



GCSE

Biology

BL3HP

Report on the Examination

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General

Nearly all questions were attempted by all students but issues which occurred most frequently included:

- the inability to express ideas clearly and unambiguously
- paying insufficient attention to information provided in the stem of a question in order to guide a reasoned response and avoid the inclusion of irrelevant information
- repeating, rather than using, information given in the question, for which no marks are available and which wastes both time and space
- the inclusion of extra, incorrect information in addition to the correct answer – for example, if one point is asked for, then a second point, if incorrect, would cancel a potential mark; or, if two other examples are required, no marks are available for including the examples given in the question
- writing in such a faint colour that scanning does not show up their responses
- although chemical formulae are generally acceptable as alternatives to the names of substances, they need to be correct, for example, CO₂ is an acceptable alternative to carbon dioxide but CO² is not.

It is helpful for students to use past papers to help them revise for their examination, but they should be reminded that future questions are unlikely to be exactly the same as those in the past so rote learning a 'standard' answer can be unhelpful as they need to tailor their answer to the context given.

There are still a significant number of students whose poor handwriting disadvantages them as examiners cannot read what has been written. In addition, students should be clear that it is better to write on additional pages as opposed to writing around the edges of the paper as these are removed for scanning purposes and their answers are lost. Where a student's writing is of such a poor standard that it might compromise marking, centres may provide scribes so that a student's knowledge and understanding of biology can be properly assessed.

In Question 6, it was noticeable that there was a high degree of confusion regarding arteries and veins in general: their structure; what they carry and to where they carry substances. Many students referred to thick and thin blood or red and blue blood.

Question 1 (Standard demand)

- (a)** The vast majority of students could correctly identify when ions would move by diffusion and some could also identify when active transport would occur to move ions from low to high concentration. However, a significant minority thought that osmosis would move ions from low to high concentration.
- (b)(i)** This question required students to recognise that water would move into the partially permeable bag containing a more concentrated sugar solution and then explain why this occurred. However, it is clear that students still struggle with the detail of osmosis. Approximately one quarter could give a full explanation for this and gained full credit but a third of all students gained no credit.

Students seemed to appreciate that water moved into the bag, but failed to be able to clearly explain why. A significant minority stated that sugar moved. For the first marking

point, many students failed to make a *comparative* statement or simply compared the solution in boiling tube A with the other tubes, as opposed to comparing the concentration gradient between the bag and solution in that tube. A misconception commonly seen was in the expression of the relative concentrations, ie 'water moves from a high concentration in the tube to the lower concentration in the bag'. This answer would be credit worthy if the candidate had added 'of water', eg 'water moves from a high concentration *of water* in the tube to the lower concentration in the bag'

Other common errors seen included:

- Weak descriptions of concentration gradients.
- Students stating the sugar moves as well as, or instead of, the water. Stating that the solution moves includes the sugar and therefore is not credit worthy.
- Active transport of the sugar occurring, failing to appreciate it is an artificial membrane, and as such is not living.
- Using statements like 'lots of' in place of 'high concentration of'.
- Not stating the **direction** of water movement.
- Not stating **where** there was a high concentration of water molecules, and simply giving a textbook (rote learned) definition of osmosis.

(b)(ii) Most students recognised which of the bags would give rise to the smallest change in mass. When students did not gain credit, most commonly this was because they chose bag D.

(b)(iii) Most students appreciated the general idea that the bag was closest in concentration to the solution and therefore there would be the smallest change in mass. As such, many gained the first marking point. The students that did go on to attempt marking point 2 most commonly did not gain credit as they did not use good scientific terminology in their explanation. The best answers gaining full marks were concise, and applied good clear scientific terminology in their answers. The use of the term 'amount' is insufficient for concentration, but was commonly seen.

Common errors seen included:

- Students struggling to explain the term 'concentration gradient' clearly.
- Use of poor wording, such as 'amount' or 'easily' frequently let students down.
- Stating the bag was full so no more solution could enter.
- As in part (b)(ii), many students stated that 'active transport of the sugar occurs', failing to appreciate that it is an artificial membrane, and as such is not living.
- Students frequently gained a mark for marking point 1, but then did not give the consequences of this,
eg 'so less movement occurred'
'so molecules moved in less'
'so less water moved in'

Question 2 (Standard demand)

(a) The vast majority of students could name guard cells as those that control the size of the stomata.

(b)(i) The majority of students achieved marking point 1 in this question, either through the wording on the mark scheme, giving the converse or through the use of the term ‘negative correlation’. It was pleasing to see that only a small number of students suggested a reverse relationship in terms of the large number of stomata *causing* a decrease in atmospheric carbon dioxide.

