

Scholarship

2012 Assessment Report

Science

COMMENTARY

The paper followed the trend in recent years of presenting information succinctly and providing bullet points as starting points for the candidates. Again, this worked well.

Candidates continue to write full answers and clearly there is no issue with the paper being too long. It should provide plenty of time for candidates to provide a considered response and so the length of the paper is appropriate.

The design and marking of the paper has recognised that it is a scholarship paper for *Science* students, not top students in single science subjects; a greater emphasis on geology in the last four years has helped to do this. The paper has provided plenty of opportunity to discriminate on the quality of the answers. Much effort has always gone into writing questions accessible to good Science students.

Question One: This question was a good question for assessing the candidates' ability to consider the issues around the genetic engineering of viruses or plants to reduce the fertility of possums. Candidates were not required to consider specific techniques for the insertion of transgenes, ethical concerns about killing possums or evolutionary processes. Candidates who were familiar with the old AS 90729 and the assessment specifications for that standard did not waste time writing about unnecessary information.

Question Two: In part (a) candidates were asked to consider isotopic ratios and cross correlation. Candidates needed to understand that the ratio of C12 to C13 is not the same as the total amount of carbon dioxide. Part (b) gave candidates the chance to exhibit their geological knowledge. The question was marked holistically so that answers in either part contributed to the total mark.

Question Three: (Surface temperatures of Venus, Earth and Mars) was a standard question that was enhanced significantly by asking the candidates to consider the roles of volcanic activity and water. The question was answered well, with nearly all candidates correctly interpreting the importance of distance from the Sun and two-thirds discussing the greenhouse effect in terms of the total amount of carbon dioxide present. A third of candidates recognised the importance of volcanism in replenishing atmospheric greenhouse gases. Good candidates were able to integrate the role of water into their explanation of the relative surface temperatures, through at least one of its multiple roles of greenhouse gas, lubricant of tectonic activity, absorber/reflector of sunlight in its solid/liquid forms, and regulator of temperature.

Question Four: (Sonar and marine animals in the ocean) was answered well. Most candidates recognised that the various shapes and sizes of swim bladders led to distinctive echo signatures, and many candidates related the reflected wave to the change in properties of the medium at the boundary of the swim bladder. The reasons for varying frequency (depth of propagation, resolution, and tuning the signal to a particular species) were well covered. The effects of depth on time for the return signal, size of signal, and distortion of the signal were considered well also. In assessing the response to how a layer of jellyfish could hide a submarine, the markers looked for an answer that did more than repeat the information in the question; for example, at least recognition by the candidate that large numbers of jellyfish would need to be present. The sonar map of daily vertical movement of different marine animals was included to illustrate the detection capability of sonar but it confused some candidates. Others used it as a cue to mention that the depth from which the echo comes can provide additional information to identify species.

This was the last year of Science scholarship. Next year Science scholarship will be replaced by Earth and Space Science (ESS) scholarship. In 2012 the questions gave an indication of the direction of the new ESS paper, while still examining the Science scholarship standard.

SCHOLARSHIP WITH OUTSTANDING PERFORMANCE

Candidates who were awarded Scholarship with Outstanding Performance typically:

- read the questions carefully and thoughtfully and covered all aspects
- were able to consistently apply a broad base of knowledge and skills to unfamiliar contexts
- clearly identified and applied relevant scientific principles and knowledge with insight
- expressed their ideas clearly and accurately and justified their statements
- logically structured their answers in essay form, using paragraphs to separate distinct aspects of the question
- expressed their ideas clearly and, for the most part, accurately, with confident use of relevant scientific language
- integrated a wide range of scientific knowledge in their discussions, so that their answers were broadly based
- reviewed and evaluated their answers and improved on some parts by adding additional paragraphs
- **question one:** had a sound understanding of the issues around the use of genetic understanding to decrease possum fertility
- **question two:** exhibited an understanding of cross correlation of evidence and thoroughly integrated relevant geological knowledge
- **question three:** recognised the importance of volcanism in replenishing atmospheric greenhouse gases and the various roles of water in the modification of surface temperatures, interpreted the data with insight
- **question four:** insightfully applied extensive knowledge and understanding to a unique context.

SCHOLARSHIP

Candidates who were awarded Scholarship but not Scholarship with Outstanding Performance typically:

- read the questions carefully and related the questions to their learning
- covered most aspects of all questions
- applied a broad base of knowledge and skills to unfamiliar contexts
- identified and applied most scientific principles relevant to each question
- expressed their ideas clearly and generally accurately and qualified their statements
- demonstrated some scientific insight
- structured their answers using paragraphs to separate aspects of the question
- expressed their ideas clearly and, for the most part, accurately, with confident use of relevant scientific language

- integrated a range of scientific knowledge in their discussions
- reviewed their answers and improved on some parts by adding additional paragraphs
- **question one:** had a good understanding of the issues around the use of genetic understanding to decrease possum fertility
- **question two:** understood the implications of the changing ratio of C12 to C13 and integrated relevant geological knowledge.
- **question three:** understood the greenhouse effect of carbon dioxide, the importance of volcanism in replenishing atmospheric greenhouse gases and at least one role of water in the modification of surface temperatures, interpreted the data to reach valid conclusions
- **question four:** successfully applied knowledge and understanding to a unique context.

OTHER CANDIDATES

Candidates who were not awarded Scholarship typically:

- often just repeated statements in a different way, or generalised, even when they were on the right track
- identified only some of the scientific principles relevant to each question
- expressed their ideas with insufficient clarity and accuracy
- covered only some aspects of some questions or focused on only a narrow aspect
- Applied the scientific principles, sometimes specifically to the question, sometimes in a more general way, and sometimes inappropriately
- demonstrated only occasional scientific insight
- “dumped” knowledge because they did not understand what was required by the question
- could not apply information or skills learnt to a new context
- used scientific language with various degrees of accuracy
- did not show evidence of either planning or reviewing their answers
- structured their answers in a variety of ways, sometimes logically and sometimes randomly
- expressed their ideas with various degrees of clarity and accuracy, with some candidates writing poor English and almost illegibly
- had not read or understood either the relevant Science standard or assessment specifications
- **question one:** had a poor understanding of the issues around the use of genetics to decrease possum fertility
- **question two:** did not understand the implications of the changing ratio of C12 to C13 and exhibited very little geological knowledge.
- **question three:** understood the importance of distance from the Sun but was not able to interpret the data accurately
- **question four:** only repeated information given in the question rather than successfully applying knowledge to a unique context.

OTHER COMMENTS

This was the last year of Science scholarship. Next year Science scholarship will be replaced by Earth and Space Science (ESS) scholarship. Careful reading of the new ESS scholarship standard and assessment specifications is essential as there are changes that candidates need to know about. The new ESS scholarship standard is based on the relevant Achievement Objectives of Level 8 of the New Zealand Curriculum document in the Nature of Science and the Planet Earth and Beyond strand. Candidates who only learn the material required to pass the Level 3 ESS standards will find themselves at a disadvantage.