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FOREWORD

This booklet contains reports written by Examiners on the work of candidates in certain papers. **Its contents are primarily for the information of the subject teachers concerned.**

ENVIRONMENTAL MANAGEMENT

GCE Ordinary Level

Paper 5014/01

Paper 1

General comments

On this paper the total mark out of forty for the answers to **Questions 1 – 4** was usually similar to the mark for **Question 5**, also marked out of a total of forty. The mark for **Question 6**, also out of a total of forty, was typically a few marks lower. This repeats the previous pattern. The average mark for **Questions 1 – 3** was the same; for **Question 4** it was about one mark lower. Some candidates gave full answers and maintained quality of performance throughout the six questions. Others felt the pressure at one or more points during the examination so that their overall standard was reduced by some inferior answers.

Answers were attempted to all questions by the majority of candidates; shortage of time for finishing the paper did not appear to be an issue this time. Questions which required construction only, for which no lines were provided in the answer booklet, such as **Question 5 (d)(ii)** and **Question 6 (a)(i)**, were the ones most likely to have been left unanswered, even though practical skills questions like these typically yield high average marks. There was a tendency for candidates to use up the first two lines for repeating the question, without having begun to answer the question itself. Therefore, some candidates did need to continue answers, especially to longer questions, into the spaces below the lines. This was quite acceptable; everything was marked provided that the candidate made clear exactly which question was being answered. Nevertheless, it would have been better examination technique to have given more direct answers, particularly as filling the number of lines available is synonymous with having fully answered the question in the minds of many candidates. Not all candidates made best use of the two guides to the amount of detail expected to each question – the sub-mark and number of lines.

Another general failing in examination technique was exposed most clearly in parts **(a)** and **(b)** of **Question 6**; this was the failure by many candidates to use and quote information from the graphs, despite in some cases precise instructions in the question to do so. The result was many answers about the general causes of flooding in **Question 6 (b)(iii)** and the general reasons for the use of irrigation water in **Question 6 (b)(v)**, unrelated to the rainfall data provided.

Comments on specific questions

Question 1

The typical mark for answers to part **(a)** was two; the second mark remained unclaimed in part **(a)(ii)** because the difference in trend between fluctuations pre-1985 and a more constant increase after 1985 was rarely noted. In parts **(b)** and **(c)** the choice of possible answers was wide; therefore, candidate marks tended to reflect breadth of response. More candidates could have used the sub-marks and number of lines as guides towards the amount of detail needed.

Question 2

The information supplied in the question was used well in part **(a)**. Some candidates stopped after mentioning just one or two advantages in part **(b)**; without any attempt to elaborate in their answers, this was insufficient for all three marks. There were many possible answers to part **(c)**. Limited content, rather than problems with understanding, restricted the value of some answers.

Question 3

Parts **(a)** and **(c)** posed few problems. However, the answers to part **(b)** were frequently inadequate because examples of different types of surface (land and sea, light and dark, rock and vegetation covered) were hardly mentioned and little used.

Question 4

Answers from most candidates to part **(a)** were very weak because they attempted to answer too narrow in terms of human populations instead of studies of ecosystems, as demanded in the question. Food chains and how they work in part **(b)** were well understood, even if answers were not always as precise as they might have been. The typical answer to part **(c)** included references to two reasons; candidates who kept their eye on the comparative theme of the question produced the more effective answers.

Question 5

The needs of part **(a)** were well appreciated by candidates. In inferior answers there was little development beyond what was provided in the stem of the question. In better answers, candidates not only mentioned photosynthesis but also provided further relevant details. References to plants as primary producers and importance of sunlight and heat in relation to the water cycle were characteristic inclusions in answers worth three or four marks. Between answers that were clinically precise in **(b)(i)** were others which appeared to suggest some guesswork had taken place. Use of rocks in building or construction was the way most frequently described in **(b)(ii)**. Choice of marble or limestone seemed to offer the best opportunities for fuller description to claim the second mark. Many answers to **(b)(iii)** were very clear and accurate; if the formation of only one type was known, it was more likely to be igneous than metamorphic. Answers that spread the idea that metamorphic rock was a 'mixture' of igneous and sedimentary rocks, or that sedimentary and igneous were in some way 'combined' to form metamorphic rocks, were less precise. Some candidates struggled to find accurate expression for an effective answer to **(b)(iv)**; 'hard' and 'soft', 'impermeable' and 'permeable' were examples of answers that were not credited. Better answers included references to soil composition or structure.