Only a third of all students gained marking point 2. Most students simply quoted data from the graph without giving the change in pattern. Giving individual pieces of data comparing two particular high and low points is not enough to gain credit for the second marking point.

(b)(ii) Given that so many had correctly described the relationship between carbon dioxide concentration and mean number of stomata in part (b)(i), it was surprising that many often ignored this and gave reasons referring to water loss / retention.

A third of all students gained this mark through their clear understanding of *need*. Some students did not describe the idea of ‘need’ and so were not given credit, often they described having more or less stomata so that more or less carbon dioxide was gained.

(c)(i) The majority of students did not gain this mark as they did not give a disadvantage of having a large number of stomata, although many described the process of transpiration. Most students simply stated that the plant would lose ‘a lot’ of water, failing to understand that plants can and do lose a lot of water daily but that it is the idea of ‘too much’ that was required.

A common misconception seen was the idea that letting too much carbon dioxide / water in would be a bad thing. Those who did gain the mark did so often through descriptions of the negative effect on the plant eg wilting.

(c)(ii) Over half of all students gained credit in this question, with a number of students giving more than one of the answers listed on the mark scheme. The idea of an environmental condition was rather loosely interpreted by some and examiners had the impression that a number homed in on the term environment rather than condition.

Common answers that did not gain credit were:

- humid
- desert
- too much carbon dioxide
- wet or rainy.

It was apparent that quite a few students did not understand the term humid.

Question 3 (Standard demand)

This QWC question discriminated well and the division of marks gained in levels 1, 2 and 3 were evenly distributed at approximated a third of all students scoring in each level. Only a very small percentage did not attempt an answer.

There were many excellent answers gaining the full number of marks available despite the question being plant biology, which is often not as favoured by students as other animal biology questions.

Students seemed to understand how ions and water were obtained from soil and how they were transported to the leaves. The best answers often separated the three substances and discussed each one separately. In these answers students were less likely to lose marks for incorrect processes or transportation detail. Commonly students did not gain credit because they described ions and sugar travelling in the phloem or for stating that ions, water and sugar are taken up from the soil via the roots.

It was clear that many students understand the transpiration story and gave excellent detail referring to the evaporation of water from the stomata, which draws water up through the xylem. Descriptions relating to sugar were rather less well understood and a significant number seemed to think that sugar is obtained from the soil. The role of xylem was better described than phloem. In the best answers students did appreciate that movement in phloem is bidirectional.

The Quality of Written Communication element of this question did not often cause any problems, and the quality of punctuation, spelling and organisation at least matched the level of biological knowledge expressed.

Question 4 (Standard and High demand)

(a)(i) Most students gained full or partial credit, with the majority of students scoring one mark. Marking point 2 was awarded most frequently for giving a specific area of the island which had been affected. Far less students achieved marking point 1 for recognising the general pattern of deforestation around the edges / coasts, and only a small percentage of students gave the alternative marking point of the 'central areas remain unchanged'.

Where students did not gain credit it was often because they simply stated 'it has been deforested' without giving further details on which areas of the island have been affected. This was information given in the stem of the question. Some extremely good answers had actually included data which had been manipulated from the map such as estimating the percentage of forest lost or the area of forest lost.

(a)(ii) Most students could give two possible reasons why the forest cover had decreased. Marking point 1 relating to farming or specific examples such as cattle ranching and marking point 3 relating to building / timber or specific examples of building, such as for houses, were seen in the majority of answers. Marking point 2 relating to quarrying was very rarely seen as was the additional point for forest fires. Where students failed to score two marks it was generally because of non-specific examples being given such as 'for wood', 'for materials', 'for resources', 'for economic reasons' or 'for space'. The minority of students who scored zero in this question showed no understanding of reasons for deforestation by giving reasons such as 'diseases killed trees' or 'no nutrients in the soil'.

(b) Most students could give two possible negative effects of the decrease in forest cover on ecosystems. Marking points 1 and 2 were seen in the vast majority of answers with extinctions frequently being given as an alternative to reduced biodiversity. Marking points 3 and 4 were seen far less often, with marking point 4 occasionally being awarded for examples of global warming.

Incorrect answers often related to the impact deforestation would have on food chains or how prey will no longer have any cover and so will be hunted easier, without developing this idea to include reduced habitats and biodiversity. Other incorrect answers seen

included more methane due to cattle ranches being opened or a reduction in oxygen in the atmosphere as there are less trees photosynthesising.

