

fun

Shark Trust
2007



Shark Trust 2007

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Welcome to the Shark Trust's 'Marine Educators Teaching Toolkit'!

The Toolkit is jam-packed with educational resources, games, hands-on activities and puzzles. Primarily created for teachers and marine educators working with key stage 1 and 2 children, the Toolkit can be used in its entirety or dipped into for individual components.

The Toolkit is divided into 8 parts:

1. Key stage 1 and 2 Science National Curriculum linked units, worksheets and factsheets working towards Sc1 and Sc2 targets:
 - Unit 1A – Ourselves
 - Unit 2B – Plants and Animals in the Local Environment
 - Unit 2C – Variation
 - Unit 3A – Teeth and Eating
 - Unit 4A – Moving and Growing
 - Unit 4B – Habitats
 - Unit 5B – Lifecycles
 - Unit 6A – Interdependence and AdaptationEach unit contains teaching notes and resources supporting the subject. Links to other curriculum areas and ideas for embedding English are also suggested.
2. Discussion Cards – Habitat Destruction, Pollution, Bycatch and Overfishing, supporting English 'Speaking and Listening' Attainment Targets
3. Puzzles and Wordsearches
4. Artistic and creative activities
5. Educational games (outdoor and indoor)
6. Presentations
 - Shark, Skates and Rays – The Lowdown
 - Sharks
 - Skates and Rays
7. Skate and ray eggcases
8. Activity Sheets and certificates

The elasmobranch fishes (sharks, skates and rays) are some of the most threatened organisms in the sea. Tens of millions of sharks are killed each year and many species have declined by up to 95% of their original numbers as a consequence.

The Shark Trust works to raise awareness of the issues surrounding sharks and the threats faced by the coastal and marine environment as a whole. Providing accessible knowledge and information and instilling a sense of wonder is one way the Shark Trust works to improve the understanding of elasmobranchs and move towards effective conservation of these amazing yet threatened animals.

Follow Basil the Basking Shark™ through the Units and activity sheets or dip into pages and sections that interest you. The pages are there to be used so please photocopy them if you would like multiple copies. All of the pages are also available to download from the 'Education' section of the Shark Trust website www.sharktrust.org.

Introduction

The Marine Educators Teaching Toolkit has been created by the Shark Trust, a marine conservation charity dedicated to the conservation of elamobranch fishes – sharks, skates and rays.

The idea driving the Toolkit's production was to increase young peoples understanding and awareness of coastal and marine environments and the most serious threats faced by them now and in the future.

With a specific focus on sharks and their role within the environment, the resources use an ecosystem-wide approach to educating, and improving both understanding and fascination of coastal and marine habitats along with the species found within them.

The Toolkit is intended to be user-friendly and ultimately accessible to anyone who picks it up. Many of the ideas found within the pages are transferable to different species and locations and are intended to be flexible and adaptable.

If you have any comments, suggestions or ideas regarding the Toolkit or would like to contribute material we would really like to hear from you – good or bad – so that we can continue to improve the educational value of the product.

Get in touch via the Shark Trust Website www.sharktrust.org or by emailing enquiries@sharktrust.org.

Unit 1A Ourselves – Teaching Notes

This unit investigates the fact that humans are animals and that there are similarities and differences between all organisms.

Resources associated with this unit:

- A4 and A6 Picture Cards of things that are 'alive' or 'not-alive'
- A5 Vocabulary Cards of words used within this Unit
- Senses Worksheet
- Senses of Sharks Factsheet
- Senses Wordsearch
- Glossary

Resource use Ideas

As a whole class or in smaller groups, use the complete set of **Picture Cards** and **Vocabulary Cards** to explore the differences between 'alive' and 'not-alive'. Under the two headings write a list or draw a picture of something that is 'alive' or 'not alive'. Ask the children to suggest more things that are 'alive' or 'not alive'.

