OCR
Oxford Cambridge and RSA

GCE

Science

Advanced Subsidiary GCE AS **H178**

OCR Report to Centres June 2016

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This report on the examination provides information on the performance of candidates which it is hoped will be useful to teachers in their preparation of candidates for future examinations. It is intended to be constructive and informative and to promote better understanding of the specification content, of the operation of the scheme of assessment and of the application of assessment criteria.

Reports should be read in conjunction with the published question papers and mark schemes for the examination.

OCR will not enter into any discussion or correspondence in connection with this report.

CONTENTS

Advanced Subsidiary GCE Science (H178)

OCR REPORT TO CENTRES

G641 Remote Sensing and the Natural Environment

General Comments:

This was the final year of the examination and the entry, whilst slightly larger than last year, was still very low.

Candidates found the paper accessible and there was a wide spread of marks. Invariably, all the questions were attempted.

Comments on Individual Questions:

Question 1

(a) Candidates were well aware that the minerals leached into the water from the land, but they rarely attributed it to the ducks, focusing rather on the 'farm' and quoting the use of fertilisers.

(b) They could describe the effects of the different minerals on plankton growth, but often failed to tie in the geographical location of the sampling sites in relation to the duck farm.

(c) The basics of the nitrogen cycle are well known by the better candidates. The commonest error was to assert that nitrogen fixing bacteria produce nitrates. The use to which they are put in a living system was well known.

Question 2

(a) The differences in wavelength and frequency between the different areas of the electromagnetic spectrum were well known, but their common speed, less so. The commonest wrong answer was ‘amplitude’.

(b)(i) Weaker candidates lost the mark by omitting 'thermal'.

(b)(ii) Whilst many candidates recognised that the brighter area corresponded to greater intensity of infrared radiation, there was confusion as to whether it was being emitted or reflected. For those having decided it was emitted, there was further confusion as to how it arose - heat being given out by respiration was a common suggestion. Some candidates mixed the whole thing up with satellite imagery using NIR.

(b)(iii) Candidates are now well used to questions linking the intensity of radiation and the production of an image. Only the very weakest failed to score at least one mark.

(c) The mark describing the property of the radiation causing damage to DNA was the one most usually lost.

Question 3

(a) An easy question, universally well answered.

(b) Whilst most could identify that the waves became closer together when they entered the glass, only the stronger candidates recognised that they had slowed down.

(c)(i) All candidates recognised that waves spread out as they pass through the aperture. Some remembered that the waves would be a similar wavelength to the aperture, but only the most able were able to suggest widening the gap to lessen the diffraction.

(c)(ii) Whilst the blurring of the image was quite well known, only the stronger candidates suggested it was at the edges.

Question 4

(a) Even weaker candidates could produce a creditable definition.

(b) A straightforward question. The commonest error was the confusion of respiration and photosynthesis. The energy components were well understood.

(c) The calculation was well done and there were sensible suggestions as to other uses of energy by the caterpillar. We have at last moved away from the lower level answers of 'growth' or 'heat'.

(d) Everyone could name a decomposer, but factors inhibiting its function and what then happens was another matter. The build-up of organic matter, or inability to recycle nutrients was not widely understood.

Question 5

(a) This question was surprisingly poorly answered. Responses tended to be too vague - e.g.'temperature'.

(b) The term *biodiversity* is well understood

(c) A good discriminator. Weaker candidates would mention 'geographical isolation' without going into any details of the terrain. Others would simply describe the process of evolution (in some detail). Stronger candidates produced some excellent and thoughtful responses.

(d) This question was universally well answered. Deforestation was the favourite response.

G642 Science and Human Activity

General Comments:

This series was the final time that this unit will be offered

This year saw a slight rise in the total number of entries for this paper compared to the previous two years. The overall standard of candidates' responses remained generally pleasing and the number of very poor scripts seen was extremely low. The highest raw mark was 83 and the lowest was 24.

As in previous series, many candidates seemed to have heeded advice to use language carefully in their responses and the general scientific accuracy of the responses seen was much better than in some previous sessions.

Candidates found the more open nature of some of the questions more challenging however and it was rare to find even the best candidates scoring full marks on these questions.

Many of the calculations were completed confidently and accurately, showing competence in handling both powers of ten and the rearrangement of selected formulae.

Comments on Individual Questions:

Question 1

Most candidates found this an accessible opening question.

Many responses lost marks in (a) (ii) by not specifying that the catalyst remain unchanged at the end of the reaction. Few candidates realised that in (c), the key idea was to choose a replacement molecule with a similar boiling point.

Question 2

This was answered well by the majority of candidates, with some good clear descriptions of the role of tRNA.

Question 3

This proved a demanding question for many candidates, even though the North Atlantic Oscillation and the sinking of water in the North Atlantic are specifically mentioned in the specification. Many candidates drew the wind direction arrow incorrectly in **(b)(i),** often showing it pointing directly from high to low pressure.

There were some good answers to (d) (ii) although many did incorrectly refer to ice formation.

Question 4

Almost all candidates correctly balanced the equation in **(a)(iii),** although much fewer could write a correct equation for dissociation in **(a)(iii).**

Most candidates could describe titration in general terms, but only the very best responses contained the fine detail to score full marks.

Some marks were lost by some imprecise wording; for example many candidates referred to repeating the titration, but to score full marks it was necessary to describe both repeating the titration with the same sample of acid rain (in order improve reliability) and to repeat the whole process with the second sample of acid rain to make a comparison.