Question 5 (Standard and High demand)

- (a) The vast majority of students gained at least partial credit in this question. Many students lost one mark for giving the movement of the diaphragm when breathing in as 'in and out' or simply stated that the diaphragm contracted.
- (b)(i) Approximately three quarters of all students could describe the difference between the alveoli by describing the change to surface area. Students expressed this either by stating 'it has a larger surface area' or by stating the converse of 'the alveolus from a person with emphysema has a smaller surface area'. A significant minority stated that 'there was a smaller surface area', which in the context of the question asked was incorrect.
- (b)(ii) Only a small percentage of students gained three marks in this question for a full explanation of the effect of surface area on the ability of a person with emphysema to exercise.

Many students gained marking point 1, for less oxygen availability, but the link to less oxygen passing into the blood / to cells / to muscles was not always stated. Many only stated that less oxygen 'got into the body' which was insufficient as the same volume of oxygen would enter the lungs, it is gaseous exchange that is the crucial difference here.

Marking point 2 was also described by many students, with many good answers stating: 'less oxygen passes to the muscles for respiration', which gained credit for marking points 1 and 2. Some students followed the anaerobic train of thought, correctly identifying the need for energy to exercise but then discussing negative effects of lactic acid build up, which was not credit worthy.

Very few students gained marking point 3. For this mark, students had to be clear in their answer that energy was released or made available for exercise. A significant minority made the link to energy but incorrectly stated that energy was made or produced which is incorrect.

It was pleasing to see that only a very small number of students stated that **no** energy would be released or that there was less energy **for** respiration.

Question 6 (Standard and High demand)

- (a)(i) Two thirds of all students gained one or two marks for correctly describing how the structure of an artery is different from the structure of a vein. This question required a comparative answer and there are still many students who are only giving one side of the story or not using comparative language, such as thicker. Many students referred to lumen size and thickness of walls as their two responses and did not mention valves. The presence of valves in veins, or, more frequently, absence of valves in arteries (marking point 1) was not as well-known as marking point 2, but when valves were mentioned answers were generally correct.

(a)(ii) This question required students to give two differences in the composition of the blood taken from an artery in the leg and the blood taken from a vein in the leg and just over half of all students gained one or two marks for their answers. Most students gained one mark for marking point 1, by correctly stating that the blood in the artery carries more oxygen than the blood in the vein. Many students expressed the comparison as the artery contains oxygenated blood and the vein has deoxygenated blood, for this marking point. Those students who did not achieve this mark, often did not make a comparison and simply stated that the artery has oxygen. Several students referred to veins having no oxygen which was not creditworthy. Marking point 3 referred to carbon dioxide, so the correct responses seen were less carbon dioxide in the artery or that there was more carbon dioxide in the vein.

Many students were confused and managed to get the artery and vein mixed up and there were many incorrect answers referring to colour differences such as arteries carrying red blood and veins carrying blue blood.

Very few students obtained marking point 2, for more glucose, amino acids or fatty acids in arterial blood or marking point 4 for less lactic acid in the artery. A sizeable number of students incorrectly referred to pressure differences which did not answer this question regarding the composition of blood. Examiners had the impression that some students did not understand the meaning of the word composition.

(b) This question provided students with some information about a new artificial blood product made from sea worms. Students were asked to suggest two possible advantages of using the new artificial blood, instead of human blood, for a transfusion in humans. The answer required two suggestions and the mark scheme had four possible mark points for a maximum of two marks. Almost all students gained at least one mark with nearly half gaining two marks for their suggestions.

Many students were able to suggest a creditworthy answer stating that there would be an abundant supply of the sea worm product for marking point 2 and expressed this idea in a wide variety of ways. Suggestions such as many sea worms are available for mass production and there are more available than human blood donors were responses seen frequently. Many students stated that there would be no side effects, which was not creditworthy but a sizeable number of students correctly stated that rejection would not be a problem or that no tissue / blood typing would be required, for marking point 1.

Although not provided within the information in the stem of the question, some students had researched alternative blood products as they knew that the protein would have a long shelf life and would not need refrigeration for marking point 4. A few students obtained marking point 3 as they realised that there would be less risk of infection with the sea worm protein.

Question 7 (High demand)

The vast majority of students demonstrated some knowledge and understanding in this question and the discrimination of the question was very good, for example approximately one sixth of students gained five or six marks, a further third gained three or four marks and another third gained one or two marks.

Students appeared to understand many aspects of the mechanisms involved but a significant number are still losing marks for the following misconceptions:

- blood vessels move
- capillaries or veins constrict
- energy being 'made'.

A substantial number of students did not relate their answer to humans and therefore discussed hairs erecting and trapping air. This was often well explained but not credit worthy.

