking point two. This is

because students explained why polar molecules could not pass through, but did not explain why some molecules could pass through the membrane.
There were also some responses which showed some confusion about the use of the terms polar and non-polar.

Question 6(c)

This question required students to compare and contrast the processes of endocytosis and exocytosis. There was a noticeable improvement in the quality of response to this command word. The majority of students used comparative statements and gave both similarities and differences.
The most commonly awarded marking points were the first and the third. For example:
'Endocytosis and exocytosis both need a cvesicle involved for the process. Endocytosis engulfs molecules into the cell whereas exocytosis releases molecules out of the cell.'

Question 7(a)(iii)

The vast majority of students were able to successfully calculate the percentage of guanine in the same sample of DNA.

Question 7(b)(i)

This question required students to describe how mRNA is synthesised at a template strand of DNA. This was a recall type question and as a result the majority of students were able to answer this correctly.
However, imprecise terminology did limit the awarding of marks. For example some students referred to DNA polymerase instead of RNA polymerase, or referred to hydrogen bonds between bases instead of phosphodiester bonds between the nucleotides.

Question 7(b)(ii)

This question required students to describe differences between the structure of DNA and RNA. Generally this was answered well by the majority of students. However some weaker responses lost marks as they did not make a relevant comment about each structure.
For example
'DNA has a double helix but RNA doesn't' was insufficient for the first marking point.

Question 7(c)

This question required students to compare and contrast the process of transcription with the process of DNA replication. Maximum marks could only be awarded if students considered both similarities and differences.
It was pleasing to see that the majority of students had a good understanding of both processes. However the majority of responses focussed on just differences between the two processes and this limited the number of marks that could be awarded.

Some students lost marks by only giving half of a marking point. For example 'in transcription complementary base pairing occurs between the free RNA nucleotides and the template DNA strand to form one strand of RNA whereas double stranded DNA forms.' Here only the fifth marking point could be awarded and not the third as there was no reference to DNA nucleotides.

Question 8(a)(iii)

This question required the students to state the type of blood vessel that has no collagen in its wall. Most students were able to answer this question correctly.

Question 8(b)

This question gave the context of an ischaemic stroke and asked the students to explain how a blood clot could form in a blood vessel. It was clear that students understood the process of the blood clotting cascade and many excellent responses were seen covering the bottom four marking points. However, the most common error which limited the number of marks awarded was for not including the exposure of collagen when the wall of the blood vessel is damaged.

Question 8(c)(i)

The students were asked why statin medication would not be an effective treatment for a blood clot in the arteries in the diagram. Most responses seen gave the responses in the additional guidance, with the role of statins in lowering LDL's being the most common. Common responses which did not gain marks included 'statins lower blood pressure' or statins would not be able to reach the blood clot in these arteries'.

Question 8(c)(ii)

This questions required students to analyse the information given before Q8(c)(i) in order to explain why the location of the blood clot would affect the oxygen saturation of the blood leaving the right lung.
This proved to be the most challenging question on the paper and few students gained full marks. Students struggled to link topic one and topic two knowledge and apply it to this context.

It was surprising that more students did not give a response that included mark point one. The linking of the data in the table with the diagram was attempted by some students, but not successfully.
Few students linked the blood clot resulting in reduced blood flow in the blood vessels. It was surprising how many students referred to 'less oxygen can be supplied to the lung cells'.

Question 8(d)

This question required students to analyse three graphs in order to give advice to a male smoker who has had one ischaemic stroke in order to reduce his risk of another.
Generally students answered this question well, with some extremely high quality responses seen, which made reference to the graphs. They needed to give advice which related to their analysis of all three graphs in order to access level three. The most common responses referred to stopping smoking which would help to reduce blood pressure, reducing the levels of salt in the diet which would help to reduce blood pressure, reducing cholesterol / saturated fat in the diet and increasing levels of exercise. The advice had to be supported by analysis of the data to be awarded the higher mark in the level.
Some responses however just analysed data and did not give any advice, which did not answer the question.

Paper summary

Based on their performance on this paper, students are offered the following advice:

- Read the whole question carefully, including the introduction, to help relate your answer to the context asked. You should take into account the command words as well as the context given. Answers which do not match the command words ot do not relate to the given context will not gain high marks.
- Do not try and make a mark scheme you have learnt from a previous paper fit a different question with different context and command words.
- Study the mathematical skills which could be tested and make sure you include your working with all calculations. Give relevant units where applicable.
- When asked to compare and contrast, make sure you have included both similarities and differences in your answer.
- Ensure you use the correct technical names and terms in your answer.

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