



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

SAMPLE ASSESSMENT TASKS

EARTH AND ENVIRONMENTAL SCIENCE
ATAR YEAR 11

Copyright

© School Curriculum and Standards Authority, 2014

This document – apart from any third party copyright material contained in it – may be freely copied, or communicated on an intranet, for non-commercial purposes in educational institutions, provided that the School Curriculum and Standards Authority is acknowledged as the copyright owner, and that the Authority's moral rights are not infringed.

Copying or communication for any other purpose can be done only within the terms of the *Copyright Act 1968* or with prior written permission of the School Curriculum and Standards Authority. Copying or communication of any third party copyright material can be done only within the terms of the *Copyright Act 1968* or with permission of the copyright owners.

Any content in this document that has been derived from the Australian Curriculum may be used under the terms of the [Creative Commons Attribution 4.0 International licence](#)

Disclaimer

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.

Sample assessment task

Earth and Environmental Science – ATAR Year 11

Task 1 – Unit 1

Assessment type: Investigation

Conditions

Time for the task: one session for planning
one session for conducting
25 minutes for in-class validation test

Task weighting

5% of the school mark for Units 1 and 2

Investigate soil properties: wettability

Many soils in Western Australia are ‘non-wetting’, which means that water applied to the soil is unable to penetrate, and therefore is not available for plant uptake.

You are to work in groups of two or three students to design and conduct an investigation into this issue.

You could compare the wettability of different soils, or test the effect of soil wetting agents on soil.

Your scientific report includes the following:

Planning

7 marks

Background research: What is soil wettability and how could you measure it?
How do soil wetting agents work?

Decide what you are going to investigate and write a hypothesis that relates the dependent and independent variables.

Plan the equipment you will require and the measurements you will make. Include replicates or repeat trials.

Conducting

12 marks

Write your procedure in sufficient detail to enable someone to replicate your investigation.

Draw a labelled diagram of your equipment setup.

Record your results in a suitable table.

Processing and analysis

11 marks

Discuss your results, including trends in your data, and make a conclusion. Relate your conclusion to your hypothesis.

Discuss the limitations of your investigation and make suggestions for improvements.

Hand in your scientific report.

Answer the in-class validation questions.

18 marks

Marking key for sample assessment task 1 – Unit 1

Description	Marks
Scientific report	/30
Planning	/7
Develops a hypothesis which relates the independent and dependent variables.	1–2
Lists all materials.	1–2
States how controlled variables are controlled.	1–2
Plans for repeat trials.	1
Conducting	/12
Clearly lists the procedure including:	
• logical detailed sequence of steps	1–2
• specifies how soil samples are measured	1
• specifies how added water (and wetting agent if used) is measured	1
• specifies how the amount of water absorbed is measured or calculated.	1
Provides a labelled diagram of equipment setup.	1–2
Selects appropriate equipment and collects accurate results.	1–2
Displays data in a table with appropriate headings and units of measurement.	1–2
Averages the data from repeat trials.	1
Processing and analysis	/11
Graphs data collected from the investigation (if applicable):	
• appropriate graph title	1–5
• axes correctly labelled	
• includes appropriate units of measurement	
• plots data correctly	
• draws the appropriate type of graph.	
Refers to specific data when describing trends in the results.	1–2
States a conclusion and relates it to the hypothesis.	1–2
Makes reasonable suggestions for improvements to procedure.	1–2
In-class validation questions	/18
1. Clear logical description of how the measurements for wettability were taken, and any calculations conducted:	
• measure initial mass of soil sample	1
• add a measured volume of water	1
• measure mass of wet soil or volume of water that was not absorbed	1
• calculate amount of water absorbed by samples	1
• average results from repeat trials.	1
2. a. Lists at least three controlled variables	1–3
b. Correctly identifies independent variable.	1
c. Correctly identifies dependent variable.	1
3. Clearly states a relevant conclusion based on the data.	1–2
Discusses the conclusion using relevant science understanding.	1–2
4. Describes the need for soils to allow water to penetrate so it is available for plant roots.	1–2
5. Describes 2 appropriate measures for improving the procedure.	1–2
Total	/48

Sample assessment task

Earth and Environmental Science – ATAR Year 11

Task 9 – Unit 2

Assessment type: Extended task

Conditions

Time allowed for completion of the task: 2 weeks

Task weighting

5% of the school mark for Units 1 and 2

Research the use of satellite information to monitor and manage biomass production

Satellite technology provides a vast amount of data including land surface temperature, sea surface temperature, infrared images, position, biomass estimates, spectral analysis, evapotranspiration, and much more. Farmers, horticulturists, foresters, conservationists and fishers can use this information to assist with monitoring and managing biomass production or natural resources.

Your task is to research this data as it applies to an Australian location of your choice and to discuss your findings. Use the points below to guide your research.

- Select an area to investigate and describe it.
- Describe at least two types of satellite data, the type of radiation they use and the information they provide.
- Describe the information that satellite data provides about your chosen area.
- Describe how the information gives a greater understanding of what is happening over time in the area.
- Discuss how the satellite information is or could be used to make decisions about managing the area.

You will be asked to respond to an in-class question based on your research. You may bring your research notes with you for this task.

