

Survival Skills & Secrets



Pre-Visit Activities

Students can be prepared for their journey by having a basic understanding of why animals have adaptations, and how these adaptations are determined by biotic and abiotic environmental factors. They should also have learnt about the four types of adaptations: structural, behavioural, physiological and reproductive.

Activity 1: What's an Adaptation?

Part A: Structural adaptations

Have you ever wondered why an animal looks the way it does? These features are called adaptations and have been developed over time to help them to survive in their environment. Adaptations are used for a variety of reasons: collecting food, finding a mate, avoiding being eaten, keeping warm/cool and raising offspring. Once students have a clear understanding of what adaptations are used for, have them select one terrestrial animal and one marine animal to study. Using Worksheet 1, have the students list the different structural adaptations of each animal and answer the questions on the bottom of the worksheet.

This activity develops students' knowledge of adaptations, and how environmental factors influence the type of adaptations that organisms have.

Part B: Other Adaptations

Students should now have a firm insight on structural adaptations; however there are other types of adaptations, such as behavioural, reproductive and physiological.

Behavioural adaptations: are the ways organisms physically act in order to survive. For example, a frog may call in order to find a mate, or a bear may hibernate over winter so that it doesn't starve from lack of food.

Reproductive adaptations: are adaptations that help the organism successfully reproduce. The main goal for organisms in the wild is to survive and reproduce. There is no point surviving if you're not going to produce offspring. For example, rabbits breed all year round so the chances of some of their offspring surviving are higher.

Physiological adaptations: are those that help to regulate a function of the body. For example, the amount of melanin produced in human skin serves as protection against UV radiation, or the production of a special fat that Bears use as food during hibernation.

Using the two animals from Part A, students should make a list of the three different types of behavioural, reproductive and physiological adaptations (Worksheet 2) and a reason for this feature. Books and the internet can be used as aids. For example:

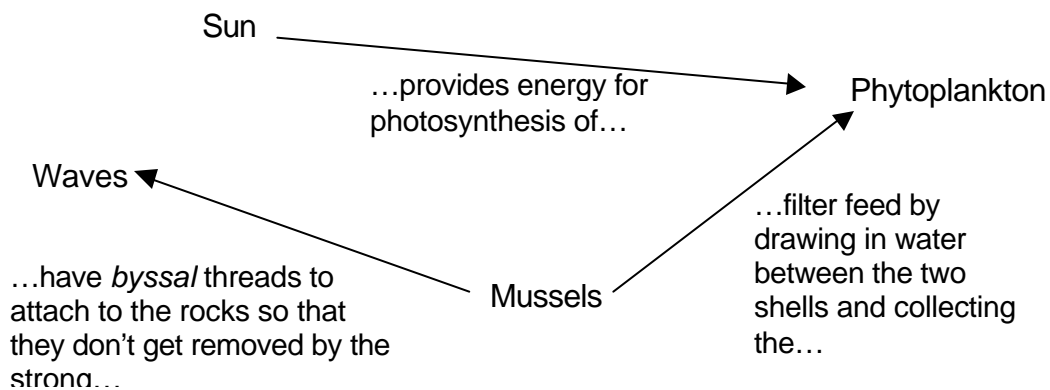
| Animal | Behavioural | Reproductive | Physiological |
|------------------------|---|---|--|
| Lion | Hunt in packs so that they can surround their prey | The pride synchronizes its reproduction so they can rear their cubs together. | Unless pregnant, a lioness comes into heat every three weeks. So to increase the success of fertilisation |
| Emperor Penguin | The adults huddle together during winter storms. This protects them from freezing to death. | The parents are monogamous and will take turn in feeding and taking care of the egg or chick. | Male Emperor Penguins are capable of not eating for over four months. This enables them to protect their egg or chick. |

Activity 2: What sort of adaptation is it?

This activity helps develop the students understanding of the different types of adaptations and the reasons for having adaptations. Have students work through Worksheet 3.

Activity 3: Environmental factors that influence the type of adaptation

Environmental factors determine the type of adaptations that an animal has. Have the students brainstorm the various abiotic (non-living) environmental factors that might influence the survival of animals in a rock pool habitat. Then get them to come up with a list of plants and animals (biotic factors) that might live in that rockpool. Combine these together in the form of a concept map. This will help students appreciate the relationship between adaptations and the environment. For example:



Activity 4: Local adaptations

For a more practical approach to teaching adaptations, head out into the school grounds and have them choose a type of insect. The students will observe the adaptations of that insect and explain the benefits of having these features. The same activity could also be done using plants. For example, students could evaluate how the size and shape of the plant could influence the survival of the species.

Post-Visit Activities

Following their visit students will have the knowledge and skills to confidently differentiate between the different types of adaptations and describe the benefits of having specific adaptations.

Activity 1: Adaptations of Port Phillip Bay

Students choose an animal or type of seaweed that they saw on the trip and research its structural, behavioural, reproductive, and physiological adaptations.

