Applicable standards

National Curriculum for England Key Stage 3

KS3 Science Element of the Science Programme of Study	Lessons 1	2	3	4	5	6	7
Biology							
• Interactions and interdependencies (Relationships in an ecosystem)	✓		✓			✓	
• The interdependence of organisms in an ecosystem	✓		✓				
• Genetics and evolution (Inheritance, chromosomes, DNA and genes)		✓		✓	✓	✓	
• Differences between species		✓					
• Variation between species and between individuals of the same species meaning some organisms compete more successfully		✓					
• Material cycles and energy (Photosynthesis)			✓				
• Dependence of almost all life on Earth on the ability of photosynthetic organisms			✓				
• Changes in the environment may leave individuals within a species less well adapted to compete successfully and reproduce, which in turn may lead to extinction				✓	✓	✓	
• How organisms affect, and are affected by, their environment, including the accumulation of toxic materials						✓	
Physics							
• Motion and forces (Pressure in fluids)					✓		
• Pressure in liquids, increasing with depth					✓		
Working scientifically							
• Use appropriate techniques, apparatus, and materials during fieldwork and laboratory work, paying attention to health and safety	✓				✓		
• Apply sampling techniques		✓					
• Make predictions using scientific knowledge and understanding					✓	✓	
• Make and record observations and measurements					✓		
• Select, plan and carry out the most appropriate types of scientific enquiries to test predictions					✓		
• Pay attention to objectivity and concern for accuracy, precision, repeatability and reproducibility						✓	
• Understand that scientific methods and theories develop as earlier explanations are modified to take account of new evidence and ideas, together with the importance of publishing results and peer review						✓	
• Ask questions and develop a line of enquiry based on observations of the real world, alongside prior knowledge and experience						✓	
• Present observations and data using appropriate methods and draw conclusions						✓	

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KS3 Science (continued)

Element of the Science Programme of Study	Lessons 1	2	3	4	5	6	7
Working scientifically							
• Present reasoned explanations						✓	
• Evaluate data						✓	
• Identify further questions arising from their results						✓	

Lesson 1: How do scientists explore underwater ecosystems?

Overview

This lesson introduces students to the marine habitat and the wealth and diversity of life found in the ocean. Students will learn about how scientists explore underwater, going on their first classroom 'Dive' and learning some important dive skills.

Learning outcomes

- Recognize the diversity and range of habitats and life in the ocean
- Use some of the dive skills needed to explore underwater
- Classify common species found on coral reefs

Resources

Slideshow 1:
How do scientists explore underwater ecosystems?

Student Sheet 1a:
Video reflection

Student Sheet 1b:
Species card sort

Student Sheet 1c:
Dive log

Video:
Setting sail

Video:
Dive signs

Google Map:
Lady Elliot Island

Subject Update:
About: Catlin Seaview Survey

Subject Update:
How to: Quick start to 360VR in the classroom

Subject Update:
How to: Four ways to use 360VR in the classroom

Lesson 2: How do scientists use classification in coral habitats?

Overview

Coral reefs support 25% of all marine life on the planet. During this lesson, students will discover more about the coral ecosystem and about the different types of coral. They will then 'dive' on the Great Barrier Reef to undertake a coral survey, identifying the main coral types, distribution and abundance on two survey sites.

Learning outcomes

- Identify the different habitat zones and describe differences in environmental conditions
- Use simple key to identify coral types
- Use survey techniques to compare coral distribution

Resources

Slideshow 2:
How do scientists use classification in coral habitats?

Student Sheet 2a:
Coral reef scale

Student Sheet 2b:
Reef habitat zones

Student Sheet 2c:
Coral ID

Student Sheet 2d:
Dive log

Video:
Wonders of coral

Gallery:
Zones on the reef

Gallery:
Coral reef quadrat survey

Lesson 3: How is energy transferred on the reef?

Overview

In this lesson students will explore the interdependence of life on the reef and where different animals, plants and other organisms get their energy from through feeding and symbiosis. Students will learn about the different nature of primary production on the reef compared to terrestrial environments.

Learning outcomes

- Describe the different techniques species use to get their energy
- Identify the range of primary producers in the ocean
- Create a food web describing interdependence of reef life

Resources

Slideshow 3:
How is energy transferred on the reef?

