NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

Scholarship, 2007

Science

Assessment Report

Commentary:

The 2007 scholarship paper in Science provided scope for candidates to display the full range of scholarship skills – discussion, analysis, interpretation, and the ability to relate a novel concept to prior learning.

The best performing candidates most commonly demonstrated the following skills and / or knowledge:

- scientific judgement – the ability to relate the question to their own scientific knowledge, ie to identify the science appropriate to the context
- insight – the ability to recognise factors which might be important in the integrated and sometimes unfamiliar context they were considering and to provide scientific explanation of why they might be important. Candidates cannot be expected to be correct in all of the factors that they identify but, at least, to show the ability to think scientifically
- coherent writing – answering the question in a logical, considered, and succinct manner. There were few generalizations and these were qualified with accurate examples
- broad knowledge – drawing on knowledge from all disciplines (biology, chemistry, physics, and geology) and considering both technical issues and more general issues (such as ethics)
- discussed all three groups considering all of the bullet points. They had enough general knowledge about the life cycles to understand when each would be able to produce insulin. They were able to work out how each would be contained and understood the ethical issues involved. Consequently, comments on these had substance and generalisations were qualified. There was confusion between bacteria and yeast but if the comments were accurate and relevant this was generally accepted (question 1)
- were able to relate magma type to the type of volcano (to excellence level) for both volcanic fields, and understood how trapped and expanding gas and water vapour affected the explosiveness of eruptions. They also understood the role of water from subducted sediments in forming magma in subduction volcanoes, and the implications of the “dry” magma in the hot spot volcanoes of the Auckland volcanic zone (question 2)
- understood implications of the relative polarity and density of the various reactants and products (part a). They then applied this to the experimental situation to justify the key steps. In part (b) they understood the link between the melting point of fatty acid chains and chain length and saturation, and could apply this to the use of biofuels in different temperatures (question 3)
- incorporated many aspects of wave behaviour, leading to a wide variety of very good answers. Although superficially the question was similar to a previous question on the use of echo location by dolphins and whales, successful candidates clearly related the ability of elephants to gain information and communicate in the two different ways to relevant physical aspects of waves. Comparable speed of waves in air and rocks; how distance could be determined; and the reflection, refraction, and diffraction of waves through the different media were more important than echolocation and constructive and destructive interference (question 4)
- were able to apply the properties such as absorption, reflection, and refraction of infra-red and visible radiation to the reason for the different temperature distributions on Venus and Mercury. A few candidates were able to provide a precise account of the greenhouse effect that causes the warming of Venus. Good candidates concentrated on both the effect of the Venusian atmosphere on the incoming radiation from the Sun, and the outgoing radiation from the planet’s surface. The variability of temperatures on Mercury was explained very well, with some candidates even bringing in the ellipticity of the orbit as another factor. A few candidates also suggested a mechanism suggesting how the atmosphere causes the temperature on Venus to be constant (question 5)

- identified the types of radiation that would be most suited to diagnosis and the types that would be most suited to treatment, and provided reasons (question 6).

Candidates who did NOT achieve scholarship lacked some or all of the skills and knowledge above and in addition they:

- did not read or understand the question properly. They focussed on a few key words rather than the whole question
- often "dumped" knowledge because they did not understand or take time to work out what was required by the question
- could not apply information or skills learnt to a new context
- repeated information without adding anything new or developing key ideas
- applied rote learnt skills and information from previous exam questions and were unable to adapt to new questions and contexts.
- made far too many generalisations, even if they were on the right track
- wrote about "contamination" rather than "containment", and made only very vague comments on ethical issues (question 1)
- were unable to relate the type of magma to the type of volcano for both volcanic fields (question 2)
- exhibited very few skills in justifying key steps in an experimental situation (question 3)
- repeated rote learned information from the 2005 question on dolphins. They also discussed the biological and ecological aspects of elephants, rather than physical aspects of waves (question 4)
- were not able to apply properties of electromagnetic radiation to a novel context (question 5)
- had not learned straightforward information on radioisotopes and diagnosis and treatment (question 6)
- did not show any evidence of planning their answers
- did not attempt all questions
- were not familiar with the Level Three Science skills and content.