GCSE

Additional Science / Biology

BL2FP

Report on the Examination

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General

Particular problems which occurred quite frequently included:

- The inability to express ideas clearly and unambiguously, in particular the misuse of the pronoun 'it'
- 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
- Careless reading of the question resulting in an inappropriate answer, for example failure to give a comparative answer to a comparative question, or selecting a single option in a multiple-choice question when two are required, or missing a question when the answer has to be placed on a diagram
- Misunderstanding of the difference between the two command words, *explain* and *describe* which can lead to a completely inappropriate answer
- Careless reading of data from a graph – especially when one square represents two units
- Limited ability to apply what had been learned to a novel situation.
- Poor understanding of certain topics, such as diffusion, the study of the distribution of organisms using a transect, and the fact that energy cannot be created
- Poor handwriting, for example with numerals – especially the distinction between the numbers 1 and 2.

Question 1 *(Low Demand)*

This question was well answered by most students.

(a) (i) Most knew that structure 'A' in the diagram of cells from the stomach lining was the cell membrane and that 'B' was the cytoplasm, although a few got these the wrong way round.

(a) (ii) Nearly all students knew that the function of the nucleus was to control the activities of the cell.

(b) Over three quarters of students were able to assign the three parts of the body to their scientific name.

Question 2 *(Low Demand)*

(a) Descriptions of the method by which students should have used a quadrat and a tape measure to obtain the given results for the distribution of dandelion plants across a grassy field revealed that many students had probably not performed this practical exercise themselves. There were many references to the placing of quadrats randomly rather than at regular intervals along a transect line. Given that the data showed the *number of dandelion plants*, few students actually thought of counting the plants in each quadrat and simply dismissed this aspect as 'record the results'. A little over one-eighth of students scored all 3 marks for this question.

(b) (i) The vast majority of students were able to suggest a suitable reason for the absence of dandelions under the trees, the most common being lack of light. Scarcity of water or mineral ions were quite common alternative sensible suggestions.

(b) (ii) Only a minority could suggest a reason for the absence of dandelions at one position in the middle of the field, such as it being a path, or being due to some unsuitable local characteristic of the soil, or even random variation.

(c) For improvements to the method to enable a valid conclusion to be drawn, a little over half of the students correctly suggested repetition, but relatively few realised that repetition at different positions across the field would be more representative. Many resorted to throwing quadrats randomly which, in addition to the implicit dangers involved in such a method, would have been unsuitable for obtaining data relating to variation across a habitat.

Question 3 ***(Low Demand)***

(a) The catalytic properties of enzymes were well known but only around a half of students were able to answer part (ii) and (iii) correctly.

(b) Here students were presented with a diagram of a vertical column containing beads of gel with the enzyme isomerase attached and had to select two advantages, from a list of four suggestions, of using the enzyme attached to the beads of gel. This was perhaps a novel situation to which students had to apply their understanding of the use of enzymes. More able students were able to work out that the enzyme could easily be used again and that the product would not be contaminated with enzyme. Only around a quarter of students were able to select both of these answers, with some students ticking only *one* box.

Question 4 ***(Low Demand)***

(a) The vast majority correctly chose the option that fossils show change over time as the reason why fossils can provide evidence for evolution.

(b) Most students were able to give at least one correct point in their description of how a marine animal like a plesiosaur could become fossilised. Given that there was mud at the bottom of the sea, most students could deduce that the dead animal would become buried in the mud; but only more able students stated that the soft parts would decay to leave just the bones and that mineralisation (or 'turning to rock') would occur.

(c) Again, most students knew that the reason why scientists could not be certain about the nature of the skin of a plesiosaur was that the skin would not have been fossilised. The idea of 'insufficient evidence' was also credited.

(d) Possible reasons for extinction of the plesiosaur were fairly well known with most students being able to give at least one. Around a half were able to give two reasons.

Question 5 ***(Low Demand)***

(a) (i) Nearly all students were able to select *fertilisation* as the process in which an egg and sperm fuse together.

(a) (ii) Over one-third were able to list the terms *gene*, *chromosome* and *nucleus* in the correct order according to their relative sizes.

(a) (iii) The fact that the genetic material is composed of *DNA* was almost universally known.

(b) (i) Less than one-third of students were able to identify correctly a symbol that represented a sperm cell. A small number of students gave no answer at all.

(b) (ii) Although almost three quarters of students knew the chance of having a female child, many failed to give the reason for their answer and many more spoiled their answer by using an incorrect expression for the probability Answers such as 0.5, ½, 50%, 1:1, 50:50 and 1 in 2 were all acceptable, but answers in the format of racing odds, such as '50/50' and '50 – 50' were not as, mathematically, the former equates with 1.0 and the latter with 0.

Question 6 *(Low Demand)*

(a) Here, two answers had to be selected as suitable conclusions from the given investigation. As in question 3(b), a significant minority of students selected only *one* answer.