Discarding the 'not-alive' cards:

- Explore the fact that humans are animals and that there are similarities and differences between different animals (including humans). What are they?
- Encourage observations on how animals move and make comparisons between different animals.
- Using the cards ask the children to group the animals, e.g. according to their similarities, differences or the way they move.

Senses Worksheet - Use the discussion cards to introduce senses. On the worksheet, match the sense organ with the sense.

Re-introduce the idea that there are similarities and differences between humans and animals. On the worksheet match the senses to the organs on the human and the shark.

Shark Senses – The sight and taste senses of sharks are obvious and their nostrils can be found at the front of the shark's snout. Sharks do not have external ears like humans but have inner ears located just behind the shark's eyes. Sharks have nerve endings under the skin that are sensitive to touch. They can 'feel' their environment by detecting changes in water movements and can tell the difference between stationary and moving objects and hot, cold and pain. Many sharks living on the seabed have barbels, which are used to probe the sand for food.

Curriculum, resource and other links

Sc1 & Sc2

P.E. Ask children to mimic different animals movements

Read more on the Shark Trust's 'Senses Factsheet'

Complete the 'Senses Wordsearch'

PSHE Themes

- Differences between humans
- Respect for animals
- Care for animals

Opportunities for embedding English objectives within this Unit:

- Discuss the differences between 'alive' and 'not alive'
- As a class write a list of 'alive' and 'not alive' things
- Write or copy the labels for each of the senses onto the worksheet

Unit 1 – Ourselves – Senses Worksheet

Vocabulary

Eyes
Ears
Mouth

Nose
Fingers
Sight

Hear
Taste
Smell

Touch

We all have 'senses' which we use to find out more about the world we live in. Can you name the five senses we have?

1. _____
2. _____
3. _____
4. _____
5. _____

Draw a line to match the body part with its sense.

Eyes

Mouth

Hands

Nose

Ears

Hear

Touch

Smell

Taste

Sight

Similarities and Differences

There are many different types of animals around the world – including humans! We are just one type of animal. If you look closely you will see that there are similarities and differences between us all.

Using the picture cards list more body parts found on each animal – there are some there to start you off.

People:

- Two arms
- Two legs
- Skin
- Ears
-
-

Birds:

- Feathers
- Two legs
- Wings
- Beak
-
-

Sharks:


