All About Shells

TEACHER'S GUIDE

Activity Unit Includes:

- All About Shells
  - information poster
- Shell Line Key
  - interactive poster
- Teacher Notes
  & Curriculum Links
- Student Activities
- Shell Collection (optional)

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All About Shells - Teacher's Guide

Overview:

Everyone who has walked along the seashore has picked up sea shells and commented on their form and wondered where they came from. This unit includes a series of activities which focus on the shells made from animals in the Phylum Mollusca (e.g. snails, mussels, limpets, chitons). The background information required to teach this unit can be found on the enclosed posters. A shell collection may be purchased or you may want to collect your own shells from a local beach.

Main Topics and Level:

- Classification of Mollusc Shells
- Mollusc Structure and Function

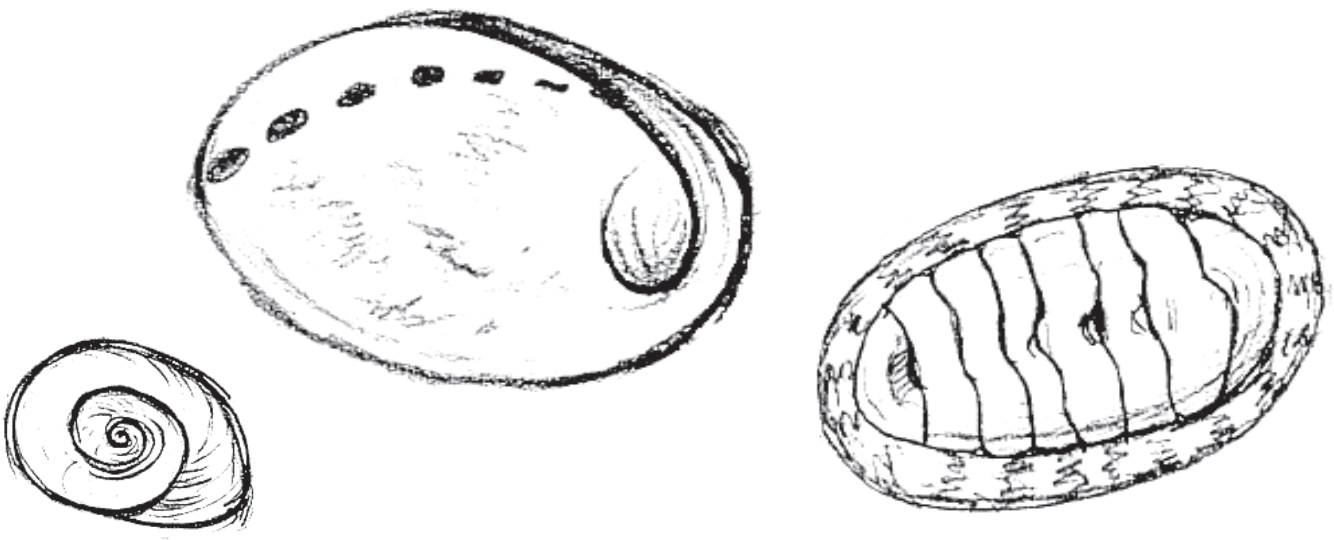
This unit is designed for levels 3 & 4 of the Science in the New Zealand Curriculum document but the resources can be used at all levels.
For example it is great to work through the line key with a Level 8 group prior to doing a shore survey so that they know the difference between a limpet and a chiton. Similarly you might have Level 1 or 2 students match up the shells with pictures.

Unit Resources:

- **All About Shells - Teacher's Guide** - Curriculum links and activities.
- **All About Shells -** A1 poster with information about molluscs for both teachers and students to refer to throughout the unit.
- **Shell Collection -** Shells from 12 common NZ molluscs.
- **Shell Line Key -** A1 poster used for classifying mollusc shells.
- **Mollusc Photographs -** Colour photographs on the unit cover of the molluscs that made some of the shells in the collection. Cut out the individual photographs and laminate to use with the activities.