Many answers to **(c)(i)** seemed to draw too heavily upon what the diagram showed; references to typical depths or widths for the continental shelf, that could have added some precision to the answer, were rare. The two most obvious answers to **(c)(ii)** were fish and minerals (especially oil and natural gas). Answers to **(c)(iii)** tended to be dominated by concentration upon one reason alone, such as lack of technology or cost; this generated answers which were too shallow or narrow for all three marks. Those answers which included problems for both discovery and exploitation were the most successful. Inclusion of weather conditions, whilst not compulsory for a full mark answer, was one of the characteristics of good answers.

Many candidates in part **(d)(i)** managed to state two similarities such as fossil fuels, non-renewable resource or formation from the decomposition of organic materials. One common answer that was not credited was 'all come from underground', as it was considered to be too imprecise. In part **(d)(ii)**, those candidates who did not mark on the scale were the ones most likely to make mistakes in showing segment sizes. It was essential for the shading shown in the key to match that used in the graph; this was not always the case. 'Increased demand' was a common, but inadequate, answer to the first half of part **(d)(iii)**, because in effect the candidate was doing no more than restating what was already given in the question. The more successful routes used to answer this question included references to growing world population, higher levels of economic development, more and greater use of technology and the relative ease and cheapness of use of fossil fuels. There was a tendency for some to write their answers to the second half of this question in too general a manner. Potential mark earning points, such as relative cheapness, availability, ease of use and widespread uses gained marks only after individual fuels were named. Candidates found comment about oil easiest, because of its great importance for cars and other means of transport. Answers which contrasted coal with oil or gas in terms of higher costs of extraction, less easy use, lower heating efficiency or more pollution, were the ones that gained all six marks. One misunderstanding was that coal's relative decline in importance was due to exhaustion and its shorter life expectancy than oil and gas.

Most candidates recognised that the photograph showed an example of an opencast mine in part **(e)(i)**, even if they did not always focus upon description of methods. Some drifted away from the question into advantages of this type of mining compared with underground mining. Good understanding of what was meant by sustainable showed through many of the answers to part **(e)(ii)**; what candidates found more difficult to demonstrate was application of the general to this particular example. The easiest way of doing this was to comment on the size of the area used for mining. A minority of candidates, who tried to argue that this was an example of sustainable development, usually on the grounds that the site could be filled in and reclaimed after mining ceases, faced an uphill task considering the depth and width of the mine, and the statement within the question about the number of years that known resources of copper were expected to last.

Four strategies for conservation and management of the Earth's fuel and mineral resources are in the syllabus; of these, new technology leading to the alternative and renewable resources was the most common used in answers to part **(f)(i)**. Recycling appeared from time to time, and there was an occasional mention of insulation in buildings. Those who tried to name and use the fourth strategy, increased efficiency in energy use, were less successful. The principal reason for this was that most viewed energy efficiency solely in terms of reduced consumption by cutting down on total amount of energy used. The more clear was the statement of valid strategies in **(f)(i)**, the better was the explanation of problems associated with conservation and management of resources in part **(f)(ii)**. The best answers invariably included full coverage of the problems associated with replacing fossil fuels by alternatives, such as cost of development, slowness of discovery and application of new technology and limitations imposed by the lack of suitable natural conditions.

Question 6

Part **(a)(i)** was well answered by those who did not miss it out. The main problem encountered by candidates was placement of the dots or crosses at equal intervals. From the responses, candidates did not find part **(a)(ii)** clear to answer. One of the most common answers was 'hot all year', which suggested that candidates were focusing upon 'Equator' instead of 'south of the Equator'. Others included references to rainfall without any hope of success. All that was required for the mark was recognition that temperatures were lowest in June and July, mid-winter in the southern hemisphere, however stated. The clear answer to part **(a)(iii)** was April to October. The expected answer to part **(a)(iv)** was savanna (or one of its alternative names), although tropical monsoon (not part of the climate section in the syllabus) was allowed. When the question for part **(a)(v)** was set, it was assumed that most answers would be wet season and that candidates would use examples of farm tasks by way of explanation. While wet season was the most popular choice, some candidates made out a good case for dry season, such as work associated with obtaining and using irrigation water. These answers were also credited on their merits. Overall content, however, was not always sufficient for a three mark answer.