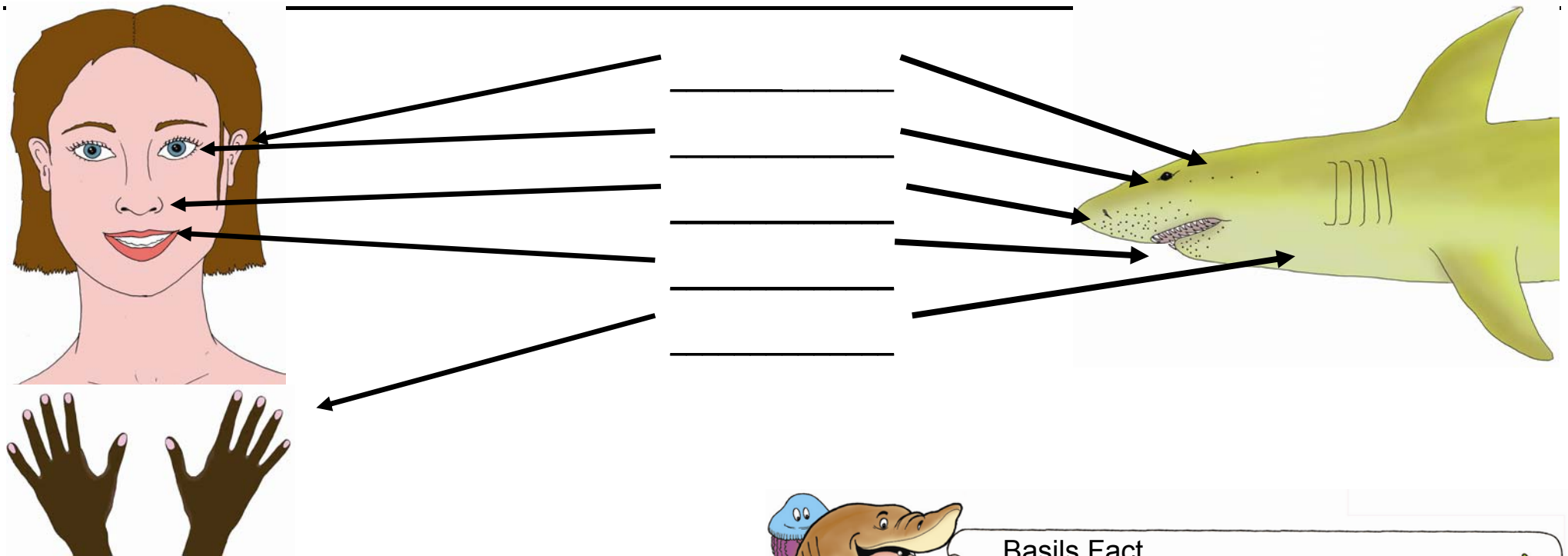
- Fins
- Mouth
- Eyes
- Teeth
-
-

What are the similarities between people and birds?

What are the differences between people and sharks?

Similarities and Differences

Despite looking very different, people and sharks have the same senses. On the picture, write the name of the sense next to the correct arrow.



Basils Fact

Sharks actually have six senses! They have the special ability to pick up electrical signals in the sea made by the other animals. This is called 'electro-reception'. Read more about this on the 'Shark Senses Factsheet'.

Unit 2B & 2C Plants and Animals in the Local Environment & Variation – Teaching Notes

These units investigate the differences between local habitats and the animals that inhabit them. They also look at reproduction and how animals change as they get older.

The units build on 'Unit 1A Ourselves' and some of the resources from that unit can also be used here.

Resources associated with this unit:

- A4 and A6 Picture Cards of different animals and plants
- A5 Vocabulary Cards of words used within this Unit
- Local habitats worksheet
- Shark Reproduction Factsheet
- Movement and Variation Wordsearch
- Shark Top Trumps
- Glossary

Resource use ideas

As a whole class or in smaller groups, use the **Picture Cards and Vocabulary Cards** to explore the differences between habitats and the animals found within them.

The habitats worksheet - using the vocabulary list to help, draw the animals and plants you might find in each habitat.

Fill a table with the animals and plants found in each habitat. Which animals/plants are found in more than one habitat? Are there similarities between the animals or plants found in the same habitat?

Use the **picture cards** to group together similar animals or plants (have legs, have fins, can fly, colour, large, small, how they move etc).

Use the shark Top Trumps to compare different species. Which are the longest? Which are the shortest?

Reproduction

All animals and plants reproduce in order to produce young; however there are many different ways in which it takes place. Some sharks, skates and rays give birth to live young and some give birth to babies inside eggcases – much like a chicken! Once they have hatched the eggcases of sharks, skates and rays

Curriculum, resource and other links

Sc1 & Sc2

Discussion Cards –
Pollution/Litter +
Seashore Code.
PSHE

IT – Make a table, graph or pictogram of the results

The Great Eggcase Hunt
www.eggcase.org
Eggcase ID Key
Eggcases in Toolkit

often wash up on the beach where you can find them all year round.

The Shark Trust runs the Great Eggcase Hunt Project which encourages people to get out onto the beach and look for shark eggcases. It is very easy to get involved – all you need is yourself and some sensible shoes. Take a look at the Great Eggcase Hunt Website – www.eggcase.org – for information on how to get involved and much more information about eggcases and the animals that lay them.

Take a look at the eggcases that came with the resource pack and the leaflet with all of the different eggcases you can find.

