AQA

AS
ENVIRONMENTAL SCIENCE
7446 Paper 1
Report on the Examination

7446
June 2018

Version: 1.0

General

Most students found this paper demanding. Whilst the majority of students attempted the higher mark questions, a significant number failed to give the detailed answers that would be expected at AS level. A lack of correct scientific terminology in their answers was apparent. There was evidence of students having not covered certain topic areas or having not prepared adequately for the examination.

Students found the mathematical content of the paper challenging and marks were lost through not giving the final answer of a calculation to the correct significant figures or decimal places.

Question 1

01.1
50% of students gave the two correct answers required and many gained one mark. It was apparent that some students knew the terminology of the processes involved in the nitrogen cycle but could not *'decide'* which term to use. Nitrogen fixation and denitrification were common incorrect answers. Excellent answers were seen that gave the correct process as well as the associated bacteria involved.

01.2
28% of students gained this mark. A number of students gave 0.85 having forgotten to include '$x10^6$' in their final answer in their calculation.

01.3
Only 4% of students gained full marks on this question, the majority achieving the first mark for legumes/named legume. 35% of students failed to achieve any marks for this question. Vague answers of '*bacteria present on roots'* were not creditworthy, nitrogen fixing bacteria/bacteria that fix nitrogen was required. Some students talked about crop rotation which is a management practice not a choice of crop as the question asked.

Question 2

02.1
Very few students (3%) gained full marks on this question. Incorrect readings taken from the graph were evident, with a number of students taking data from the 2021 year line instead of 2015. A number of students appeared not to understand the '*per capita*' term and as a consequence did not include this in their calculation. A number of students failed to give their final answers to the correct significant figures and as a consequence were only awarded 1 mark rather than 2.

02.2
This question was attempted by most students, with 63% of students gaining one or more marks. There were some vague answers of people '*being more aware or conscious of water*' this was not enough to be awarded the change in behaviour mark. '*Periods of drought*' was not creditworthy unless students then went on to explain that this would lead to restrictions in access to water.

Question 3

03.1
A significant number of students misunderstood the question and described how vegetation cover and plant species diversity could be measured in order to relate it to the age of the coppice.

In a number of answers light meters were mentioned but the mark was not awarded as students failed to mention that these would need to be calibrated. '*Same level above ground'* or '*at knee height'* were seen for the use of the light meters, but students are told in the stem of the question that **ground level** light levels are being investigated.

For the location of readings, a number of students were not sure and therefore gave a list. 36% of students achieved 2 or more marks.

03.2
The majority of students gained the first marking point of the immediate effect on light levels of a woodland having recently been coppiced. However, imprecise answers with respect to vegetation growth, such as '*there were more plants that started to grow',* did not gain students further marks. The idea of increased plant biodiversity was lacking, as was the change in the community of species. Few students gained the second marking point, which describes the coppiced wood further along in the coppicing cycle. 53% of students achieved 2 or more marks.

03.3
Many students gave answers related to the Wildlife and Countryside Act rather than the protection of an area that arises from a specific designation. Vague answers, such as, '*protect the habitat from harm'* were seen and were not creditworthy. 15% of students did give good answers describing the kind of damaging activities that would be restricted.

Question 4

04.1
43% of students achieved full marks. 29% of students gained 1 mark on this question, but failed to gain the second mark due to incorrect significant figures in their final answer.

04.2
Students found this particular calculation more challenging with 70% failing to achieve any marks. Students struggled to select the correct data from the tables in order to carry out the calculation. Few students (12%) gained full marks.

04.3
This was a higher scoring question with 46% of students achieving 3 or more marks. 15% of students gained full marks. It was apparent that students have covered this topic in some detail. A small number of students confused the role of CITES and CITES appendices with the IUCN red list and its categories.

Question 5

05.1
Only a small number gained 2 marks, with 29% achieving 1 mark for the correct data read from the graph. Some students struggled with having to calculate the increase in sea level rise using negative numbers. Few actually calculated the **rate** of increase pre and post 1940.

05.2
Many students gained 1 mark on this question, correctly stating that there was an increase in temperature. However, few then went on to link their answers about land ice melting and thermal expansion of sea water to a change in the rate and therefore failed to appreciate that these two factors would result in sea level rising more quickly than the pre 1935 rate. Students' answers appeared to be saying that pre 1935 land ice melting/thermal expansion did not happen and then post 1940 it did, which is incorrect. Good answers did incorporate the change in rate detail.

05.3
Many students gained the more accurate/precise technology mark. Use of satellites was a frequent answer but this failed to gain a mark as it is the named technology carried by the satellite that was required. 26% of students achieved full marks and 55% achieved 1 mark.

05.4
39% gained 2 out of the 3 marks available. The first two marking points were frequently seen. Answers involving anthropogenic impacts were often too vague to be creditworthy.

Question 6

06.1
Many students calculated the Simpson's diversity index correctly but failed to give the final answer to the correct number of significant figures. A number of students gained one mark despite an incorrect answer, as they had shown some correct working as instructed. Students should be encouraged to do this for all calculations. Some students appeared to have little understanding of how to attempt a Simpson's diversity index calculation.