Activity 2: Design your own species

Students work in pairs to design their own well-adapted species. Students choose from one of the scenarios on Worksheet 4 to create a new organism that would survive in that particular environment. Some of the things they will need to think about are how the organism: collects food, finds a mate, avoids being eaten, keeps warm/cool and raises offspring. Make sure that they include all four adaptation types (structural, behavioural, reproductive and physiological). This activity can either be done as a sketch or you may want the students to design a costume of their organism and then get them to do a fashion parade - where one partner models and the other commentates, just like on a real catwalk!

Activity 3: Fish or Squid Dissection

For a more hands-on activity, head to the fish markets and collect either a fish or a squid. Both animals have some very interesting adaptations that the students can analyse. Refer to Worksheet 5 for a fish dissection and Worksheet 6 for a squid dissection.

Worksheet 1: Adaptations of two different animals

Choose one terrestrial animal and one marine animal then fill in the table below.

Terrestrial Animal:

Marine Animal:

| Adaptations | Terrestrial Animal | Marine Animal |
|-------------------|--------------------|---------------|
| Collect food | | |
| Avoid being eaten | | |
| Keep warm/cool | | |
| Find mate | | |
| Breathe | | |
| Raise offspring | | |



Worksheet 2: Other Adaptations

Using the animals you chose for worksheet 1, come up with three behavioural, reproductive and physiological adaptations.

| Animal | Behavioural | Reproductive | Physiological |
|--------|-------------|--------------|---------------|
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From the information you have collected are there any major differences between the adaptations of the terrestrial animal to that of the marine animal? If so, explain for these differences.



Worksheet 3: What sort of adaptation is it?

| Adaptation | Type: behavioural, structural, reproductive, physiological | Benefits |
|--------------------------|--|----------|
| Sex change | | |
| False eye spot | | |
| Coverage of slime | | |
| Spines | | |
| Poison | | |
| Peripheral vision | | |
| Schooling | | |
| Exoskeleton | | |
| Camouflage | | |
| Remove salt from body | | |
| Swim bladder | | |
| Echolocation | | |
| Lateral line | | |



Worksheet 4: Marine Scenarios

Scenario 1: Mudflats

The seawater covering this habitat is very shallow (maximum of approximately 60cm deep), which means temperatures can reach up to 30°C on very hot days. As the name suggests the sea floor is made of mud and has very little oxygen flowing through it. The main plant that lives in this environment is seagrass, which most animals find difficult to digest. The only animals that feed on it are Swans and they will only graze the roots of the plant. Occasionally when nutrient levels are high, algae will grow on the leaves of the seagrass, and it is this algae that other herbivorous animals can eat. Besides from the Swans that live here, there are plenty of small fish, molluscs and crabs that hide out amongst between the seagrass.

Scenario 2: Icy waters

This habitat is very cold, where temperatures can reach below -80°C in winter. Sunlight only exists for about three months of the year, coinciding with an abundance in plankton activity. During this time there are large numbers of baleen whales that come to feed on the krill and plankton. Throughout the rest of the year it is dark and there are lots of predators around, such as killer whales and leopard seals, both of which feed on penguins, fish and other seals.

Scenario 3: Sandy Beaches

This is an intertidal zone, where the seawater comes in and out on a regular basis. When the water is out and the wind is blowing, the sand gets blown everywhere. The only safe place is under the sand. Here you will find lots of small animals such as worms, crabs and insects. On hot days the sand also gets very warm.

Scenario 4: Deep Ocean

This habitat is 2,400m below sea level - there is no sunlight and it is freezing cold. The lack of light means there are no plants. However hydro-thermal vents support a unique microbe that lives inside the body of other animal, helping them to create food using chemicals from the vents and oxygen from the surrounding water. The water released from these vents can reach up to 360°C. The vents are surrounded by numerous small crustaceans. Larger animals, such as fish or squid then feed on these crustaceans.



Worksheet 5: Fish Dissection



Materials

- Scalpel
- forceps
- scissors
- fish
- probe
- chopping board
- newspaper

Analyse the external features of the fish, then make a list of the various adaptations and the benefits of having them:

| Adaptation | Benefits |
|------------|----------|
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Locate the anus on the ventral side of the fish. Make an incision up the belly towards the throat, then make four lateral cuts so that you can fold the skin of the belly back.

Analyse the internal features including the: gonads, stomach, swim bladder, intestines, kidney, liver, and oesophagus.

Write down the benefits of having the following adaptations:

| Adaptation | Benefit |
|--------------|---------|
| Gonads | |
| Swim bladder | |

Worksheet 6: Squid Dissection



Materials

- Scalpel
- forceps
- scissors
- squid
- probe
- chopping board
- newspaper

Analyse the external features of the squid then make a list of the various adaptations and the benefits of having them:

| Adaptation | Benefits |
|------------|----------|
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Spread apart the tentacles and use a probe to locate the mouth. Remove the mouth piece, this is called the beak. Find the opening to the mantle (body) and make one long incision from the funnel to the tip. Pull back the flap and analyse the internal features: gills, gonads, stomach, and ink sac. To remove the pen, find the hard point at the end of the fin and gently grip it with the forceps pulling away from the squid.

Write down the benefits of having the following adaptations:

| Adaptation | Benefit |
|------------|---------|
| Beak | |
| Gonads | |
| Ink sac | |
| Pen | |