Learning experiences and sample resources

Learning experiences support the educational goals of the subject and align with assessment. Learning experiences are student-based activities that:

• provide opportunities to achieve the objectives described in the dimensions of the syllabus
• occur in authentic, relevant and worthwhile contexts
• vary in scope and depth, duration and degree of challenge
• reflect current practice in the wider community
• suit particular student needs, abilities and interests
• allow students to work independently and with others
• encourage students to think and act for themselves.

Learning experiences should provide a balance and variety of activities across the whole course and cater for the school’s context, resources and the unique characteristics of each cohort of students.

Guidelines for sample resources

The following sample resources incorporate the objectives described in the dimensions of the syllabus, include suggestions that schools could choose to follow, and offer flexibility to cater for a wide variety of students and school contexts.

These sample resources demonstrate:

• organisation and development of course content
• teaching and learning supporting the syllabus
• learning experiences that support achievement of the objectives described in the dimensions
• alignment between content, learning experiences and assessment.

Units of work

One sample unit of work is provided in this resource.

This is not a full unit of work and the materials provided are neither prescriptive nor exhaustive.

This unit of work relates to the health of Moreton Bay. Schools are advised to adapt teaching and learning experiences to suit their local marine environment and the availability of resources.
Integrating areas of study

This unit of work demonstrates ways of integrating areas of study in order to provide authentic and relevant learning experiences for students.

When developing units that integrate areas of study, teachers should:

- identify a marine environment, issue or problem as a basis for the inquiry-based investigation
- select relevant key concepts of the selected areas of study
- select elaborations which allow students to develop the depth of knowledge and understanding sufficient to demonstrate the key concepts
- develop authentic and relevant learning experiences which allow students to:
  - engage with the selected marine environment, issue or problem
  - participate in inquiry-based learning through developing syllabus objectives
  - develop the knowledge and skills required to respond to the assessment instrument (i.e. practise the elements of the chosen assessment genre).

Within learning experiences listed here, the term ‘investigate’ has been used to encapsulate the objectives of the dimension, *Investigation and analysis*. Teachers should develop a range of learning experiences to guide students through the investigation component of the inquiry process. This may include learning experiences that provide opportunities for students to:

- formulate questions, hypotheses and plans for marine investigations
- collect primary data using marine research skills
- select and organise marine information from primary and secondary sources
- analyse and interpret marine information to identify and explain relationships, trends and patterns.
## Unit title: Marine health check – Moreton Bay

**Inquiry:** How can the production of Rosella plants *Hibiscus subdantta* and profit be increased?

| Dimensions | Knowledge and understanding  
| Investigation and analysis  
| Evaluation and communication |
|---|---|
| Areas of study | Marine Biology  
Oceanography  
Conservation and sustainability  
Marine research skills |
| Key concepts | MB1 Marine environments support an abundance of diverse life, which is classified according to a range of characteristics.  
MB2 Marine organisms are shaped by their environments and interactions.  
MB3 The marine environment consists of dynamic and complex relationships between organisms and ecosystems.  
OC1 The world’s oceans and coastlines have many unique geological features.  
OC2 The world’s oceans are involved in the dispersal and cycling of all matter.  
CS2 Sustainable management practices are essential for the protection of marine resources.  
CS3 Gathering and interpreting scientific information is necessary to make informed decisions on sustainability.  
MS1 Safety is a primary concern in marine research skills.  
MS2 Boating, snorkelling and field techniques enable engagement with marine environments.  
MS2 Navigation and communication are essential tools for investigating marine environments. |
| Suggested time allocation | 55 hours; Year 11 |
## Learning experiences

Define, describe and explain boating regulatory requirements and procedures for dealing with hazards, accidents and emergencies.
Prepare simulated boating hazards, accidents and emergencies through which students apply their understandings. Work in groups to plan and deal with simulated situations.
View video footage of boating hazards, accidents and emergencies and develop plans and procedures for dealing with the situation.
Analyse procedures undertaken in video footage dealing with boating hazards, accidents and emergencies. Evaluate analyses of simulations and scenarios to formulate recommendations for future events.

