Activities in Museums and Aquaria

A Trip to the Museum

Level

1-5

Key questions

What do marine organisms look like? How are they different from terrestrial animals? How do they adapt to their environment?

Key outcome

Observe and describe marine organisms.

by Karen Wilson, Marine Discovery Centre, Woodbridge, Tasmania.

Many urban settlements now have museums or aquaria which provide marine displays. Some of these may be commercial aquaria with educational programs arranged for schools, while others will be major capital city museums with large displays and educational officers to assist teachers. The following are some of the activities which teachers of primary children have found useful.

What you need

Museum with marine collection

Paper and pencil, a few colouring pencils, sketch of a penguin (optional) or other marine life

Educational sheets provided by the museum

What you do

Divide the students into small groups, or allow individuals to work at their own pace. Younger students will need to be in the care of an adult-child ratio of one to eight maximum. Remind them not to handle exhibits unless museum staff are present. Set a time for finishing.

Marine invertebrates

Ask students to look at the specimens available. Can they identify hard coral, sea urchin and sea stars? They should sketch their favourite specimen. Use the display boards to find some information about the animal sketched.

- What does invertebrate mean?
- Does the animal move, and, if so, how?
- How does the animal reproduce?
- What type of environment does the animal live in?
- What are the special things about this animal which make it different from other animals?
- Can we eat it?

Sea birds

Students can choose a bird of the Australian seashore or Antarctica. Ask them to write a paragraph about the bird of their choice, commenting on any special features, what it eats and how it has adapted to its watery environment.

Option: Sketch and colour a drawing of a king penguin.

A Trip to the Museum

Aquarium room

All fish are adapted to the conditions they live in. Fish in the Antarctica have developed an anti-freeze substance to cope with the extreme cold. Some phytoplankton have developed a UV 'sunscreen' to cope with the hole in the ozone layer and increased radiation. Deep sea fish have very large eyes to make the most of the available light.

Look at the specimens here. Ask students to choose a fish that interests them. Sketch it and find out what its special characteristics are that enable it to live and survive in its watery world. (Younger students may find it useful to have a selection of fish outlines on a sheet of paper and then mark in features, colour it and label as required).

Sand snooping

Sand and small beach rocks may be visible under a microscope. Let students look at these closely under the microscope, watching for these:

- Do the grains of sand have sharp edges?
- Are they all the same size, shape and colour?
- How many different shapes and colours can you find?
- Can you see other things beside sand in the sand?
- If so, what?

Tasmanian fur seal or any large marine mammal

Ask students to note the answers to the following:

- How many bones in the flipper?
- How many joints?
- Can you identify the 'forearm', 'upper arm', and 'shoulder blade'?
- The flipper is very much like our hand. How does the seal use its flipper?
- What movements can the seal make with its flipper?
- What movements can we make with our hands?
- What is the difference?
- Do seals live along the whole Australian coastline or just in some parts?

This activity can be repeated with other marine life (e.g. whales, dolphins, other seals and sea lions, penguins etc).

Conclusion

Ask the students if they have seen sea life which is already familiar to them or are most of the specimens representing something new?

Follow up with further research on species of interest, adaptations to certain environmental conditions, and conservation aspects of some of the species.

Setting Up a Marine Aquarium

Level

3-8

Key question

How can an aquarium be set up?

Key outcome

Plan, set up and maintain a living marine aquarium.

Adapted from Kylie Butler, University of Queensland.

What you need

- Large glass tank with silicone sealing, bonded, no galvanised trays or covers, on stand close to an electric power plug and away from direct sunlight. There should be bracing supports across the top of the tank to prevent bowing out from pressure. (Volume of the tank with a biological filter can be calculated by allowing approximately 120 square cm of water surface area for every 1 cm of fish body length). Marine fish should be in a tank at least 900 mm by 300 mm by 380 mm holding approximately 104 litres of salt water. Some of the tank walls can be wood, concrete or fibreglass with a glass viewing panel.
- An immersion heater to hold the water at about 24°C (if coral reef fishes are to be kept).
- A single fluorescent tube of light, used for 10-15 hours a day, and packed in a waterproofed container or use a glass cover placed on top of the tank below the lamp and above the water surface.
- Filtration system (get advice from aquarium shop).
- Seawater, either natural, clean or synthetic (mixed from salts and available at aquarium shops).
- Ph kit to check acidity levels.
- Some type of substrate: gravel, coral sand, rocks without obvious metal-ore bearing veins.

What you do

Use the following set of guidelines to establishing a living marine environment in the classroom.

Choosing the fish

A knowledge of the habitat preferences and lifestyle of different fish should enable you to select fish that will survive together in the aquarium.

