



Government of **Western Australia**
School Curriculum and Standards Authority



EARTH AND ENVIRONMENTAL SCIENCE

GENERAL COURSE

Externally set task

Sample 2016

Note: This Externally set task sample is based on the following content from Unit 3 of the General Year 12 syllabus.

Science Inquiry Skills

- construct questions for investigation, propose hypotheses, identify variables and predict possible outcomes
- plan, select and use appropriate investigation methods, including field work, sampling techniques, laboratory experimentation and control variables to collect reliable data
- organise and clearly represent data in tables and graphs to identify trends, patterns and relationships
- use evidence to make and justify conclusions
- use appropriate representations, including classification keys, tables, diagrams, maps and images to communicate understanding, solve problems and make predictions
- communicate scientific ideas and information for a particular purpose, using appropriate scientific language, conventions and representations

Science as a Human Endeavour

- the Western Australian resources industry makes an important contribution to Australia's economy and employment opportunities
- Barrow Island oil and gas field is managed according to environmental and cultural guidelines

Science Understanding

- exploration methods for locating ore deposits and energy resources, such as seismic survey, magnetic survey, gravity survey, soil and stream sampling, geological mapping
- the type of mining used is related to the depth, size and grade of the ore body, and the application of underground and surface methods of extraction reflects this
- social and environmental guidelines need to be adhered to in order to responsibly manage a mining operation
- environmental strategies are employed to rehabilitate an area after extraction operations have ceased
- the formation and preservation of fossils
- the study of fossils and their distribution provides information about our understanding of paleoecology and the changes that have taken place during Earth's history, such as meteorite impacts, climate change, volcanic eruptions

In future years, this information will be provided late in Term 3 of the year prior to the conduct of the Externally set task. This will enable teachers to tailor their teaching and learning program to ensure that the content is delivered prior to the students undertaking the task in Term 2 of Year 12.

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Any resources such as texts, websites and so on that may be referred to in this document are provided as examples of resources that teachers can use to support their learning programs. Their inclusion does not imply that they are mandatory or that they are the only resources relevant to the course.

Earth and Environmental Science

Externally set task

Working time for the task: 60 minutes

Total marks: 60 marks

Weighting: 15% of the school mark

1. A mining company has obtained a lease on an area of land in Western Australia where it plans to conduct exploration for possible ore deposits. (26 marks)

(a) Preliminary investigation of the area could yield some valuable information about the likelihood of ore deposits underground. Describe **two (2)** surface features that would provide information that a geologist could use from walking around a possible mineral deposit site. (2 marks)

(b) Name and describe **two (2)** exploration techniques that the company might use in its search for an ore body. (6 marks)

- (c) If a large ore body is discovered close to the surface, name and describe the type of mining operation that is most likely to be undertaken. (2 marks)

- (d) Describe **three (3)** impacts that this type of mining operation is likely to have on the local environment. (3 marks)

- (e) Identify **three (3)** procedures that could be undertaken before mining commences which will assist with the rehabilitation of the area after mining ceases. (3 marks)

Mining activities can also impact on communities living close to where the mine and mining activities are located.

- (f) Describe **three (3)** impacts that mining operations could have on the people living in the nearby town. (3 marks)

- (g) Describe **three (3)** strategies that could be used to limit the impact on people living near the mining operations (3 marks)

- (h) After a mine has become uneconomical, it is closed. List **four (4)** steps involved in the rehabilitation of a mine site after the permanent closure of the mine. (4 marks)

2. Smoke water is water that smoke has been bubbled through, and it has been discovered that it contains chemicals which can assist in the germination of some native species which have adapted to germinating after a bushfire.
A horticulturist is employed by a mining company to propagate plants for their revegetation program. He is growing a species of native tree from seed, and wants to investigate whether using smoke water will improve the germination rate of the seeds. These seeds normally take three weeks to germinate.
Plan an investigation which will enable the horticulturist to decide whether it is worth the expense of applying smoke water to the seeds. (16 marks)

- (a) Write a hypothesis for the investigation. (2 marks)

(b) Write a step-by-step procedure for carrying out the investigation. (5 marks)

(c) Name the independent variable in this investigation. (1 mark)

Name the dependent variable. (1 mark)

Identify **four (4)** variables which will need to be controlled. (4 marks)

(d) Draw and label a table for recording your results. (3 marks)

3. Mel and Ben are on a field trip and they come across a shaley rock that breaks into parallel layers. On close examination, Mel notices an impression of a leaf on the surface of the rock. **(8 marks)**

(a) Describe how this leaf impression was formed. Use a flow diagram to illustrate your answer.

(6 marks)

(b) What information could scientists gain from this rock in terms of the conditions that occurred when the rock was formed?

(2 marks)

4. Barrow Island has an oil and gas extraction facility in a Class A nature reserve. The mining operations are carefully managed to protect the flora and fauna in the reserve. **(13 marks)**

(a) There is a concern that if food waste is put out in normal bins, it will affect the behaviour of native animals in the area. Describe how this would occur. **(3 marks)**

(b) Food waste is dried in industrial ovens before it is removed from the island by boat. Give **two (2)** reasons why this process is followed. **(4 marks)**

(c) The mining industry is important to the State's economy. List **three (3)** job types that are directly involved in the mining industry. **(3 marks)**

(d) Identify **three (3)** industries that supply services to the mining industry. **(3 marks)**