Other Useful Resources:

- Additional mollusc shells - *collect from your local shore.*
- Field Guides for common NZ sea shells - *see your local library.*
- Marine Recreational Fishing Rules (pamphlet) *- available from the Ministry of Fisheries.*
- Guidelines for Gathering Paua (pamphlet) *- available from the Ministry of Fisheries.*



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All About Shells - Unit Planning Guide

Science in the NZ Curriculum Processes:

Nature of Science
Understanding about Science: Activitiy 6
Investigating Science: Activities 1, 2, 4, 5, 7
Communicating Science: Activity 3, 6, 7, 8

CLASSIFICATION OF MOLLUSC SHELLS

Science in the NZ Curriculum Strand-Living World:

Level 1/2 - Evolution - Recognise that there are lots of different living things in the world and that they can be grouped in different ways.

Leval 3/4 - Evolution - Begin to group plants, animals and other living things into science-based classifications.

MOLLUSC - STRUCTURE & FUNCTION

Science in the NZ Curriculum Strand-Living World:

Levels 1/2 - Life Processes - Recognise that all living things have certain requirements so they can stay alive.

Levels 3/4 - Life Processes - Recognise that there are life processes common to all living things aand that these occur in different ways.

Learning outcomes:
Students are able to -

	Activity:
• Describe the shells of different molluscs.	1
• Explain where a shell has come from and how it is made.	2,3
• Define 'animal'.	2
• Define 'invertebrate'.	2
• List the common features of molluscs.	2
• Classify shells using the line key.	6
• Group shells according to other criteria eg. feeding strategy, habitat etc.	4,7
• Identify common NZ shells.	3-8

Learning outcomes:
Students are able to -

• Explain how a shell helps molluscs to survive.	3
• Identify and label the main parts of molluscs. Describe their function.	3,5
• Identify and label the internal structures of a mussel and describe their function.	5

Assessment Suggestions:

• Assess prior knowledge.	1
• Identify mollusc shells using the line key.	6
• Complete a reference collection card.	8

Fill your activity sequence in here:

ACTIVITY ONE

A shell is a shell, is a...

This activity assess student's prior knowledge of mollusc shells.

You will need: Shell Collection, newsprint.

1. Place each shell from the collection on a piece of newsprint. Set out as work stations around the room.

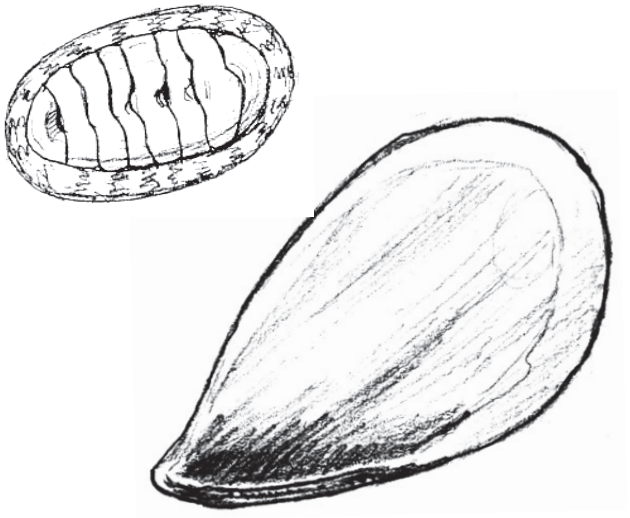
2. Split class into groups and get each group to list words that describe each shell. Encourage students to comment on shape, colour, pattern, texture and weight.

3. Students can do crayon rubbings or quick sketches.

4. Share descriptions.

5. Compile a class chart of 'Words describing Shells' to use as stimulus for creative writing (e.g. poems, stories).

6. Add to this list throughout the study including both descriptive and scientific terms.



ACTIVITY TWO

Mighty Molluscs

This activity identifies the main features of molluscs.

You will need: Shell Collection, All About Shells poster, newsprint.