- Use the eggcase ID Key to try to identify each eggcase
- Make the shark hatching flickbook and colour it in
- Draw examples of adults with their babies
- Research shark eggs on the Great Eggcase Hunt Website and make a poster about the different types

Opportunities for embedding English objectives within this Unit:

- Discuss the differences between animals and between habitats. Ask the children to suggest why there are differences or why you only find certain animals in certain habitats.
- Think about the animals you find in each habitat – pick a habitat and write a story about the different animals in the ‘neighbourhood’
- Make a poster about the different types of eggcase

Curriculum, resource and other links

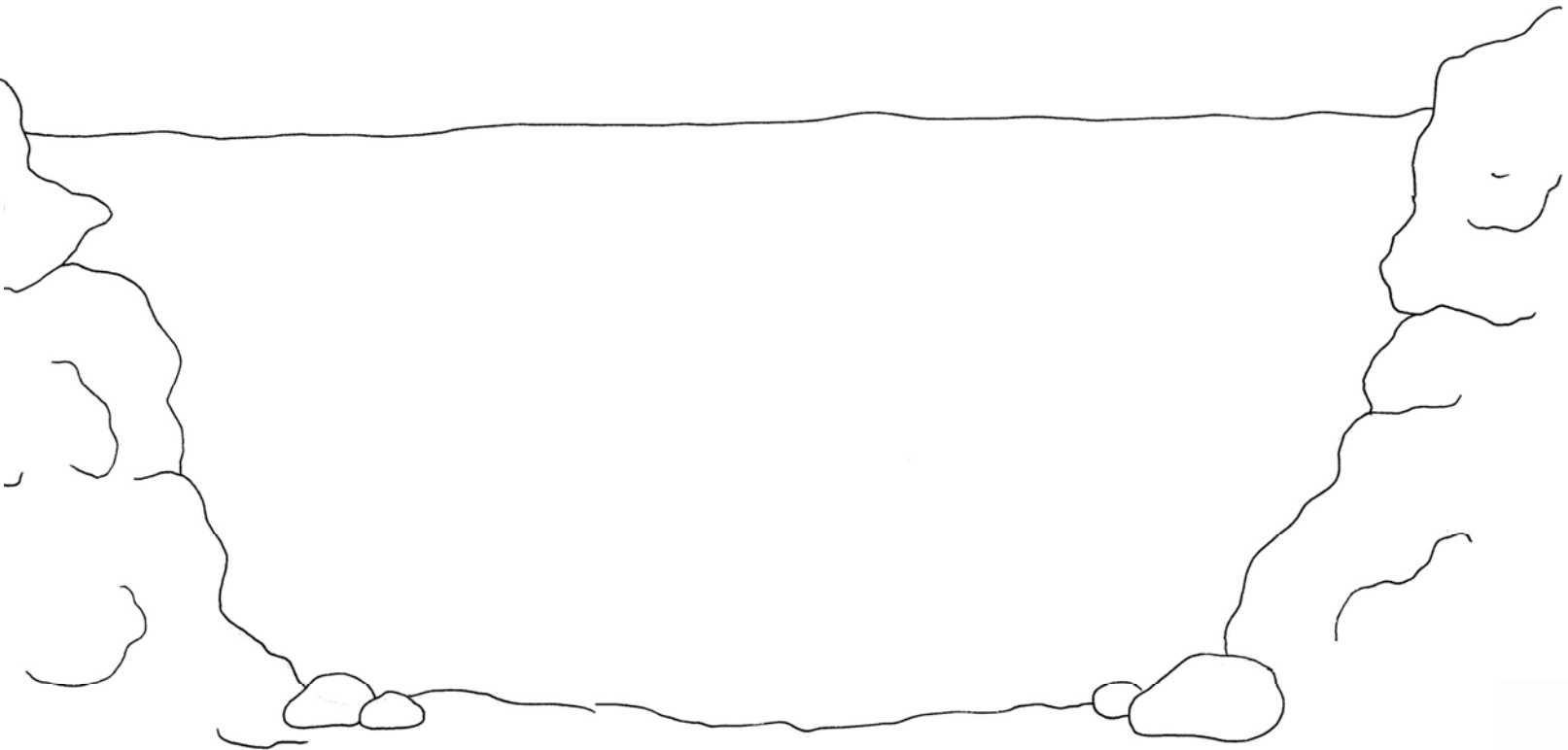
IT - www.eggcase.org

Unit 2 – Local Habitats Worksheet

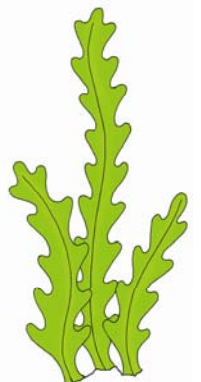