06.2
Students that addressed both parts of this question did well. Many students only gained marks from the comparable part of the mark scheme and failed to address how the method may be designed so that results obtained would give representative results. Many vague and imprecise answers were seen, such as, *about* or *similar conditions* but not the same, which is what was required. Conditions need to be specified, as in same weather conditions. Some students appear to regurgitate set marking points without giving due consideration as to the nature of the investigation. '*Collect data at the same time*' is not the same as set the traps out at the same time or traps left for the same period of time. 46% of students achieved 2 out of the 4 marks available.

06.3
Students struggled to summarise the data in the tables in order to then suggest reasons for the difference in diet of the Barn owls. Many students (47%) gained 1 mark by stating the owls preferred field voles as they were most abundant and the ease of capture in the different areas was frequently seen.

06.4
This question was answered well by students with 58% gaining full marks.

Question 7

07.1
The majority of students answered this correctly (84%).

07.2
The majority of students answered this correctly (70%).

07.3
The relatively few students that gained the full 5 marks on this question gave very good answers. They demonstrated an excellent understanding of the processes involved and used scientific terminology correctly. A significant number of students appeared to have not covered the topic in any depth or confused global warming with ozone depletion. Occasionally students went to great lengths to explain how the change in land ice in Antarctica affected albedo and therefore had an impact on ozone depletion. 47% of students failed to achieve a mark on this question.

07.4
This question was attempted by the majority of students with most (55%) achieving the first marking point. Very few answers showed an understanding of a satellite's capability for collecting data rapidly from high to low latitudes in order for ozone levels in these different areas to be compared. Ground based surveys would take much longer.

Question 8

08.1
A significant number of students went into too much detail of the environmental problem and had little discussion of how the problem may be reduced.

08.2
A minority of students gave an excellent definition of *'reserves'* in the context of the question. A number of students appeared to be confused over the terms 'reserve' and 'resource' with respect to metal ores. This became more apparent in the answers given to question 8.4. 22% of students gave a creditworthy definition.

08.3
25% of students gained 1 mark but failed to achieve full marks again due to incorrect calculation of significant figures. 15% of students achieved full marks.

08.4
Students that understood the concept of 'resource' and 'reserve' and explained how a resource could become a reserve as well as giving examples scored highly. Many students gave detailed examples of improved exploratory and extraction techniques. Too many students gave vague answers of there being technology available but no detail was given. 5% of students that achieved 7 – 9 marks stated the factor that may affect the reserves of bauxite, explained why the factor would affect the reserves and gave detailed examples.

Question 9

09.1
Students appeared to struggle to give concise answers that were creditworthy. Many students (51%) achieved 1 mark, mainly the second marking point. The first marking point, referencing over estimation of population density, was rarely seen.

09.2
Few students (28%) gained full marks, a significant number failed to calculate the correct number of ponies.

09.3
Students offered good suggestions as to the reason for the difference in the number of Pale Dog Violets between the two fields. Students that suggested that ponies grazed more had failed to understand the information given about livestock units earlier in the question. 26% achieved full marks.

09.4
Most students made a good attempt at this question. Many answers often included detail on a range of points. Students that discussed in detail a limited range of points, such as only biomimetics and medical research, did not achieve the highest marks. 11% of students achieved 7 or more marks.

10.1 /10.2/10.3
These questions were answered well with the majority scoring mark on each one.

10.4
34% of students scored 2 or more marks for this question. Lower scoring students failed to give the detail required of their stated process. The command word is 'outline' – so only *'aeration'* given as the answer is not enough.

10.5
Students that scored highly on this question addressed a minimum of two out of four methods for increasing water supplies and gave both the positive and negative environmental impacts. Many students either only discussed the negative impacts or concentrated on only one method. A number of students appeared to have little understanding of the nature of aquifers, mentioning that it is difficult to '*create'* aquifers or mentioned underground lakes of water that could be utilised. 7% of students score marks of 7 or higher.

Question 11

11.1
A majority of students (69%) focused on the water content for heating period 1 rather than ensuring the soil was dry in preparation for determining the organic matter content of the soil.

11.2
16% of students achieved the correct answer.

11.3
Students that clearly understood standard deviation and how it is used achieved full marks. Many students did describe whether the S.D. from each farm for organic matter content did or did not overlap but then incorrectly stated whether there was a significant difference or not.

11.4
75% of students achieved 1 or full marks.

11.5
Excellent answers were given by some students (6%) These answers covered a range of practices that affected soil erosion. Detailed explanation was given of how these practices increased soil erosion and how another practice could be adopted to reduce the impact of soil erosion. Students that focused on one or two farming practices or gave an unbalanced account did not achieve the higher marks. Many students just stated, for example, that *'ploughing increases soil erosion'* but failed to discuss why or what other practices may be adopted to reduce soil erosion.

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the Results Statistics page of the AQA Website.