Brainstorm/Discussion:

1. What is a shell? Animal, plant, mineral...

2. Where do you find shells?

3. Make a list of all the animals that you can think of that have shells.

4. Read middle section on **All About Shells** poster.

5. Write definitions for the following on large pieces of paper for the class to refer to throughout study:

   What is an animal?
   What is an invertebrate?
   What is a mollusc?

6. Which animals from your list (question #3) are molluscs?

7. Do some research to find out what other animal groups have shells. How do they differ from molluscs?

ACTIVITY THREE

Shell Structures

This activity looks at common features of mollusc shells.

You will need: Shell Collection, All About Shells poster, Mollusc Photographs, magnifying glasses.

1. Each student selects and draws a shell noting shape, colour and other features. Use a magnifying glass to see fine detail.

2. Label the different parts of the shell. Refer to the **All About Shells** poster for help.
- Where is the oldest part of the shell? - label this the **umbo**.
- Look to see if your shell has a **hinge**. - only bivalve shells do.
- Can you find evidence of growth? Try to count the **growth lines**.
- Is your shell sculptured? What do you think these **ridges** are for?

3. What mollusc made the shell? Look at photos and do some research to learn about how and where this mollusc lives.

4. Why have a shell? What advantages does the shape of the shell provide? Think about what happens at low tide and when the waves are big and crash against the shore. Why are terrestrial animals with shells usually small?

5. Design experiments to test some of your predictions

ACTIVITY FOUR

Sorting Shells

This activity introduces the idea of grouping animals according to similarities and differences.

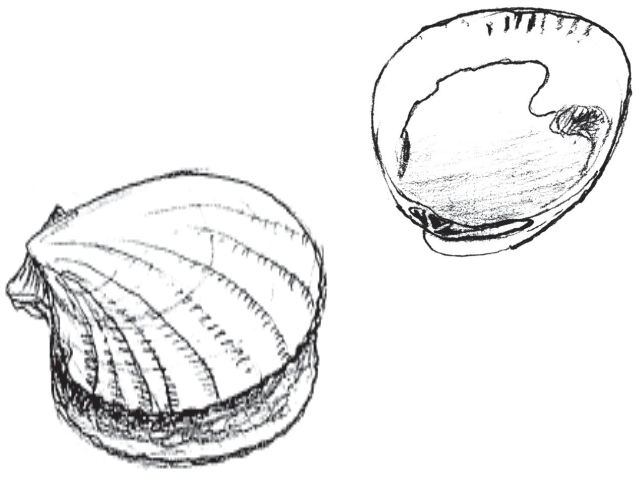
You will need: Shell Collection, Mollusc Photographs, newsprint.

1. Scientists group animals into family groups according to similarities and differences. Ask the students to group these shells according to their own criteria. They should record the characteristics they used to group them (colour, size, shape, etc.).

2. Add another shell. Does it fit into an existing group or do they need to make a new group?

3. Did all the students use the same charact-eristics to group the shells? Were some characteristics better than others to use?
e.g. size, colour, number of shells.

4. Discuss why it would be useful for scientists to divide plants and animals into groups.



ACTIVITY FIVE

Mussels Inside and Out

This activity investigates the internal features of a mussel.

You will need: Mussel shells from Shell Collection, live mussels (in shells) from supermarket (enough for one between three children).

Refer to the **All About Shells** poster for help.

START HERE

1. Measure your mussel.

   Compare the size mussel with the class data. Is it smaller or larger than the average size?

2. Can you open your mussel with your fingers? yes ❍ no ❍

   Do you think a mussel is a bivalve or a univalve?

