



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

SAMPLE ASSESSMENT TASKS

EARTH AND ENVIRONMENTAL SCIENCE
ATAR YEAR 11

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Sample assessment task

Earth and Environmental Science – ATAR Year 11

Task 1 – Unit 1

Assessment type: Investigation

Conditions

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

Task weighting

5% of the school mark for Units 1 and 2

Investigate soil wettability

Many soils in Western Australia are ‘non-wetting’, which means that water that is applied to the soil is unable to penetrate, and therefore is not made 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 can compare the wettability of different soils, or test the effect of soil wetting agents on soil.

Planning

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

Write your procedure in list format in sufficient detail for someone to replicate your experiment.

Draw a diagram of your equipment setup.

Record your results in a suitable table.

Processing and analysis

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

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

Answer the in-class validation questions.

Marking key for sample assessment task 1 – Unit 1

Description	Marks
Planning	/7
Develops a clear hypothesis which relates the variables.	1–2
Lists all materials.	1–2
States how controlled variables were controlled.	1–2
Plans for repeat trials.	1
Conducting	/10
Clearly lists the procedure to be used: <ul style="list-style-type: none"> weigh or measure soil samples measure added water (and wetting agent if used) measure water absorbed. 	1–3
Shows a diagram of equipment setup.	1–2
Selects appropriate equipment and collects accurate results.	1–2
Displays data in suitable format.	1–2
Averages data from repeat trials.	1
Processing and analysis	/6
Makes a valid statement about trends in the data.	1–2
States conclusion and relates it to the hypothesis.	1–2
Makes reasonable suggestions for improvements to procedure.	1–2
In-class validation questions	/16
1. Clear logical description of how the measurements for wettability were taken, and any calculations conducted: <ul style="list-style-type: none"> measure initial mass of soil sample add a measured volume of water measure mass of wet soil or volume of water that was not absorbed calculate amount of water absorbed by samples average results from repeat trials. 	1–5
2. a. Lists at least three controlled variables	1–3
b. Correctly names independent variable.	1
c. Correctly names dependent variable.	1
3. Clearly describes the conclusion.	1–2
4. Describes the ability of soils to allow water to penetrate so it is available for plants.	1–2
5. Describes 2 appropriate measures for improving the procedure.	1–2
Total	/39

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 use of satellite information to monitor and manage biomass production

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

Your task is to select some of this data as it applies to an Australian area of your choice.

- Explain how at least two types of satellite data are collected.
- Describe the information that this data yields about your area.
- Describe how the available information enriches knowledge of the area.
- Describe how the satellite information 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.

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/>

In-class extended response on your research.**Time allowed:** 25 minutes**Student name** _____

Using the information you researched, describe how satellite information can be used to monitor and manage the biomass of the area you studied. Include the following in your response:

- different types of information available from satellites (2 marks)
- satellite information available for your selected area (4 marks)
- how this information can be used to monitor biomass in your chosen area (4 marks)
- management strategies based on monitoring. (4 marks)

Marking key for sample assessment task 9 – Unit 2

Description	Marks
Describes at least two types of satellite information e.g. photographic, infrared	1–2
Describes the selected area e.g. topography, land use	1–2
Describes satellite information on vegetation, water sources, stock, related to this area	1–2
Describes how information can show changes over time e.g. changes in vegetation cover, water resources, stocking rates	1–2
Gives reasons for which factors are being monitored e.g. preservation of habitat for endangered species, effect of introduced pests, resource use, or management of agricultural production	1–2
Describes management strategies that could be developed or implemented for this area e.g. removal of pest species, planting vegetation, monitoring water extraction	1–3
Observing the effects in subsequent satellite information	1
Total	/14

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 and biogeochemical processes

Question 1

- a. Describe the processes that salty seawater goes through in order to become fresh water in our underground aquifers. (4 marks)

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

Question 2

- a. Explain the importance of photosynthesis to a freshwater lake ecosystem. (2 marks)

- b. Select **five (5)** appropriate plants and animals (both aquatic and terrestrial), and show their relationships to each other in a labelled food web diagram. (7 marks)

Question 3

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

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

- c. Describe **one** way that humans have interfered with the natural nitrogen cycle and how this has affected 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. (2 marks)

- b. What is the main characteristic of El Niño? (1 mark)

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

Question 5

Water is becoming an increasingly valuable resource as the rainfall in this area decreases.
List **three** (3) methods that the Western Australian government uses to supply water for the population. (3 marks)

Question 6

A horticulturist is growing a crop of lettuces in the soil at Wanneroo. This crop requires inputs of energy and matter. 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 leaving salt behind precipitation percolation into aquifer</p> <p>b. diagram with labelled arrows showing three processes</p>	<p>1–2 1 1 1–3</p>
<p>Question 2</p> <p>a. photosynthesis converts sun’s energy into biomass provides the producers of the food web for the ecosystem</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 1–2 1–5</p>
<p>Question 3</p> <p>a. nitrogen fixing bacteria absorb N from air and convert it to ammonium N made available for plants</p> <p>b. bacteria break down dead plants and animals nitrogen is released into the soil as ammonia 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. energy: heat energy transported by warm water matter: nutrients, biomass transported by masses of moving water</p> <p>b. warm ocean temperatures</p> <p>c. drier than average</p>	<p>1 1 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 salty water 	<p>1 1 1</p>
<p>Question 6</p> <p>Sun’s energy</p> <p>Matter inputs include water, nutrients/fertiliser, growing medium/soil, carbon dioxide (max 3)</p>	<p>1 3 x 1</p>
Total	/33