Activity Overview 3a:
Coral feeding game

Activity Overview 3b:
Coral food web

Student Sheet 3a:
Coral species

Student Sheet 3b:
Dive log

Video:
Wall of mouths

Video:
Sea cucumbers

Video:
Reef shark

Video:
Coral feeding game

Gallery:
Coral life (advanced)

Subject Update:
About: Coral

Lesson 4: How have reef specialists evolved and adapted?

Overview

Different species have adapted to life on the coral reef in amazing and diverse ways. From sleeping in mucus bubbles, to flexible snakelike skeletons, life on the reef has had to find ingenious methods to find food and stay alive. The reef is also host to numerous examples of symbiosis and finding food and safety in the strangest of places, whether that be in a shark's mouth or 'vacuuming' the sandy seabed. In this lesson, students are challenged to create the ultimate reef organism.

Learning outcomes

- Identify and describe different types of adaptation on the coral reef
- Create the ultimate coral animal, demonstrating an understanding of adaptation

Resources

Slideshow 4:
How have reef specialists evolved?

Student Sheet 4a:
Ultimate coral animal

Student Sheet 4b:
Dive log

Gallery:
Coral life

Gallery:
Adaptation on the reef

Subject Update:
Learn more: Adaptation

Lesson 5: How do forces affect deep coral exploration?

Overview

The expedition also explored the deep reef down to 100 metres. Find out about water pressure, the use of special technology and how corals have adapted to life in this twilight zone.

Learning outcomes

- Explain the relationship between water depth and pressure
- Describe the technology needed to explore the deep reef
- Investigate how corals adapt to lower light conditions

Resources

Slideshow 5:
How do forces affect deep coral exploration?

Activity Overview 5a:
Under pressure

Activity Overview 5b:
Exploring deep coral

Student Sheet 5a:
Diving deeper

Student Sheet 5b:
Dive log

Video:
Monitoring the reef

Video:
Submarine science

Video:
Under pressure

Subject Update:
How to: Quick start to 360VR in the classroom

Subject Update:
How to: Four ways to use 360VR in the classroom

Lesson 6: What is the effect of human impact on the reef?

Overview

Students will consider the varied threats that the coral reef faces. These range from long-term environmental changes caused by increased atmospheric carbon dioxide, to changes in land use in coastal areas and the impact of fertilizer on a certain species of starfish. Students will be prompted to consider what changes could be made to ensure that there are healthy coral reefs well into the future.

Learning outcomes

- Investigate the different factors affecting the coral reef
- Judge the impact of human activity on the coral reef
- Explain their own and others' views about environmental change

Resources

Slideshow 6:
What is the effect of human impact on the reef?

Activity Overview 6a:
Cloudy waters

Activity Overview 6b:
Ocean acidification in a cup

Activity Overview 6c:
Dissolving 'coral' in vinegar

Student Sheet 6a:
Cloudy waters

Student Sheet 6b:
Ocean acidification in a cup

Student Sheet 6c:
Dissolving 'coral' in vinegar

Student Sheet 6d:
Threats overview

Student Sheet 6e:
Coral threats information sheets

Video:
Coral future

Video:
Sailing home

Subject Update:
Learn more: Coral threats overview

Subject Update:
Learn more: Coral and water quality

Subject Update:
Learn more: Human activity on the reef

Subject Update:
Learn more: Coral in a high CO_2 world

Lesson 7: How do scientists share their findings?

Overview

At the end of an expedition, teams create an expedition report to communicate their findings to a wider audience. This could take the form of a formal written report, a press release or a video. These outputs can be shared at an assembly, parents evening, with the local press or do send a selection through to Encounter Edu (info@encounteredu.com) so that we can post them on our website.

Learning outcomes

- Communicate findings using primary and secondary sources
- Choose an appropriate format and style for a real purpose and audience
- Explain their own and others' views about environmental change

Resources

Slideshow 7:
How do scientists share their finding?

Subject Update:
Learn more: Coral threats overview

Subject Update:
Learn more: Coral in a high CO_2 world

Subject Update:
Learn more: Coral and water quality

Subject Update:
Learn more: Human activity on the reef