Geology

2012 Chief Assessor's Report

Government of South Australia

SACE Board of SA

GEOLOGY

2012 CHIEF ASSESSOR'S REPORT

OVERVIEW

Chief Assessors' reports give an overview of how students performed in their school and external assessments in relation to the learning requirements, assessment design criteria, and performance standards set out in the relevant subject outline. They provide information and advice regarding the assessment types, the application of the performance standards in school and external assessments, the quality of student performance, and any relevant statistical information.

SCHOOL ASSESSMENT

Assessment Type 1: Investigations Folio

It was pleasing to note that most folios included copies of the performance standards attached to each task sheet presented to the students, with the specific features relevant to that particular assessment shown in bold and the level achieved by the student highlighted. A useful way of indicating the nature of evidence expected in a task is to name the specific features that are relevant to each of the task requirements.

The best folios provided a broad range of student activities that gave students opportunity to demonstrate all of the performance standards at the highest level, without any unnecessary duplication of the assessment of particular standards across multiple tasks. It is important that teachers carefully read the assessment design criteria and task requirements described in the subject outline and design their tasks so that students can provide evidence against all the criteria within the overall set of tasks. Teachers need to ensure that students have the opportunity to design a detailed geological investigation for the assessment of the I1 specific feature. Some folios included the required two practical investigations, but neither task provided the opportunity to tabulate data and/or graph results. Only a few students identified and explained sources of error or suggested improvements in practical investigation methods, which made it difficult for them to achieve high grades in the analysis and evaluation criterion.

It is important that teachers ensure that all of the italicised parts of the 'Content' section listed in the subject outline are included in either the fieldwork or practical work submitted. It is suggested that teachers use a checklist to provide evidence for the assessment of these parts.

Issues investigations were generally well done. However, students should be encouraged to use in-text referencing as well as a reference list, and to identify passages directly quoted from cited sources. Generally, tasks covered a wide range of topics and provided students with the opportunity to communicate their knowledge and understanding in a range of different formats.

Assessment Type 2: Skills and Applications Tasks

As with the investigations folio, attached performance standards, highlighted to indicate student achievement in tasks, were useful for the moderation process. When constructing tasks, teachers need to select questions carefully so that students have the opportunity to demonstrate high levels of achievement in the specific features that assess analysis of connections between data, concepts, observations, and issues in geology; application of geological concepts and evidence from investigations to solve problems in new and familiar contexts; and use of knowledge of geology to understand and explain social, economic, or environmental issues. Random selection of past exam questions does not necessarily cover all of these features. Teachers are encouraged to provide information about the conditions of assessment on the task sheet, to inform students about how the task is to be completed.

EXTERNAL ASSESSMENT

Assessment Type 3: Examination

This year 42 students sat for the examination, representing a significant increase from the 31 who sat last year. There was also a significant improvement in the quality of answers from this year's cohort.

Section A: Multiple-choice Questions

This section was done better than the other two sections. A majority of students were able to demonstrate knowledge and understanding of the broad range of topics covered.

Section B: Short-answer Questions

Question 16

(a) Most students were able to correctly identify the one mineral and three non-minerals, but some found it difficult to give sound reasons for their choices.

(b) Despite the provision of two photographs, including a cross-section, many students incorrectly identified the rock type as sandstone and were unable to name the climate in which the rock (calcrete) is formed. Few students were able to explain how the rings shown in the cross-section photograph were formed.

Question 17

(a) A reasonable number of students were able to link the large number of earthquakes with the likely upward movement of magma. The movement of plate boundaries was not accepted.

(b) Most students were able to recognise basalt and describe its formation, but very few were able to explain that the 'ropy' surface appearance was a flow texture. Many gave general properties of basalt without any reference to the photograph.

(c) Many students correctly named and described the function of a tilt-meter, but others described lasers, gas analysers or thermal cameras. Although some students struggled to name the instruments, if they clearly described the function and purpose, they received full marks in part (ii).

Question 18

(a) Although this part was well done by the vast majority of students, some did not understand that stating the 'degree' of sorting requires an adjective, for example, 'poorly' sorted. For the degree of rounding, it was expected that students would use terms such as 'sub-rounded' or even 'slightly rounded'.

(b) Most students recognised that because the fragments were poorly sorted and sub-rounded they had not travelled far from their source.

(c) Most students identified that although the energy level shown in the photograph was low, it had clearly changed over time. It was necessary to clearly explain the evidence for this, such as the fact that the rounding of the larger fragments must have required much higher energy levels at some time in the past.