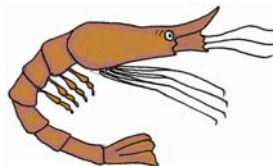
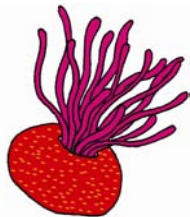
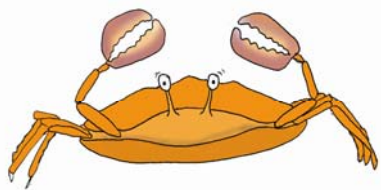
There are many different habitats in the environment, and within each habitat there are lots and lots of different animals and plants. Look at each of the habitats and draw which species you might find there.

Rockpool

Rockpools are found where water from the sea is left in dips in the rocks when the tide goes out.



What you might find... Can you think of anything else?

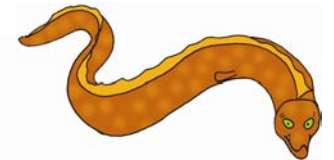
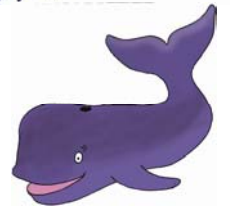
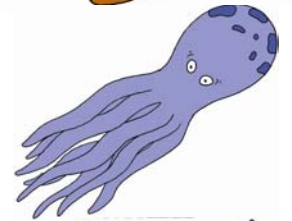
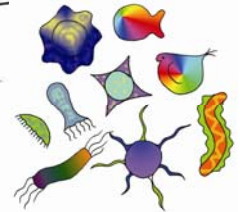
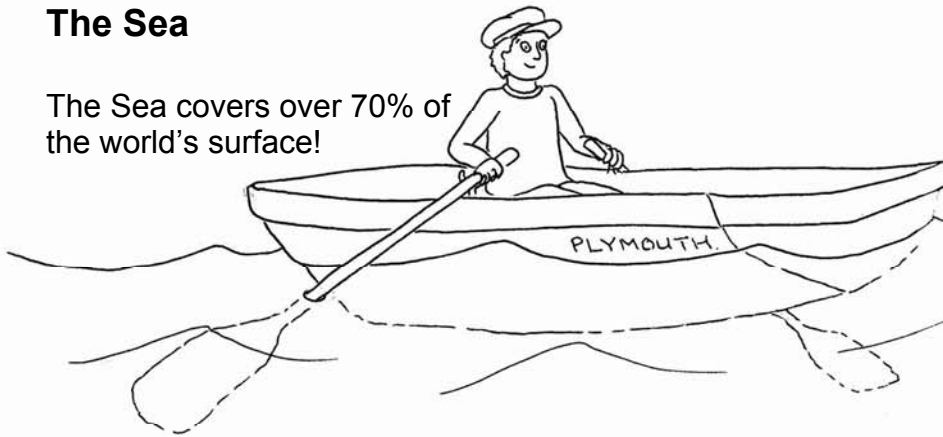


The Sea

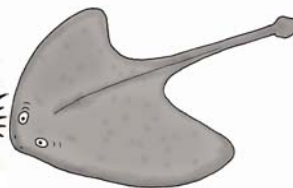
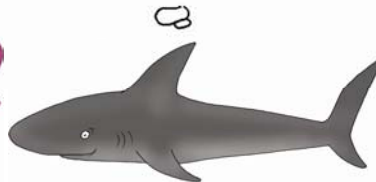
The Sea covers over 70% of the world's surface!