(b) The graph showed the effect of changing light intensity on the rate of photosynthesis. Students were required to describe the effect shown in the graph. Nearly all students were able to make at least one point and this was that the rate of photosynthesis increased with increasing light intensity. Many students also described the 'levelling off' at higher light intensities – although a common error was to state that photosynthesis had 'stopped'. Students were instructed to include numbers from the graph in their description, the most useful being either the light intensity at which the rate of photosynthesis became constant or the value of this rate. Some students included a plethora of numbers in their description of the shape of the graph – this was unnecessary and it would have been more sensible to narrow the choice to a point where something significant happened. Some students insisted on attempting to give reasons why the graph levelled off; there were no marks available for this as the question asked for a description and *not* an explanation.

(c) (i) Although almost two-thirds of students were able to give appropriate evidence for light *not* being a limiting factor of photosynthesis above the value given in the question, many had difficulty expressing their answer clearly: it was often not apparent whether reference to the line on the graph being 'straight' meant that it was, in fact, horizontal.

(c) (ii) Most students were able to suggest at least one other factor that might have been limiting the rate of photosynthesis at high light intensities although, a significant minority still included 'light' as one of their suggestions.

Question 7 *(Standard Demand)*

(a) (i) Less than one-third of students knew that *amino acids* (or, alternatively, *peptides*) were the product of protein digestion.

(a) (ii) There was much more success in selecting *protease* as the name of the protein-digesting enzyme.

(b) (i) Almost two-thirds of students were able to select pH 2 from the table of data as the pH at which the enzyme worked best, although a significant minority chose a value between 5 and 7 (the table showed that no reaction had taken place at these values, whereas pH 2 had the greatest decrease in length of the egg white).

(b) (ii) Most students appreciated that the experiment would need to be repeated; however, this would not have improved the accuracy, as demanded by the question. Very few students were able to qualify their answer with a suitable pH range around their answer for (b)(i), and at smaller intervals of pH.

(b) (iii) While a few students knew that *denaturation* of the enzyme would be the likely reason for it not working at pH 5 to 7, many thought that digestion of the protein was brought about by 'acid' and argued that, since the solution was less acidic, digestion would cease. The most common mark awarded was for the idea that the enzyme did not work at these pHs.

(c) Just over one-third of students knew that *hydrochloric acid* was responsible for the low pH in the stomach. Incorrect answers included 'bile' and 'amino acid'.

Question 8 *(Standard Demand)*

Students were required to describe why diffusion is important to animals and plants. The quality of written communication was also taken into account in the awarding of marks. Most students gave a definition of diffusion, although this was not always an accurate one. 'Cells' moving by diffusion was a common error, as was particles moving 'up' the concentration gradient. Selectively permeable membranes were often mentioned. Some students thought that diffusion was controlled by the nucleus. There was a long list of things that were incorrectly described as diffusing, including 'light', 'energy', 'chlorophyll', 'pollen' and 'seeds'.

Correct answers generally made reference to oxygen, carbon dioxide, respiration and photosynthesis. A lot of answers were confused or nonspecific, e.g. oxygen and carbon dioxide moving 'in and out' during respiration. There was a lot of confusion between breathing, gaseous exchange and respiration. Answers relating to foods diffusing from the intestine into the blood were also muddled and vague.

Almost all students attempted this question and almost all were able to get into at least Level 1 (scoring 1 or 2 marks out of the 6 available). Even very weak students attempted to include information about both plants and animals in their answer. Many students gained 2 marks by a combination of a definition of diffusion and the name of a substance that could diffuse.

To attain Level 2 (3 or 4 marks), students had to establish a link between at least one named substance and a process that involved diffusion of that substance, common examples being oxygen diffusing into the blood in the lungs during gaseous exchange (or for respiration), or carbon dioxide diffusing into a plant leaf for photosynthesis.

A very small minority of students gave clear descriptions of processes that involved diffusion and hence achieved Level 3 (5 or 6 marks). For example, carbon dioxide diffusing into a leaf through the stomata and entering chloroplasts for photosynthesis, or an equation for the process of photosynthesis would have been a suitable description. To gain full marks it was necessary to give such details for either animals or plants and, at least, to link a substance and a process for the other type of organism.

Question 9 *(Standard Demand)*

(a) Just over one-third of students knew that the equation showing lactic acid production from glucose in an athlete's muscles represented *anaerobic respiration*.

(b) (i) Students had to use data obtained by reading the graph to determine the increase in lactic acid production by an athlete running at two different speeds. Almost two-thirds of students successfully derived the figure *4.4* units by subtracting the two appropriate readings. The main error was in reading one or both figures from the graph incorrectly (mainly due to misinterpretation of the scale where one small square represented 0.2 units), although

some others interpreted '*How much more...*' in the question as requiring a division rather than a subtraction.

(b) (ii) Hardly any students scored the full 3 marks available. Students had to explain that running at the higher speed would demand more energy and that, since not enough oxygen could be supplied to meet this increased demand, then the athlete would be more dependent upon anaerobic respiration – thus more lactic acid would have been produced. Since the question was comparative, it required a comparative answer and this was not always given. Many thought, incorrectly, that 'less' oxygen would be supplied to the athlete's muscles at the higher running speed rather than *not enough* to meet the increased energy demand. References to *energy* were frequently omitted and the concept of simply 'working harder' was not rewarded by examiners. If anaerobic respiration was mentioned, it was often described as just having started at the higher speed of running.

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