Below are some resources to get you started, but you will find more information yourself.

Resources

http://www.pasturesfromspace.csiro.au/farm_by_satellite.pdf

http://en.wikipedia.org/wiki/Precision_agriculture

<http://www.satimagingcorp.com/applications/natural-resources/agriculture/>

Marking key for sample assessment task 9 – Unit 2

Description	Marks
Describes the selected area <ul style="list-style-type: none"> • topography, vegetation (1 mark for brief or 2 marks for detailed) • land use or other relevant information (brief or detailed) 	1–2 1–2
Describes two methods of satellite imaging e.g. photographic, infrared and the information this provides about the area e.g. vegetation, water sources, stock	1–2 1–2
Describes in detail how satellite information can show changes in two factors over time such as <ul style="list-style-type: none"> • changes in vegetation cover • water resources • stocking rates 	1–2 1–2
Describes two management strategies that could be developed or implemented for this area such as <ul style="list-style-type: none"> • removal of pest species • planting vegetation • selective fertilising of land • monitoring water extraction • observing the effects of strategies in subsequent satellite information 	1–2 1–2
Total	/16
Accept other relevant answers	

Sample assessment task

Earth and Environmental Science – ATAR Year 11

Task 11 – Unit 2

Assessment type: Test

Conditions

Time for the task: 45 minutes

Under test conditions

Task weighting

5% of the school mark for Units 1 and 2

Test: Ocean processes, energy transfer and biogeochemical processes

Question 1

- a. Use your understanding of the water cycle to describe the processes that transform salty seawater into the fresh water stored in underground aquifers. (4 marks)

- b. Show **three** (3) of these processes in a labelled diagram. (6 marks)

Question 2

- a. Explain the importance of photosynthesis to the organisms living in a freshwater lake ecosystem. (4 marks)

- b. Select **five (5)** appropriate plants and animals (both aquatic and terrestrial) from a freshwater lake ecosystem, and draw a labelled food web diagram which shows their relationships to each other. (7 marks)

Question 3

- a. Describe the role of nitrogen-fixing bacteria in the nitrogen cycle. (2 marks)

- b. Describe the role of nitrifying bacteria in the nitrogen cycle. (2 marks)

- c. Describe **one (1)** way that humans have interfered with the natural nitrogen cycle and how this affects the levels of nitrogen in the relevant parts of the cycle. (2 marks)

Question 4

- a. Oceans transport both energy and matter around the globe.
Explain this statement. (4 marks)

- b. Describe an important characteristic of El Niño? (1 mark)

- c. Describe the main effect of El Niño on the climate of south eastern Australia. (1 mark)

Question 5

Water is becoming an increasingly valuable resource as the rainfall in WA decreases.

In the table below list three methods that the Western Australian government uses to supply water for the population to use.

In the table, compare how much water each method will produce in the future and how much it will cost in the future. Use words such as most, least, moderate to complete the table. (9 marks)

Method of water supply	Amount of water produced	Comparative cost

Question 6

A horticulturist is growing a crop of lettuces in the soil at Wanneroo. This crop requires inputs of energy and matter in order for the plants to grow. List them below: (4 marks)

Energy input: _____

Matter input: _____

Marking key for sample assessment task 11 – Unit 2

Test: Ocean processes and biogeochemical processes

Description	Marks
<p>Question 1</p> <p>a. evaporation: pure water evaporates from seawater leaving salt behind precipitation percolation into aquifer</p> <p>b. diagram showing the three processes labelled arrows in correct direction</p>	<p>1–2 1 1 1–3 1–3</p>
<p>Question 2</p> <p>a. photosynthesis converts sun’s energy into biomass enables the producers to grow producers provide the food for first order consumers in the ecosystem higher order consumers eat the lower order consumers</p> <p>b. selects five appropriate labelled organisms e.g. algae, grass, trees, appropriate aquatic and terrestrial animals shows correct relationships between producers and consumers; 1 for each correct arrow</p>	<p>1 1 1 1 1–2 1–5</p>
<p>Question 3</p> <p>a. nitrogen-fixing bacteria absorb nitrogen from air convert it to ammonia</p> <p>b. nitrifying bacteria convert ammonia into nitrites or nitrates</p> <p>c. applying nitrogen-rich fertiliser, septic sewage systems or other relevant methods nitrogen levels increase in groundwater or freshwater</p>	<p>1 1 1 1 1 1</p>
<p>Question 4</p> <p>a. describes transport of energy: heat energy transported by warm water in ocean currents describes transport of matter: nutrients, biomass transported by masses of moving water</p> <p>b. warm ocean temperatures</p> <p>c. drier than average</p>	<p>1–2 1–2 1 1</p>
<p>Question 5</p> <p>Methods used:</p> <ul style="list-style-type: none"> • water catchment in dams • extraction of water from aquifers • desalination of salt water <p>compares future availability of water from each source discusses comparative cost of each method</p>	<p>1 1 1 1–3 1–3</p>
<p>Question 6</p> <p>Sun’s energy or UV light Matter inputs include</p> <ul style="list-style-type: none"> • water • nutrients/fertiliser • growing medium/soil • carbon dioxide (max 3) 	<p>1 3 x 1</p>
Total	/46
Accept other relevant answers	