Unit 2 – Local Habitats Worksheet

There are many different habitats in the environment and within each habitat there are lots and lots of different animals and plants. Look at each of the habitats and draw which species you might find there.



What you might find...
Can you think of anything else?

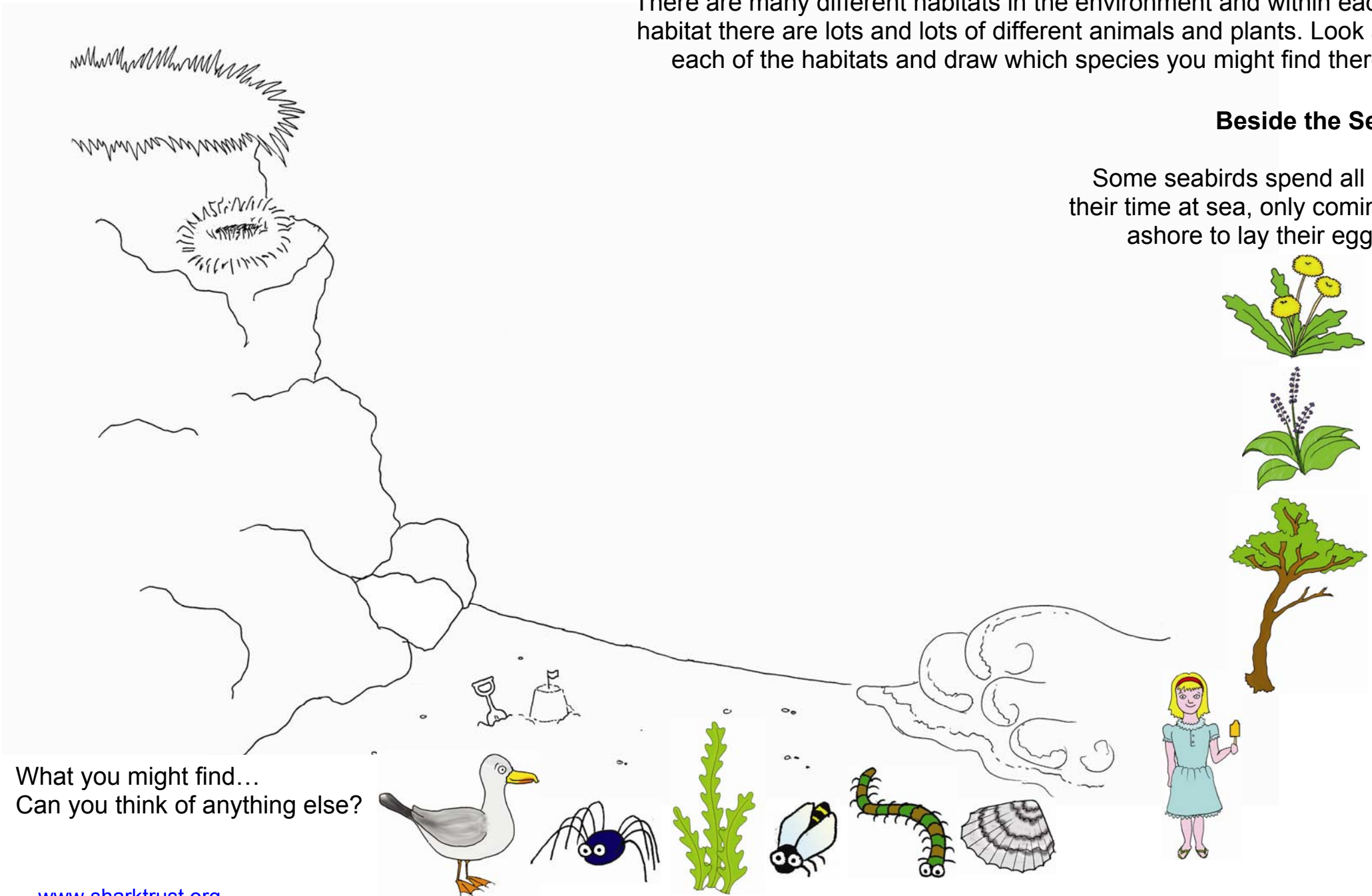


Unit 2 – Local Habitats Worksheet

There are many different habitats in the environment and within each habitat there are lots and lots of different animals and plants. Look at each of the habitats and draw which species you might find there.