Question 19

(a) Students were able to easily identify factors that caused the road to collapse, but they were not always careful to ensure that the factors they named were 'environmental factors', as required by the question. Correct answers included 'a freak storm', 'tidal erosion', and 'undercutting by ocean waves'. Simply stating 'weathering' or 'erosion' was not an acceptable answer.

(b) Most students were able to suggest a way to stabilise the area, such as by building a sea wall or a breakwater, or by installing a line of large boulders.

(c) A reasonable number of students recognised that the position of this road was inappropriate and that an engineer might advise not to build so close to the beach.

Question 20

(a) The best answers for the graph had the y-axis properly labeled with 'T (°C)', had a scale that allowed an appropriate spread of points to be plotted, and placed the numbers on the axis in the correct sequence; for example, with –20° at the top and –25° at the bottom. Line graphs that were best-fit as well as joining the points were accepted. A good title should provide a short description of the data, such as 'Atmospheric temperature, 1860–2005'.

(b) Most students recognised that the temperature was increasing (warming). Those who had drawn their graph upside down thought that the temperature was decreasing (cooling). There were a number of accepted answers to a suggested cause for a warming trend, including increasing levels of greenhouse gases, the burning of fossil fuels, and changes in solar radiation.

(c) Most students selected temperature or proportion of carbon dioxide, but many needed to explain more fully how the factor can be determined from ice cores.

Question 21

(a) Students only obtained marks for this question if the named features were of a coal seam (e.g. shallow, reasonable grade, size, thickness). Distance from a port or infrastructure were not accepted as correct answers as they are not features of a coal seam.

(b) Most students correctly identified the mine as open-cut.

(c) Most students were able to describe the dust causing coughing and health problems, and the noise preventing sleep. Students who wrote only the words 'dust' and 'noise' received only half the marks, as they needed to link the problem with the effect on health.

(d) To receive full marks for part (i), students needed to clearly make five points about possible procedures. Some students misread the question and explained ways of reducing the dust and noise of the mining operation. For part (ii), most students could identify key features of an environmental impact statement (EIS) other than rehabilitation, including effects on native flora and fauna, air and water pollution, visual impact, and Indigenous heritage considerations. To answer part (iii) of the question, it was necessary to refer to the article, which stated that an EIS is not required to consider effects on local people, only on flora and fauna.

Question 22

(a) This question was not well done. To obtain full marks, students needed to make sure that:

- all eight rock types were included in the key (even though two of them were not on the geological map that needed to be drawn)
- the key was arranged in the correct way, with the youngest rock at the top and the oldest at the bottom
- the direction of north was correctly shown
- the width of each rock outcrop on the map was similar to that shown in the block diagram
- a true 'geological map' (2D) was drawn, rather than a cross-section or 3D diagram.

(b) This question was poorly done. Although most were able to draw a correct dip and strike symbol, many indicated dips to the east rather than the west and were unable to indicate an acceptable angle of dip (30°– 45°). Students needed to show correct dip and strike symbols on each of the beds outcropping in the mapped area. Very few students indicated that the limestone bedding was horizontal.

Section C: Extended-response Question

Question 23

Students generally wrote much better responses to this question than to the extended-response question last year. They were able to describe open-cut mining as the method of extraction of aggregate, and to describe one of several methods of mining uranium, including in-situ leaching, open-cut, and underground mining.

Most students were able to include a diagram (at least one diagram was expected), although these were sometimes poorly labelled and/or without a scale. It was also expected that at least one field example (a particular mine or quarry visited) would be provided.

Environmental impacts of the mining methods were described well, as were the uses of both resources.

The sustainability of these two resources was not well described. It was expected that some depth of understanding would be demonstrated, not simply a statement that both are ‘non-renewable’.

OPERATIONAL ADVICE

Teachers seemed to be confused about which assessment type certain tasks belonged to. For example, mineral and rock identification tests were classified differently, and some research or investigation tasks were in skills and applications folders. Teachers should check the requirements in the ‘School Assessment’ section of the subject outline.

When designing assessment programs, teachers should ensure that:

- the specific features of the assessment design criteria for the task are indicated to the students
- the requirements of the task enable all the indicated specific features of the assessment design criteria to be fulfilled
- tasks set for both assessment types enable students to provide evidence against all four assessment design criteria — three or four specific features per task are usually sufficient to cover this requirement.

Chief Assessor
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