The questions in parts **(b)(i)** and **(ii)** had a skills focus – to obtain and use the rainfall ranges shown in the dispersion diagram, in order to introduce candidates to what the diagram showed about rainfall totals in Zumbo. The majority gave the best answers of 1120 and 350. The disappointment came with answers to part **(b)(iii)**; too many candidates deserted the graph and the example of Zumbo and gave general causes of flooding. Only a few candidates appreciated that the diagram showed a wide spread of annual values around the mean, resulting in several years with significantly higher rainfall totals above 1000 mm. In part **(b)(iv)**, although some dealt only with health or income, the majority demonstrated good knowledge of water related diseases.

Answers to part **(b)(v)** suffered from some of the same problems as those to **(b)(iii)**. Only those who obeyed the instruction to quote values from the graph to support the answer produced strong answers. Candidates had plenty of choice since both the climate graph and dispersion diagram were suitable sources. The best answers given to part **(b)(vi)** were based around the choice of an example from the home country. The worth of some answers was reduced by an over-emphasis on reasons why irrigation water was needed. Answer quality to part **(b)(vii)** varied greatly. Candidates who gave strong answers focused well on the question theme of damage to the environment and included comments about salination and damage caused by building large dams or by the removal of water from surface and underground stores. Good coverage of one of these was adequate for all three marks. The weakest environment related answers came from those candidates who over-concentrated on soil erosion; they failed to appreciate that excessive use of irrigation water was more likely to lead to salination than soil erosion. The trickle drip type of irrigation, illustrated in part **(b)(viii)**, was familiar to most candidates. Despite this, there were many one mark answers, because comment was not directed towards the environmental theme of the question. In too many answers the focus was upon good crop growth and high output.

One mark answers to part **(c)(i)** were also common; often a valid point was made about either GM crops or established crops, but without the difference between them being established. Some candidates did not realise that the pie graph in part **(c)(ii)** had already been started for them. Typically there was a high level of correlation between candidate ability and answer quality in answers to both parts of **(d)**. Weaker candidates relied heavily upon the information supplied; from the weakest of all, only single statements for the scientist and environmentalist were made in part **(d)(i)**. Stronger candidates used the information as a trigger for broader explanation. Many candidates found the choice between the different views of scientists and environmentalists difficult to make in **(d)(ii)**. As a result, some answers suffered from an approach that was too two-sided for the question set. Those familiar with the use of GM crops, and with definite views of their own, produced good quality answers because they made a range of relevant points, whilst at the same time showing an awareness of the merits of the other person's viewpoint.

Paper 5014/02**Paper 2****General comments**

The paper was set in Malawi, a developing country in Africa. There were four questions, each presenting source data and information requiring a variety of responses from drawing tables and graphs to making suggestions about sustainable methods of using resources. The Examiners were pleased to see that nearly all candidates attempted every section on the paper and their written answers were usually easily read and understood. There was no evidence of candidates failing to complete the paper due to lack of time.

Comments on specific questions**Question 1**

This question tested the candidates' ability to gather and process data in a scientifically valid manner as well as identify and describe trends in data. The ways in which woodland with crops could be used in a sustainable manner was also considered.

