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GCE

Science

Advanced Subsidiary GCE **AS H178**

Examiners' Reports

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Oxford Cambridge and RSA Examinations

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G641 Remote Sensing and the Natural Environment

General Comments

The candidates appeared to find the paper straightforward, with few failing to attempt all the questions.

Comments on Individual Questions

1 Practically all candidates could identify the retina and name the photoreceptor cells, but some were confused about their function. The majority also answered (b) correctly, but a disturbing number thought the ultraviolet wave travels faster. Part (c) was well answered, the commonest error was to bend the ray beyond the normal. Part (d) proved to be a good discriminator with the better candidates producing some excellent explanations. Weaker candidates would just throw down phrases like 'natural selection' or 'survival of the fittest' with no explanation, or there was a belief that the gecko could learn to see in the dark or increase the number of photoreceptors at will and then pass these on to their offspring.

2 Candidates found this the most demanding question on the paper. (a)(i) was very poorly answered. It was frequently left blank, but common incorrect answers were fungi and algae, but in (ii), most could come up with at least one product of aerobic respiration. However, they then failed to realise that (iii) was actually about anaerobic respiration, saying things like 'without oxygen, it would just rot', missing the point that rotting is a bacterial process. Most failed to score in (b).

Part (c) proved difficult, yet it was just a variation on the usual question about eutrophication and there had been hints about the growth of reeds along the way. The commonest misconception was that algae need oxygen to grow.

3 Candidates are now well used to drawing a wave and most could identify amplitude correctly. There was still some very sloppy labelling of wavelength, however. The commonest error in (ii) was the failure to convert cm to m. However, most could rearrange the equation, cope with standard form and were aware of the correct units. Although Q3(b) has appeared a number of times on the paper in recent years, it is still poorly answered (although improving). A common error was to assume that different numbers are assigned to different wavelengths, rather than the intensity of the radiation. A significant proportion failed to mention that numbers were involved at all. In (c), candidates tended to confuse pseudocolour with false colour images, assigning colours to different wavelengths rather than shades fo grey or ranges of numbers. However, they were able to recognise that they are easier to interpret.

4 Candidates scored well in 4(a)(i) and (ii), but responses in (iii) were poor. They merely described the graph in terms of carbon absorbed, e.g 'from January to March the carbon absorbed is negative', rather than mentioning that it is released and explanations were very thin, if they were there at all. The disruption of steady state was well understood in (b)(i), but the term 'negative feedback' was less well known.

5 Few candidates were aware that healthy vegetation reflects NIR well and so were unable to interpret the satellite image correctly. The effect of the atmosphere on visible light was not well known, although many did realise there is a problem at night time. However, most could identify the types of radiation used in communication in (c), with reading DVDs with lasers being the most problematic. Parts (ii) and (iii) were well answered.

G642 Science and Human Activity

General Comments

A total of 386 candidates submitted scripts for the June 2011 G642 Science and Human Activity paper. The spread of marks was similar to last year with fewer very poor scripts. There were a number of questions that many centres found difficult which will be referred to later in this report. Generally speaking the scripts were clear with very few border-line illegible scripts. Many students still fail to appreciate that questions are structured in a way that build on the topic being assessed. Too many students are seeing part questions in isolation rather than appreciating that early parts of the question are likely to act as a guide to later sections of the same question. A minority of students are not reading the question paper sufficiently carefully and thus are missing straight forward marks. There are other general issues of exam technique that could be addressed if students are to improve marks. Some of these will be referred to below.

Comments on Individual Questions

1 A straight forward question with better students securing all 7 marks. Many marks could have been improved if students had read the passage first and then selected the best words rather than enter plausible answers on first reading.

2 Parts (a) (i) and (ii) proved straight forward but the rest of the question proved difficult for many. Few students could not EXPLAIN the reason behind the molecule's dipole. Ideas behind solubility and hydrogen bonding were not well understood. Many students thinking that covalent bonds are broken in the solvation process.

3 Equations were well balanced showing a significant improvement in this area. The explanation behind the release of metal ions from the soil by acid rain was answered well by many but elicited some very vague responses in some cases. Better answers had well labelled diagrams to support written answers. In section (c) many students still see the HSW terms accuracy (how close to the true value) and precision (the number of decimal places to which a quantity is measured) as interchangeable terms and so lost marks on (c) (ii).