Some students began 'the story' at the thermoregulatory centre and how blood temperature was monitored and whilst this wasn't credit worthy it did potentially waste students' time.

The mechanisms of reduced heat loss by radiation and evaporation of sweat were well explained by a number of students. The most commonly missed marking point was marking point 1, as students were not clear and precise in terms of explaining that it is the blood vessels **supplying** the skin capillaries that constrict and often wrote fairly vague answers referring to blood vessels near the skin.

Question 8 (High demand)

- (a) Approximately three quarters of all students gained some credit for explaining why a transplanted organ may be rejected as they could relate the question to the immune system. Although a significant number did write about immunosuppressive drugs instead of answering the question asked.

There was generally a good understanding of the idea of antigens being different on the transplanted pancreas but the need for specific antibodies to be produced in order to attack the antigens on the transplanted pancreas was less well known.

Students usually gained one mark for referring to the immune system or white blood cells but only the more able students gained marking point 2.

- (b)(i) Most students gained one or two marks in this question and a further fifth gave enough detail to gain three or four marks. The question required students to use the information provided to explain what would happen for the woman in the question and therefore answers needed to relate to this for marking points 1 and 2. Information taken from the figure needed value added to gain the mark.

Many students achieved marking points 1 and 2 as they could explain how the rise in blood glucose in the woman was detected and how the insulin dose needed to return blood glucose levels to normal was calculated. A significant proportion of students failed to gain marking point 3 as they simply restated the information from the diagram regarding insulin being injected under the skin but did not go further to explain that this passes into the bloodstream. When students did complete the explanation and attempted to give marking point 4, a significant minority stated that glucose was converted to glucagon or glycerol or glucogen, which are all incorrect.

- (b)(ii) Many students did not gain credit in this question as they did not appear to understand or read the question fully. When students did gain credit it was for stating that the artificial pancreas would avoid human error or was more accurate.

The idea that it would reduce spikes in blood glucose level was rarely seen, with most simply saying it was automatic or continuous or even that you could live a normal life for

which they gained no mark. It was clear in some answers that students were mixing up the need to attend hospital for dialysis with the question asked this year.

Question 9 (High demand)

- (a)(i)** Many students could give at least a partial answer as to why using more cultured meat might slow down the rate of global warming. The fact that cows produce methane is very well known. Unfortunately many students simply stated this fact but did not go on to tie this in to an explanation of why using cultured meat would help to reduce global warming, so they did not mention there would be less cows and therefore less methane.

There were some good responses for marking point 2. However, too often students who were thinking along the right lines failed to gain the mark because their response lacked sufficient detail as they did not refer to carbon dioxide eg 'less fuel is used to transport meat' or students made vague references to machinery used in cattle farming releasing carbon dioxide.

- (a)(ii)** Most students could give one advantage of producing cultured meat instead of farmed meat. There were many responses referring to quicker production or not having to wait for cows to grow, but these answers rarely linked this to the advantage of helping to feed an increasing population and therefore marking point 1 was rarely awarded.

Some students showed they understood that cultured meat would be disease free, but others focused on disease transmission between cattle which was not credit worthy.

Marking points 3 and 4 were commonly awarded for the ideas of:

- the cultured meat being lower fat
- it might be suitable for vegetarians
- fewer cows would be killed.

However, a significant number of students missed this mark due to vague references to ethics which weren't then further explained.

A small proportion of students identified the idea that the meat would be antibiotic free or that the land could be used for farming crops instead.

- (b)** The majority of students correctly identified fungus / *Fusarium* but there were a significant number of students referring to yeast / bacteria being used in the fermenter. References to sugar or maize starch were the common ways in which marking point 2 was lost if the candidate did name a substrate.

The majority of students gained marking point 3 as they recognised that oxygen was bubbled into the fermenter or that there were aerobic conditions. However, some lost the mark by referring to anaerobic fermentation – it appeared that a number of students knew that fermentation is an anaerobic process and because mycoprotein production takes place in a fermenter they thought that mycoprotein production was therefore a fermentation reaction.

Marking point 4 was rarely seen with most students simply referring to removal of the mycoprotein in various ways without any hint of processing. A few had paid good attention to the specification and wrote 'harvested and purified' to gain the mark.

Nitrates / nitrogen / amino acids appeared about as often as ammonia but the idea that a source of nitrogen was needed by the fungus was rarely addressed. As this is beyond the scope of the specification and therefore credit was given as an additional possible mark.

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the [Results Statistics](#) page of the AQA Website.

Converting Marks into UMS marks

Convert raw marks into Uniform Mark Scale (UMS) marks by using the link below.

[UMS conversion calculator](#)