

Agricultural Science 2019 v1.3

Unit 2 sample assessment instrument

August 2022

Research investigation

This sample has been compiled by the QCAA to assist and support teachers in planning and developing assessment instruments for individual school settings.

Schools develop internal assessments for each senior subject, based on the learning described in Units 1 and 2 of the subject syllabus. Each unit objective must be assessed at least once.

Assessment objectives

This assessment instrument is used to determine student achievement in the following objectives:

2. apply understanding of management of renewable resources; physical resource management; and agricultural management, research and innovation
3. analyse evidence about management of renewable resources; physical resource management; and agricultural management, research and innovation
4. interpret evidence about management of renewable resources; physical resource management; and agricultural management, research and innovation
5. investigate phenomena associated with management of renewable resources; physical resource management; and agricultural management, research and innovation
6. evaluate processes, claims and conclusions about management of renewable resources; physical resource management; and agricultural management, research and innovation
7. communicate understandings, findings, arguments and conclusions about management of renewable resources; physical resource management; and agricultural management, research and innovation.

Note: Objective 1 is not assessed in this instrument.

Subject	Agricultural Science
Technique	Research investigation
Unit	Unit 2: Resources
Topic	Topic 1: Management of renewable resources Topic 2: Physical resource management Topic 3: Agricultural management, research and innovation

Conditions			
Duration	10 hours class time		
Mode	Written response — scientific essay	Length	1500–2000 words
Individual/group	Individual	Other	—
Resources available	School library (online: internet and school intranet, databases, journals)		
Context			
<p>Investigate one of the following claims:</p> <ul style="list-style-type: none"> • Sustainable management of the physical, chemical and biological properties of soil is essential for agricultural production. • Soil sequestration of carbon will reduce greenhouse gas emissions. • Sustainable use of water from the Murray-Darling Basin is essential for the continuation of agricultural production in the region. • Intensive animal industries need to have energy-efficient waste management systems to be sustainable. • Genetically modified organisms are the answer to increasing demands for greater food production. • Native fisheries are causing the extinction of edible marine species. • Managing climate change is essential for the success of intensive agriculture. • Biofuel production can save the Australian grain industry. • Climate change is threatening the continuation of the grain industry in temperate Australia. <p>You may identify an alternative claim in consultation with your teacher. This claim must be related to Unit 2 subject matter.</p>			
Task			
<p>Gather secondary evidence related to a research question in order to evaluate the claim. Develop your research question based on a number of possible claims provided by your teacher.</p> <p>Obtain evidence by researching scientifically credible sources, such as scientific journals, books by well-credentialed scientists, and websites of governments, universities, independent research bodies, or science and technology manufacturers. You must adhere to research conventions.</p>			
To complete this task, you must:			
<ul style="list-style-type: none"> • select a claim to be evaluated • identify the relevant scientific concepts associated with the claim • pose a research question addressing an aspect of the claim • conduct research to gather scientific evidence that may be used to address the research question and subsequently evaluate the claim 			

Conditions

- analyse the data to identify sufficient and relevant evidence
- identify the trends, patterns or relationships in the evidence
- analyse the evidence to identify limitations
- interpret the evidence to construct justified scientific arguments
- interpret the evidence to form a justified conclusion to the research question
- discuss the quality of the evidence
- evaluate the claim by extrapolating the findings of the research question to the claim
- suggest improvements and extensions to the investigation
- communicate findings in an appropriate scientific genre, i.e. scientific essay.

Stimulus

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Checkpoints

- Week 1: Select claim and develop research question.
- Week 2: Identify sources and conduct research.
- Week 3: Analyse and evaluate evidence.
- Week 4: Submit draft.
- Week 5: Submit final response.

Criterion	Marks allocated	Result
Research and planning Assessment objectives 2, 5		
Analysis of evidence Assessment objectives 3, 4		
Interpretation and evaluation Assessment objectives 4, 6		
Communication Assessment objective 7		

Authentication strategies

- The teacher will provide class time for task completion.
- Students will provide documentation of their progress at indicated checkpoints.
- The teacher will collect and annotate drafts.
- The teacher will conduct interviews or consultations with each student as they develop the response.
- Students will use plagiarism-detection software at submission of the response.
- Students must acknowledge all sources.

Scaffolding

The response must be presented using an appropriate scientific genre (i.e. scientific essay) and contain:

- a claim
- a research question
- a rationale for the investigation
- justified scientific arguments using evidence
- a conclusion to the research question based on the interpretation of the evidence
- evaluation of the claim and suggestions of improvements and extensions to the investigation
- a reference list.

An example of how one of the claims could be developed into a research question

Claim: Native fisheries in Australia are causing the extinction of edible marine species.

Research question: What effect has changing the trawling gear and time of harvest in the Northern Prawn Fishery had on the population of tiger prawns (*Penaeus monodon*) and ensured the sustainability of this fishery?

Developing the research question:

1. Identify the key (important) terms in the claim.
 - a. native fisheries
 - b. extinction
 - c. edible marine species
2. Propose questions that need to be addressed to refine key terms and narrow the focus of the claim.
 - a. How can sufficient and relevant evidence be collected to evaluate the effect of native fisheries on edible marine species?
 - b. How do you determine the 'level' at which a species will not recover and will eventually become extinct?
 - c. Which edible marine species in Australia should be chosen to investigate?
3. Conduct research to gather information to address the questions.
 - a. There is a 'maximum sustainable yield' which can be scientifically measured to make decisions about the level of fishing.
 - b. Australia has over 100 marketable edible marine species.
 - c. There are several approaches to catching marine species in native fisheries.
 - d. What are the trends in population for the chosen marine species from the beginning of the fishery? How have practices changed in relation to the sustainability of the species in the fishery?
 - e. There are social issues regarding the level of bycatch being caught and the pressure for change in harvesting practices.
 - f. Which changes to the aquaculture industry are relevant to the survival of native marine species?
4. Draft the research question to address the claim.
 - a. What effect can management practices have on the survival of the tiger prawn (*Penaeus monodon*) and the sustainability of the Northern Prawn Fishery?
5. Refine and focus the research question.
 - a. What type of data is relevant?
 - b. What management practices for harvesting prawns would be considered significant in terms of the impact they would have on the population of tiger prawns and the sustainability of the industry?
6. Present the research question to the teacher for approval.

What effect has changing the trawling gear and time of harvest in the Northern Prawn Fishery had on the population of tiger prawns (*Penaeus monodon*) and ensured the sustainability of this fishery?

Note: You cannot use this sample research question for your investigation.



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