Maintaining the environment

Stable conditions are important. You should be able to control temperature, lighting and water condition. It is advisable to make the tank as natural as possible, this can be achieved by incorporating corals and other invertebrates.

The tank

The size of the tank will depend on many factors for example, how many fish you wish to keep. The marine tank should be fairly large for both the fishes and your enjoyment.

Setting Up a Marine Aquarium

The tank will need to be situated near an electrical socket. And remember when the tank is full it will be very heavy so a stand which can take the weight is essential.

Heating and lighting

Heating requirements will depend on the type of fish you wish to keep. Coral reef fish, however, need a constant temperature of 24°C.

Lighting will also depend on the type of aquarium. Fluorescent lighting can be used, the amount will depend on whether you wish to have a semi-natural environment.

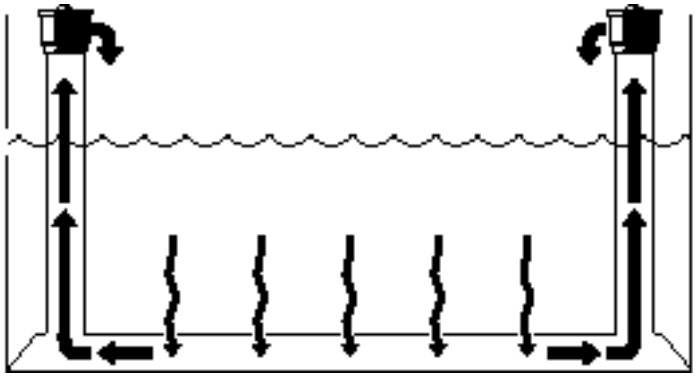


Figure 1. Illustration of circulation of water through a biological filter

Aeration and filtration

An airpump is required for both aeration and movement of the water in the tank and for the filtration system. Filtration systems available include mechanical, chemical and biological, one or a combination of these should be used.

The water

Salinity, water quality, and pH must be monitored in the marine tank.

The water itself can either come directly from the sea or synthetic sea water can be used.

Decorating the tank

Choose a substrate appropriate for your type of marine life (e.g. sand, coral). Place cleaned corals, seashells and rocks to provide spaces for fishes and invertebrates to shelter and hide in.

Seaweeds may be difficult to keep, but you could try.

Setting Up a Marine Aquarium

Set up the tank

Make sure you have everything you need close to hand. Prepare the tank without the living animals and make sure everything is working as it should. Once the tank has matured the fish and other animals can be introduced.

Feeding

What the fish need to eat should be thought about in the initial stages of choosing the fish. Feeding should generally follow the rule ‘a very little and very often’.

Prevention and cure of diseases

If you maintain the tank in the best possible condition, the creatures in it should remain healthy. However, you need to be able to recognize some diseases so that if they do occur they can be treated.

Breeding

Once your indoor marine environment is well established you may wish to breed some of your own fish. This is not impossible but you may have to work at it.

Reference

Mills, D. 1985, *A Fishkeeper’s guide to Marine Fishes*, Salamander Books Ltd, UK.

Numerous other books in school and local government libraries provide useful information.

Measurements and Marine Life

Level

4-5

Key question

How do you relate mathematical measurements to biological organisms?

Key outcome

Understanding how to do mathematical measurements using aquarium or fish tank.

Adapted from Karen Wilson, Marine Discovery Centre, Woodbridge, Tasmania.

What you need

Appropriate field site such as rock pools or aquarium or fish tank and touch tank
Pencil, paper
Watch
Selection of diving gear for demonstration, shells, live specimens of invertebrates and a few dead seastars
Hand lens
Ruler
String
Graph paper
Glass jar

What you do

These questions have been developed for you to use in a marine centre with an aquarium and touch tank. They can be adapted for use in the field on a rocky platform or following a collection trip (combined with a salt-water fish tank).

Answer the following questions as you walk around the aquarium:

- how many sharks can you see in the aquarium
- count the flathead
- count the number of seahorses
- estimate the length of an eel
- how many different shapes can you see in the aquarium?
- what is the most common shape:

  round

  spiral

  elongated

  curved?

At the touch tank:

- How many different shapes can you see in the touch tank?
- Turn over a seastar and time how long it takes to turn over again.
- Which seastar is heavier, a live or dead one, and why (do not keep the live seastar out of the water for too long).

Measurements and Marine Life

Look in the shell box.