Define, describe and explain water safety skills and first aid procedures. Use first aid videos or mannequins to explain and model procedures. Practice water safety and first aid procedures by ‘rescuing’ fellow students under simulated conditions. Analyse and interpret the outcomes of these simulations to determine relationships, trends and patterns in performance and to identify any errors. Evaluate analyses of simulations to formulate recommendations for future first aid.

In groups, research a range of dangerous marine organisms and the appropriate first aid treatments for these organisms. Develop a maritime safety chart outlining the treatments for specific dangerous marine organisms. Define, describe and explain sea floor topography and apply this to Moreton Bay and beyond, including the continental margin, ocean-basin floor, deep-sea trenches and mid-ocean ridges. In groups, develop a model of geological formations and topography for a simulated marine environment. Research the factors that influence geological formations and coastline shape. Analyse the shape of coastlines in Moreton Bay to determine the causes.

Define, describe and explain the use of navigation and communication devices and procedures for pilotage coordination and safety. Model the use of the IALA-A (International Association of Lighthouse Authorities region A). View photos and images of buoys from Maritime Safety Queensland to explain and determine meaning. Use simulated or school-based communication devices to practise lodging and receiving calls. Practise alarm signals, distress communications, urgency and safety signals and communications with marine rescue. As a class, use navigational aids to plot courses and record locations within your local area. Plot courses and record locations within Moreton Bay. Take a field trip on a boat through an Outdoor Environmental Education Centre to practise these skills. In small groups, use GPS (global positioning system) to establish or locate research sites. Locate and visit CoralWatch’s permanent transects (if developing snorkelling skills in conjunction with or prior to this unit).

Define, describe and explain the use of chart datum when operating vessels. In groups, analyse and interpret chart datum when preparing to enter Moreton Bay. Define, describe and explain how to operate a vessel safely in different conditions. Analyse and interpret weather forecasts and synoptic charts to predict the conditions that may be encountered. Model the maintenance and servicing of boat parts and accessories.

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**Learning experiences**

Learning experiences are developed by drawing together objectives and elaborations.

Learning experiences may be sequenced to suit the inquiry-based approach.

Safety is a priority. Teachers should complete curriculum activity risk assessments prior to conducting learning experiences in marine environments.

Students reflect on their own and others’ performance.

Learning occurs prior to entering the marine environment.
Learning experiences

Explain how boat design, materials and methods of propulsion affect vessels. Model these effects by designing, building and testing small models. Race these models in a small body of water, analysing and interpreting the performance of different boat designs. Evaluate the performance of models by developing criteria and judging accordingly. Evaluate boat design to make recommendations for future design.

Engage the services of a registered training organisation (RTO) as students develop competence in boating. (Please note that using an RTO is not a requirement of the syllabus).

In groups, plan a safe passage in Moreton Bay using calculations. Teachers oversee plans and develop methods for monitoring students in the field. Implement plans by operating a vessel safely in Moreton Bay and making modifications as required. Passengers may document modifications for analysing and interpreting performance. Teachers monitor students closely and mitigate risks. Evaluate performance to make recommendations for future boating experiences.

Define, describe and explain abiotic and biotic factors, including the physical and chemical properties of seawater. Model the use of specialised equipment when collecting information about abiotic and biotic factors. Test equipment with restricted samples. Evaluate methods of data collection to make recommendations prior to using equipment in marine environments. Use specialised equipment to collect information on abiotic and biotic factors.

Define, describe and explain biodiversity within marine species and its role in the health of an ecosystem. Examine the biodiversity of the local marine ecosystem. Visit marine environments or aquariums to study marine species. Use classification keys of Moreton Bay to classify species located. Examine local species for adaptations. An organisation such as Ocean Life Education can bring specimens to your school. Examine and analyse interactions between factors in relation to adaptations. Research flora and fauna distribution and the zonation patterns of marine organisms.