4 This question provided a clear example of weaker students failing to see the question as a whole (see general comments) The introductory parts were well done by many (although it may be that some students have not seen an IR spectrum in their lessons?) The frequency and energy calculations were well done. Surprisingly a simple definition of a radical was not well known and part (d) was poorly answered by many because they are failing to use the equation at the start of the question and in part (c) (i). Weaker students talked about bacteria returning nitrogen gas to the atmosphere and then reacting with oxygen in the air. Consideration of the question as a whole would have avoided this mistake.

5 This proved to be an accessible question. Only the stronger students realised that by substituting the CYS residue in particular disulfide bonds could no longer form and thus this would have a significant impact on tertiary structure. Many pupils understood competitive inhibition but not non-competitive inhibition.

6 This question gave well prepared students the chance to score well and marks of 8/10 and 9/10 were frequently awarded. It is worth emphasising that a clearly labelled diagram could have secured many marks on this question and, although a space was provided, a significant minority of pupils are attempting to answer the question without a diagram

7 Few students could explain the term ionising radiation and many students answered their own question that seemed to be interpreted as "what are the potential effects of ionising radiation?" The half life question was generally well answered.

8 Many students failed to answer part (a). The calculations, again, were generally well done and most students made attempts at part (c) although many think that fissile material is a renewable energy resource.

G643 Practical Skills in Science

General Comments

All candidates completed a suitable Practical Task and Case Study from the ones available for moderation in 2011. In each case all three possibilities were attempted by a fair proportion of the candidates.

Practical Tasks

Most candidates completed the Practical Task and produced suitable results. Analysis and Evaluation were the skills which caused the most problems. If the criteria state that temperatures must be recorded to 0.5 ^{o}C this must mean all of them and not some of them. In all Practical Tasks the moderator has to check the candidate's results against the Supervisor's. It is important that the Supervisor's results are included.

Candidates generally recorded the results in suitable tables usually with correct units. The graphs sometimes had incorrect lines of best fit. In the rates task, as has always been the case, large triangles must be drawn at the origin to get accurate gradients.

The problem still comes in Evaluation where candidates are not expected to evaluate their performance but the method – its limitations and possible improvements. Using better equipment alone is not enough unless the candidate can explain why it is necessary. In the volume of gas experiment, for example, controlling the temperature of the water bath is important. In the hydrogen peroxide decomposition candidates did not realise that oxygen would escape as the apparatus is assembled. Candidates need to consider the quality of the data. If there are repeats the candidate should look at their closeness. If there are not repeats perhaps the closeness to the line of best fit might be considered. In the gas volume task candidates might realise from their theory studies that projecting their graph should go through –273 ^{o}C.

Case Studies

It is important to match the criteria for each Quality. There is additional guidance which accompanies the criteria in each task.

In Quality A there is often too much reliance on sources such as Wikipedia. The references at the end of a Wikipedia article can sometimes be helpful. For 1 mark the candidate only uses the material provided by OCR. For 3 marks they find two suitable sources such as textbooks, encyclopaedias and descriptive sources. These sources must be fully referenced so they can be checked. Finding more similar sources does not lead to a higher mark. A higher mark can only be achieved by finding the original work of the scientists listed in the stimulus material or their contemporaries. There should be data for use in Quality C.

In Quality B the Moderator is looking at the understanding of the Science. Too often material is just pasted in from websites. This does not show understanding. In the Haber task, for example, to score high marks the candidate must explain how Le Chatalier's Principle explains the control of the equilibrium. Depending upon the task candidates should consider either ethical issues and/or the safe and skilful techniques used by the original scientists.

In Quality C, even for 1 mark, the candidate must find a trend in the OCR stimulus material. This must be a real trend and not a fact. For 3 marks the candidates must carry out basic processing of data.

To go above 3 marks further higher processing must be done to reveal additional information. this cannot just be done with routine plotting of a graph. Only at 5 marks is there a need to consider reliability and validity. This does not mean as at GCSE that they say one source is reliable and another is not reliable. They have to consider the reliability and validity of the data.

Summary

Centres generally supplied their samples quickly and the portfolios were arranged well. The marking was usually clear and in red. There was some useful annotation which helped the moderators to support marks awarded especially during the practical aspects.

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