- Examine the shapes and colours of the shells. Group the shells as to colour and shape.
- Examine the patterns on the shells with the use of a hand lens.
- Work out the area and perimeter of the shells. Perimeter is the distance around the outside of your shell. Choose a shell. Take a piece of string and measure the outside of your shell. Now measure the piece of string that went around the outside of your shell with a ruler. How many centimetres? This is the perimeter of your shell.
- Draw an outline of your shell. Put it on top of the graph paper. Count the number of square centimetres inside your outline. This is the area of your shell.

Look at the diving gear.

- How thick is the wetsuit?
- How heavy are the weights?

Imagine that this glass jar was picked up from the beach yesterday.

- How much does it weigh?
- If this amount of glass was picked up on our beach everyday, how much would we collect in one week?

At the conclusion of this activity, students can compare results, shapes and measurements.

Shark Studies in an Aquarium

Level

4-6

Key questions

Where do sharks live? Why do they live there?

What are their body forms? What do they eat? How are sharks different from other fish? Do sharks need protection?

Key outcome

Understanding of the habitat requirement and characteristics of sharks.

Adapted from Sophie Creet, *Sharks Education Resource Kit*, and the Marine Discovery Centre, Woodbridge, Tasmania, and Kelly Tarlton's Underwater World, New Zealand.

Sharks may be divided into two main groups, the shallow water species that live on the continental shelf and the deep water species that live in the deep oceans.

These may then be divided into those that live on the bottom, benthic sharks and those that swim freely through out the water column, pelagic sharks.

What you need

Pencil, note pad

A number of different shark species in an aquarium

What you do

1. Before you visit the aquarium find out the answers to these questions:

- The habitat of a species is the place where that species lives. It provides the things necessary to sustain that organism's life.
- Make a list of all the things a shark needs to live.

2. At the aquarium, complete the following studies in small groups or pairs.

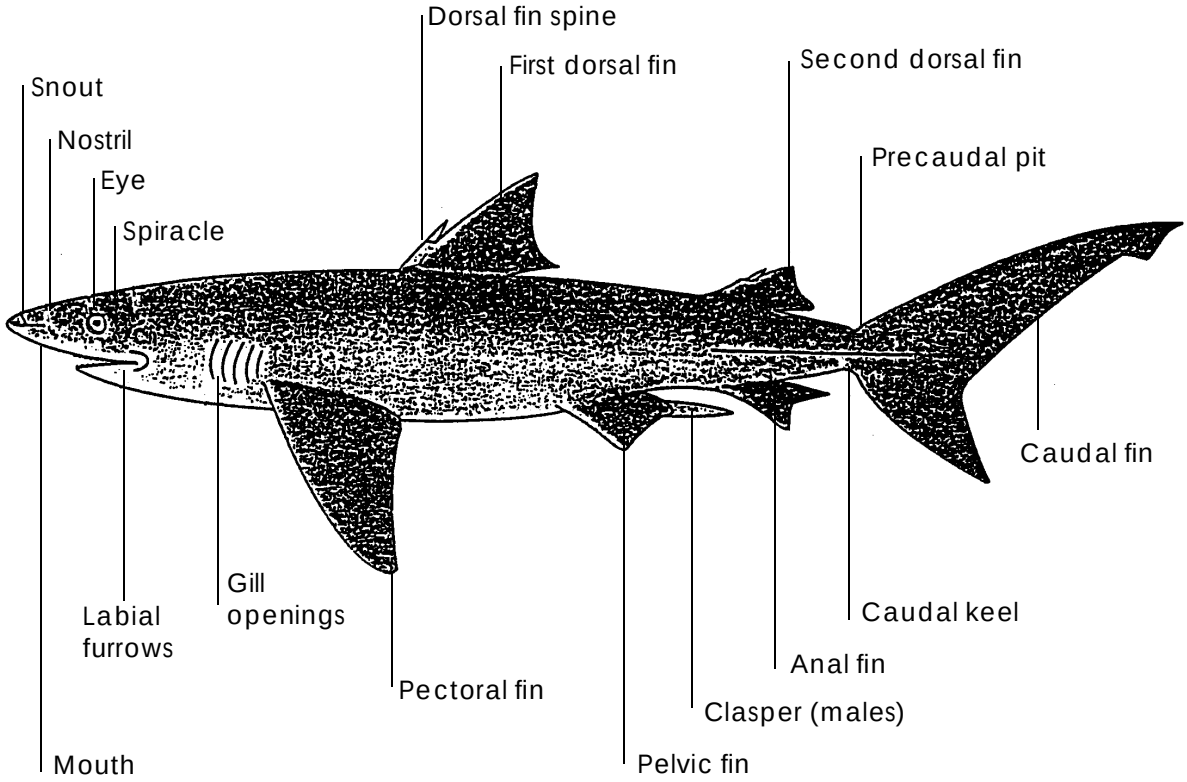
My Shark's Home

- Observe the sharks in the shark tank and write a short story describing your favourite shark's home.
- Does it live on the bottom of the ocean or swim freely over a coral reef?
- How cold is it?
- What does it look like?
- How does a shark's body form reflects its lifestyle?