Question 5

Calculations were often completed correctly in this question, although many candidates were unsure about how to handle the fact that wavenumber is given in cm^{-1}, not m^{-1}.

Few candidates were aware that that frequency (or wavenumber) of the radiation absorbed depends on the mass of the atoms in the bond.

Question **(c)(ii)** was also demanding for many, with few responses making a clear comparison between the half-life and very long time that has elapsed since the organisms died.

It was pleasing to see some excellent answers to the description of the action of greenhouse gases in **(d).**

Question 6

This question had some structured questions about enzyme action and then a long, extended writing question about alternative fuels. Questions about enzymes are usually answered well by candidates, and this was true in this paper also. However, few answers to **(c)(ii)** referred to the link between changes in pH and the charges on the side groups in the active site.

The extended response question proved to be more of a challenge, and scores of 7 or 8 marks were rare; most candidates scored in the range 3-5 marks. Many candidates, when describing advantages simply stated that no carbon dioxide would be emitted – which is true for all of these alternatives and hence gained no credit. Some descriptions of advantages were presented in a slightly woolly way; for example it was common to read that nuclear fission (or fusion) produces a lot of energy, rather than focusing on the idea that a lot of energy is produced from a very small mass of fuel.

Very often, candidates failed to state their choice of strategy, or to make any justification for their choice, and this meant that they were unable to access the higher mark in each of the levels in the mark scheme.

Question 7

Candidates were very confident with the electrical calculation in **(c)** and the idea of reducing power in **(b)(ii).** Most candidates found it difficult to define a field in **(a)(i)** and, surprisingly the idea of field strength being indicated by the closeness of field lines was only familiar to a minority of candidates.

G643 Practical Skills in Science 845777 38723596

This component gives centres the opportunity for candidates to show their competence and ability in skills not assessed in the written papers. Staff are thanked for their preparation and marking of both the case studies and the practical tasks. Work seen this series was again well annotated and the centres had enclosed the supervisor's results with the candidates' practical work. This is a requirement necessary to support the moderation process. Centres are thanked for the promptness of sending their samples for moderation following electronic requests from OCR. Work again was suitably collated and cover sheets clearly completed and attached to the work. Candidates and centres are thanked for their support of this specification

Radiocarbon dating was a popular choice and a wide variety of research was evidenced by candidates. It was evident this session that some centres had used the additional guidance 'Instructions for teachers and technicians' which accompanies the criteria.

The case studies offered this session were:

- **DNA sequencing and the human genome**
- **Infra-red spectroscopy**
- **Radiocarbon dating**

For **Quality A** there was still some generous assessment where full marks were awarded. Some very good scripts however were moderated, particularly for 'Radiocarbon dating' where candidates had completed a variety of independent research and it was evident that the sources had been used effectively and references were evidenced throughout the report.

For **Quality B** most candidates did show some understanding of the topic chosen. Again this was more evident in the radiocarbon dating where interesting and relevant scientific information was endorsed. Generally candidates did produce information to include ethical issues but in most cases this was quite basic and discussions of statements researched were not evident.

The relevant safety techniques were also minimal but evidence of higher level scientific understanding regarding half-life and decay were often included. Candidates were still not adapting their research fully to support both the task requirements and demonstrate their understanding of the assessment criteria.

Quality C for 3 marks candidates are expected to carry out some processing of data and identify the main conclusions, patterns or trends from the outcome of their research.

In several scripts which were moderated, data was collected but processing was either copied or quite basic. Numerical information displayed in tables was only processed to a basic level e.g. bar chart displays or basic percentages. To attain 4 or 5 marks candidates should be carrying out higher level processing which could reveal further information. For 5 marks work should also show that candidates have considered the reliability and validity of the data used, simply stating that a particular source is reliable is insufficient. Conclusions also need to have depth of scientific understanding for the higher mark bands.

Practical Tasks available this session were:

- **The Pendulum**
- **Changes in intermolecular bonding with temperature**
- **Catalytic decomposition of hydrogen peroxide**

The evidence seen through moderation indicated that the practical tasks were achievable by the candidates and results collected were suitably processed. For the most part, centres demonstrated careful assessment and a correct application of the mark scheme.

For most candidates assessment of **Skill A2 Demonstrating safe and skilful techniques** was supported. This was assessed by the staff supervising the practical task.

Assessment of **Skill B1 & B2 Making reliable and valid observations and measurements and recording them** was also generally supported. Most centres had included staff results, it is important that these are sent with candidates' work. Candidates' results are checked in the moderation against those completed by the staff. Candidates had designed their own tables for their results, but correct units and the recording of the data to the correct number of decimal figures was not always adhered to.

For **C2 analysing and interpreting results,** graph plotting was much better this series and scales and labelling of axes were generally correct. For The Pendulum task candidates had drawn appropriately sized triangles for gradients and calculated correctly. Most candidates did again correctly link viscosity and intermolecular bonding.

For C3 & C4 Explaining and Evaluating. This section scored highly this series as the majority of candidates are now correctly commenting on the repeatability of their data i.e. by including statements such as scatter/range bars were small, points were on a straight line, and all 3 values were considered and were within +/- stated value were evident. In addition there was a vast improvement of the detail required by candidates when describing the reliability of the experiment carried out and how this could be improved. Sources of error were also well documented. There were also better suggestions given on possible improvements supported with correct reasoning or indication of why these should be used.

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