3. Describe the outside of the shell using three words only.

4. What colours can you see on your shell?

5. Is anything growing on the outside of the shell?

6. Label the **umbo** (oldest part of the shell) and the hinge.

7. Does your mussel have **byssal threads** (These are hairy threads that attach the mussel to the rock)

   yes ❍ no ❍

8. How many **growth lines** can you count?

9. Ask an adult to open the shell for you.

(Males have white sacs filled with sperm and females have yellow/orange sacs filled with eggs)

10. Is your mussel a male ❍ or a female ❍ ?

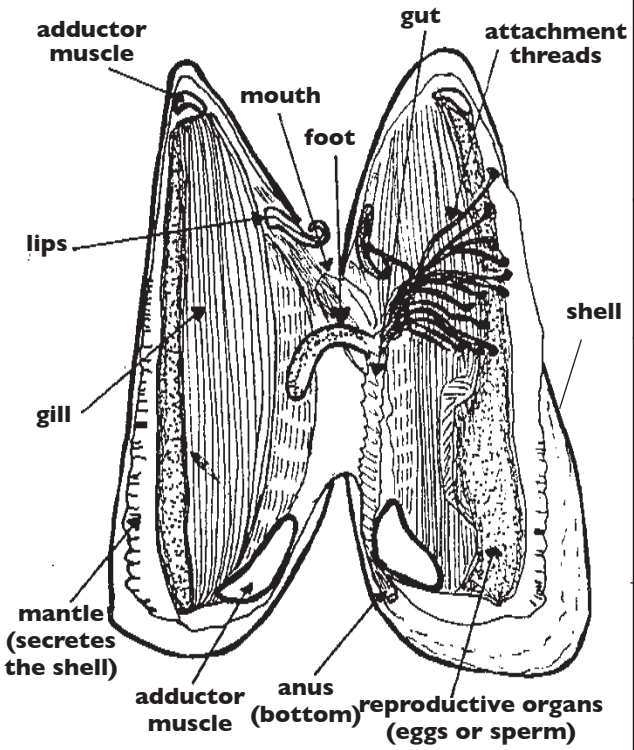
11. Find the muscles (adductor muscles) that pull the shell closed. How many are there?

12. The **mantle** tissue is located at the edge of the shell. It adds new shell on the outer edge. What colour is it?

13. The **foot** looks like a large dark tongue. What is it used for?

14. The gills are used to breath and filter plankton out of the water. How many gills are there?

15. When you eat mussels, what part do you eat?



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ACTIVITY SIX

Name that Shell

This activity introduces a systematic model scientists use for classifying animals. Students will become familiar with the different mollusc groups.

This activity is suitable for assessment.

You will need: Shell Collection, Activity sheet #1, Shell Line Key poster.

Directions for using the Shell Line Key:

1. Spread the shells out on the bench with the poster.
2. Take one shell at a time, place at the start position on the **Shell Line Key** poster.
3. Decide which of the two lines to follow by selecting the best description of the shell. Continue to select the best description until a name is reached at the bottom of the poster.
4. Repeat the process with each shell.

Results:

5. Have the students fill out activity sheet #1 and discuss the features used to classify and identify the different types of shells.

Discussion:

Extension:

- Identify the shell species using field guides.
- Create your own line key to identify types of mussels, snails, chitons etc.

A Line key is a method that scientists have designed to identify different groups or species of plants and animals. There are over 50,000 different types of molluscs so a method for organising them is essential. Many different types of classification are possible. Molluscs for example could be classified according to where they live, what they look like or what they eat. Scientists classify animals according to evolutionary relationships, so closely related animals are grouped together.

6. What characteristics were important in grouping the shells? What do you call the molluscs with one shell, two shells, or eight shells?
7. Discuss how the line key worked. What were some of the problems you encountered when trying to match the descriptions with each shell? How could the key be improved?
8. Often shells have other plants and animals growing on them and some are damaged or have holes that have been drilled by other animals. Sometimes only one half of the bivalve shells is found. Do you think this would make them difficult to identify? Can you find shells that demonstrate this?
9. Think about why scientists have designed keys to classify animals and plants. Can you think of a better system? Has the line key been useful for you?

Activity Sheet #1

Name that Shell

Name: _____

Date: _____

Place one shell at the start position and decide which of the two lines to follow by selecting the best description of the shell. Continue to select the best description until the name is reached at the bottom of the poster.

Collect information about each shell and record it on the table below.