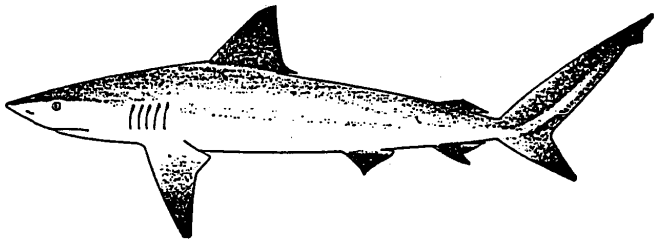
The body form of sharks, like all animals, can be related to their way of life. They live an active, predatory lifestyle with exceptional success in a demanding environment. They can move through a medium 800 times denser than air with superb grace, speed, and agility, or lie prostrate and camouflaged on the ocean floor (see Figure 1).

Shark Studies in an Aquarium

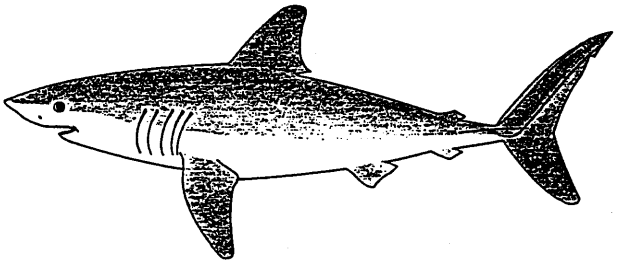
What do they look like?



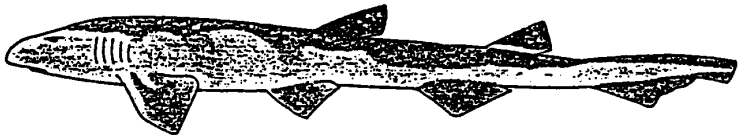
Body form of a 'Typical Shark' represented by the whaler genus



Body form of a Mackerel Shark



Body form of a Catshark



Shark Studies in an Aquarium

Observe a free swimming and a bottom dwelling shark.

- Note as many differences as you can between their forms.
- Write down some of the ways in which the shark's body is suited to its lifestyle. What advantage does its body shape give it?
- Draw a picture of the shark isolated in the tank and use the diagram provided to label the parts you can see.

Note the colour of the shark you have drawn and its size.

- Measure the shark from its snout to the tip of its caudal fin.
- Is your shark a male or a female? How do you know?

Shark's skin

A shark's skin is covered in a sort of flexible armour made up of thousands of small scale like spines.

- Gently touch the shark in the tank. Does it feel the same which ever way you rub it? Describe what it feels like.
- What are the benefits of this type of skin for the shark?

Different species of shark will eat different prey depending on their feeding preference and biology. For example a bottom dwelling shark will eat very different food to a pelagic, free swimming species.

- What does an ocean–dwelling shark such as the Tiger Shark, *Galeocerdo cuvier,* eat?
- What does a bottom–dwelling shark such as the Port Jackson Shark, *Heterodontus portusjacksoni,* eat?
- What are the advantages of living in separate environments for these two species of shark?
- How do their body forms and their eating habits differ?
- What are the differences between sharks and other fish?

Sharks are different from normal bony fish in a number of ways. Their skeletons are made of cartilage instead of bone and they do not have an air filled bladder for buoyancy like most fish.

- Watch the sharks in the large tank. How many different species of shark can you see in the tank?
- How many different kinds of fish can you see?
- How many differences can you observe between the sharks and the fish? Notice the way they swim, the shape of their body, their size, what their skin looks like.
- Fill out the data sheet, showing the differences you can see between fish and sharks.

<u>Extension</u>

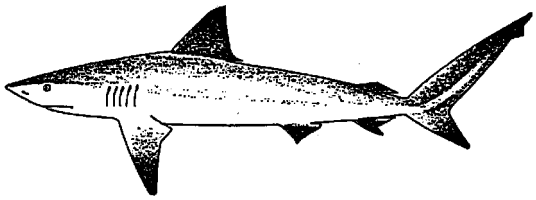
Investigate claims that sharks are becoming endangered in Australian waters and need protection from fishing, and shark nets (protecting surfing beaches).

Design a campaign to make the public more aware of sharks, their characteristics and their role in the sea.

Shark Studies in an Aquarium

Shark study data sheet

What are the differences between sharks and other fish?

	
Other fish	**Sharks**