- (a) Candidates needed to consider which plan of action for gathering information was least likely to give a reliable answer. If plan A was chosen then the weaknesses were that no information was gathered from the other two paths and the count was only done on one day. If plan C was chosen then again only one path was sampled and wood was not counted or weighed. Unfortunately some candidates selected plan B which was more reliable than either of the other plans so no marks could be awarded.
- (b) Nearly all candidates drew a table as the question asked and many gave two sensible headings for columns or rows.
- (c) Most candidates correctly calculated the number of bundles used in one week but a surprising number of candidates did not multiply 365 days by 33 to give the best answer. The alternatives of a leap year 366 days or 52 weeks were allowed.
- (d) Only a small number of candidates suggested two good improvements such as sampling for more than one day or finding the weight of each bundle or sampling at different times of the year.
- (e)(i) The graphs were usually correctly orientated and labelled but there were often errors in the scales chosen by the candidates and plotting the data. The Examiners did make some allowance for the small graphical area provided in the examination paper.
- (ii) The increase in charcoal consumption was often correctly found from the data table.
- (iii) A range of likely values was accepted but this question proved to be difficult for many candidates, the values given were often large over- or under-estimates.
- (iv) Some candidates seemed to have confused coal with charcoal. The Examiners hoped that a link with increasing population would be made. From this a number of ideas could be used to explain an increase in consumption.
- (f)(i) Candidates were asked to describe the changes in nitrate availability between points A-E. This was clearly done and candidates stated that there was an increase to a maximum at C and then a decrease.
- (ii) The change could have been described from A to E or a comparison between sample points after three years and at first cultivation. Only a small number of candidates wrote down every reading from the table or tried to explain the changes in nitrate availability.
- (iii) This proved to be a demanding question because candidates could often only state that there would be a low level of nitrates or the nitrate level had not had time to recover without going on to explain why this would happen.

- (iv) A diagram and details of a method of agroforestry cultivation were presented and candidates were asked to explain how four guidelines would encourage the sustainable use of this system. Examiners were surprised to find that many candidates did not state that seeds and fruits were a source of food for humans or farm animals. It was also suggested that the seeds could be used to plant more trees. The link between cutting trees for fastest growth at the time of the rainy season (given in the introduction of the paper) was made, but not as frequently as expected. Concepts of sustainable management of a resource are central to this examination and every paper provides an opportunity for the candidates to demonstrate their understanding of these concepts.

Question 2

The supply of water from a waterhole and a well was described in words and a diagram.

- (a) Candidates often correctly stated one advantage of having a well, such as time saved compared to walking to a waterhole, but many statements about the better quality of the well water were too vague to be given credit. However in parts (ii) and (iii) there were many good answers which included all the alternatives stated in the mark scheme.
- (b) Candidates were asked to explain why peoples' health would improve after the well had been built. Many candidates correctly suggested that there would be more water for washing themselves or clothes, also cooking with clean water without bacteria. Unfortunately some answers could not gain full credit as there were only vague references to clean or contaminated water.

Question 3

This question focused on fishing activities in a large lake and most candidates responded well to each section.

- (a) Most candidates correctly suggested protein as well as some valid alternatives. In part (ii) a wide variety of valid fishing controls were stated and they were often backed up by good explanations. It was clear that the need to control fishing was well understood by most candidates.
- (b) Many candidates carefully constructed questions about the supply of fish and gave alternative answers in a similar style to **Question 1** and **Question 2**. One mark was awarded for good layout and one mark for each question that helped to find out more information. Only a small number of candidates gave rather general questions such as how do you feel about the fishing that were not awarded marks.
- (c) A number of diseases related to water were correctly stated and in many cases the symptoms and method of disease spread were well known.

Question 4

This question considered the different values of people directly and indirectly involved in trading elephant ivory.

- (a) Some candidates could express the idea that the villagers could directly benefit from jobs and/or money from hunting for ivory as well as the country earning more money and so developing infrastructure. Unfortunately some candidates did not realise that the question was about international trade and so they suggested, from the source, that villagers would gain money guiding ecotourists. In (ii) the idea that limits would be needed to stop the supply of ivory declining and then the money that was earned from selling it was not communicated well enough to gain two marks.
- (b) Those candidates that understood that an ecotourist is specifically interested in seeing wildlife often correctly suggested that they might not approve of killing the elephants or reducing their numbers by selling ivory. This question proved difficult for the majority of candidates. In (ii) there were a wide variety of correct answers and it was clear that candidates appreciated how big and potentially dangerous an elephant is.

Overall

The candidates usually attempted all the parts of all the questions. However, the Examiners were a little disappointed to see that candidates did not always develop their answers to gain a second mark even though they seemed to have fully understood the question and have relevant knowledge.