Conduct a risk assessment prior to entering the field. Use marine research skills to collect data in marine environments in groups (e.g. survey organisms, identify and record distribution, conduct water sampling). Analyse and interpret findings to identify relationships, trends and patterns between abiotic factors, such as water and sediment distribution, and species distribution. Pay attention to indicator species when analysing the health of the ecosystem. Evaluate the health of the environment based on biodiversity.

Investigate the impacts population density has on the health of the bay. Analyse the outlook reports of the Great Barrier Reef Marine Park Authority (GBRMPA) or University of Queensland’s Health-e-waterways report cards over time to determine changes in the health of marine environments. Define, describe and explain maritime jurisdictional zones, and legislation, licensing and enforcement. Invite a guest speaker to speak with students about the legislation, licensing and enforcement tasks undertaken in Moreton Bay. Consult local agencies, such as the Australian Marine Environment Protection Association (AUSMEPA) to learn about natural resource management strategies for sustainable outcomes.

Visit local sites under management to identify strategies, collect and analyse information regarding the success of these strategies. Relate findings of the field study to management strategies to evaluate effectiveness. Make recommendations for future management based on findings.
Possible assessments

Two possible assessment ideas are provided here to model the ways in which assessment may be developed in Marine Science. These are examples only and are neither prescriptive nor exhaustive.

<table>
<thead>
<tr>
<th>Possible Assessment A</th>
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| **Dimensions and objectives** | **Knowledge and understanding**  
  • define and describe marine science concepts  
  • explain marine systems using concepts and models  
  • apply understandings to marine environments, issues and problems.  

  **Investigation and analysis**  
  • formulate questions, hypotheses and plans for marine investigations  
  • collect primary data using marine research skills  
  • select and organise marine information from primary and secondary sources  
  • analyse and interpret marine information to identify and explain relationships, trends and patterns.  

  **Evaluation and communication**  
  • evaluate marine information to draw conclusions, and make decisions and recommendations  
  • justify conclusions, decisions and recommendations about marine environments, issues and problems  
  • communicate using language conventions to suit audiences and purposes.  

| **Possible task** | Plan and conduct an action research project to gather information about a range of biotic and abiotic factors, and determine the overall health of Moreton Bay.  
Consider the health of Moreton Bay over time and the impacts of management strategies that have been implemented. Obtain views of various stakeholders to support your findings.  
Prepare a multimodal presentation for the Moreton Bay Regional Council in which you assess the health of the bay. Make and justify decisions about the management of Moreton Bay. Propose recommendations for the future management of the bay. |
| **Conditions** | 5–8 minutes |
### Possible Assessment B

**Assessment technique**  
Examination:  
Extended response test (Response to stimulus)

**Dimensions and objectives**  
*Knowledge and understanding*  
- define and describe marine science concepts  
- explain marine systems using concepts and models  
- apply understandings to marine environments, issues and problems.

*Investigation and analysis*  
- select and organise marine information from primary and secondary sources  
- analyse and interpret marine information to identify and explain relationships, trends and patterns.

*Evaluation and communication*  
- evaluate marine information to draw conclusions, and make decisions and recommendations  
- justify conclusions, decisions and recommendations about marine environments, issues and problems  
- communicate using language conventions to suit audiences and purposes.

**Possible task**  
Consider the stimulus materials provided (a range of articles showcasing positive and negative views on the health of Moreton Bay and the Health-e-waterways report cards).  
Analyse and interpret the information to evaluate the management strategies that have been implemented in Moreton Bay over time.  
Write an essay outlining the relationship between management strategies and the health of the bay.  
Develop and justify recommendations about the future management of Moreton Bay.

**Conditions**  
120 minutes  
600–800 words  
Stimulus materials provided one day prior

### Possible resources

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<tr>
<th>Author</th>
<th>Title</th>
<th>Source</th>
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<td>Australian Marine Environment Protection Association (AUSMEPA)</td>
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<td>University of Queensland (UQ)</td>
<td>Health-e-waterways</td>
<td><a href="http://www.health-e-waterways.org/reportcard">www.health-e-waterways.org/reportcard</a></td>
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