Beside the Sea

Some seabirds spend all of their time at sea, only coming ashore to lay their eggs!



Unit 2 – Local Habitats Worksheet

Can you think of any more habitats? Think of one and draw a picture of it and the animals and plants you might find there.

Unit 3A Teeth and Eating – Teaching Notes

These pages relate to the idea that different animals have different diets and how this can be investigated.

Resources Associated with this unit:

- Teeth and Eating Worksheet
- Shark Facts Booklet
- Glossary

Resource use ideas

Teeth and Eating worksheet - Draw an arrow between the shark mouth parts and the prey animals. Also, think about what the other animals might eat and draw a picture for each.

Using the **Shark Facts Booklet** investigate what food each shark likes to eat. Use the information to work out what type of teeth each shark has. Use the information to make a table and present the findings in a graph or pictogram.

Opportunities for embedding English objectives within this Unit

- Use the shark facts booklet as a source of information for the children. The booklet can be read and then summarised orally, in writing, or presented in a table or graph.

Curriculum, resource and other links

Sc1 & Sc2

IT – Make a table, graph or pictogram of the results

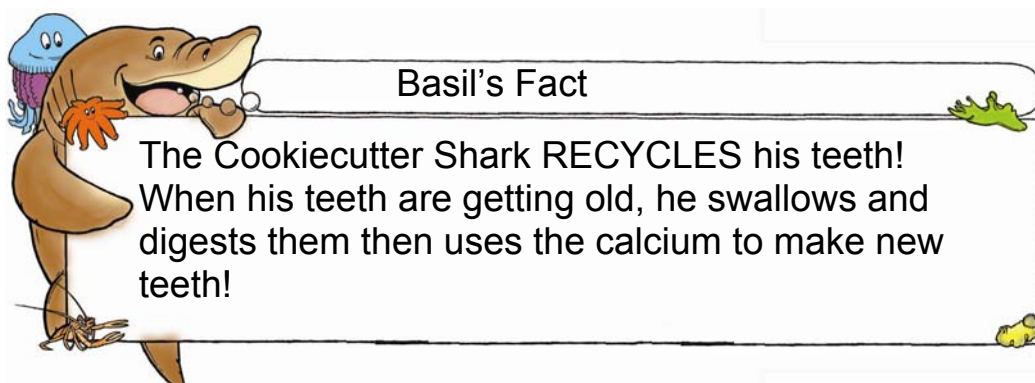
Unit 3 – Teeth and Eating Worksheet

All animals have to eat in order to stay healthy and to grow. Different animals have different diets and are adapted to different types of food.

What did you eat for dinner last night?

What is your favourite type of food?

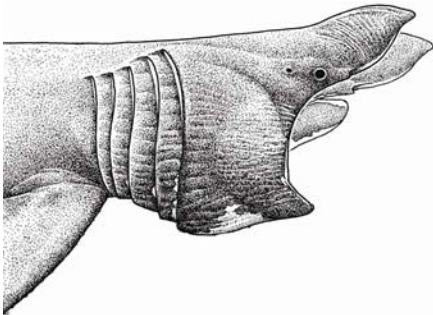
Can you think of what foods other animals like to eat?



Unit 3 – Teeth and Eating Worksheet

Sharks live in the sea and like to eat lots of different foods. Different species of sharks are adapted to eat certain types of food. Read about the different types of teeth to work out which food each shark eats.