Shell Number	Shell Name	Number of shell parts	Describe the features used to identify the shell
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

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ACTIVITY SEVEN

The Life of a Mollusc

This activity encourages students to explore other ways of grouping animals and learn about the ecology of molluscs.

You will need: All About Shells poster, Shell Line Key, Shell Collection, Mollusc Photographs, reference books on shells and molluscs.

1. Research and group shells according to the following criteria:

Number of Shells:
- **Gastropod**
- **Bivalve**
- **Chiton**

Feeding strategies:
- **Filter Feeder**
- **Grazer**
- **Predator**

Use:
- **Used for Aquaculture**
- **Commercially Harvested**
- **Traditionally Harvested by Maori**
- **Not Harvested**

Habitat:
- **Surf Beach**
- **Mudflat**
- **Rocky Shore**
- **Deep Water**

ACTIVITY EIGHT

Shell Reference Collection

This activity involves students collecting, identifying, and researching mollusc shells. They then report this information on a reference collection card in the same way scientists do.

This activity is ideal for assessing students at the end of your unit.

You will need: Shell Collection, Activity sheet #2, All About Shells poster. Shell Line Key poster and sea shell field guides.

1. Each student (or group) chooses a shell and puts together an information card.

2. Glue the reference collection form to cardboard and attach the actual shell with glue.

3. Fill in the appropriate information on the reference collection form. Use the posters and field guides for reference.

4. Display around the room as the class reference.

Activity Sheet #2

Attach shell here

MOLLUSC REFERENCE COLLECTION

Common Name: _____

Scientific Name: _____

Maori Name: _____

Collected from: _____

Collector: _____

Food eaten: _____

Predators: _____

Other interesting features: _____

_____

_____

Attach shell here

MOLLUSC REFERENCE COLLECTION

Common Name: _____

Scientific Name: _____

Maori Name: _____

Collected from: _____

Collector: _____

Food eaten: _____

Predators: _____

Other interesting features: _____

_____

_____

Extension Ideas

Field Trip

Visit your local seashore to:

- Collect other mollusc shells.
- View and identify live molluscs.
- Observe the behaviour of live molluscs in their habitat.
- Conduct a shore survey to find out where different molluscs live.
- Look for shell fossils.

Food Webs

- Find out what eats the molluscs in the collection and what they eat.
- Construct a food web using this information.

Growth

- Measure a number of shells of the same species. Find the smallest, largest and average size. Graph your results (size-frequency bar graph).
- Find out how scientists use the shells to age molluscs. How would they determine if a line represents a year or a months growth?

Tangata Whenua

- Find out about traditional Maori use of molluscs for food.
- Plan a field trip to the museum to see how shells have been used in early Polynesian and Maori cultures.

Cooking

- Look through cookbooks to find recipes for molluscs.

Life Cycles

- Investigate the lifecycle of a mollusc from the shell collection.
- Draw a flow chart of how the shell changes through its life including what happens when the mollusc dies.

Language

- Use the **All About Shells** poster to write definitions for unfamiliar words.
- Read and write stories, poems etc. about sea shells and molluscs.

Fishery

- Refer to the Recreational Fishing Rules to find out which molluscs you can collect and how many.
- Find out what the quota system is and why it was set up.
- Find out what an algal bloom is and how it affects shellfish and the fishery.
- Find out where marine reserves are located in NZ and why they were established.

Aquaculture

- Find out which mollusc species are farmed commercially.
- What do you need to know about a mollusc species to farm it?
- Visit a local shellfish farm and describe how the animals are collected, held, fed etc.

Adaptations

- Compare land snails with sea snails. How are they adapted (specially made) to live on land or in the sea?

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View live molluscs at the Aquarium

Bring your class on a field trip to the New Zealand Marine Studies Centre and see molluscs on the beach, under the microscope and in the aquarium tanks. Find out about the ecology of this diverse group through this innovative programme.

It is guaranteed to be "hands-on" and will develop your students' investigative skills.

For further information and bookings please contact:

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