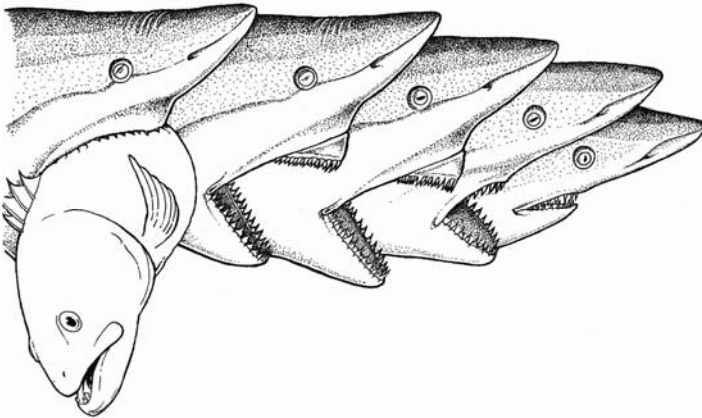
Gill Rakers



The gigantic Basking Shark grows to 10 metres in length and uses gill rakers to sieve very small items of food out of the water

Favourite Food: _____

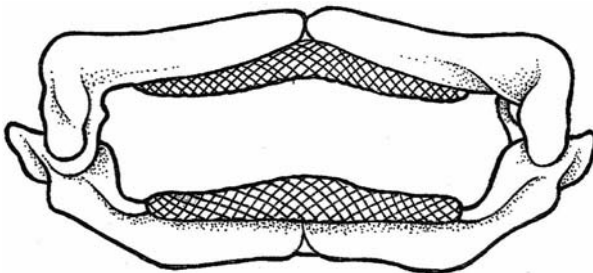
Sharp Teeth



The Mako Shark has rows of pointed and serrated teeth that are used to pin down its quick moving prey.

Favourite Food: _____

Crushing Teeth



The Port Jackson Shark has strong jaws and flat teeth for crushing food with hard shells.

Favourite Food _____



Plankton consists of very small plants and animals that float around in the sea.



Fish are slippery animals that are difficult to hold still.



Sea Urchins have hard shells and spines.

Investigation – What food do different sharks eat?

Use the Shark Facts Booklet to investigate the favourite food of different sharks.

Use the index to help you answer the questions.

What does the Whale Shark eat?

What does it use to eat this food?

What does the Porbeagle Shark eat?

What type of teeth does this shark have?

What does the Wobbegong eat?

What type of teeth does this shark have?

Are there some sharks that like to eat the same food?

Fill in the table with the name of the shark and the food they prefer to eat.

		Favourite Food			
Shark Name					
					Total

How many sharks like to eat plankton?

How many sharks like to eat fish?

How many sharks like to eat crustaceans?

Draw a graph showing how many sharks like each different type of food

Unit 4A Moving and Growing – Teaching Notes

These pages relate to the idea that animals have a skeleton which supports the body and helps them move.

Resources Associated with this unit:

- Moving and Growing Worksheet
- Movement and Variation Wordsearch
- What Makes a Shark Factsheet
- True and False Statements
- Glossary

Resource use ideas:

Moving and Growing Worksheet – answer the questions on the worksheet and label each of the skeletons.

Use the internet or other books to find out how each of the animals use their skeleton to move.

After reading the worksheet, answer the true and false questions.

Opportunities for embedding English objectives within this Unit:

- Write a report about the different types of skeletons found in the animal kingdom
- Make a poster about the different skeleton types

Curriculum, resource
and other links

Sc1 & Sc2

IT – research the
skeletons and
movements of different
animals
PE – mimic the different
ways animals move.
Pick an animal and
have races using they
way they move

Unit 4A Moving and Growing Worksheet

The **skeleton** provides support to an animal's body and there are many different types of skeleton in the animal kingdom.

Vertebrates are animals that have a backbone or spinal column such as all mammals, fish, birds, amphibians and reptiles.

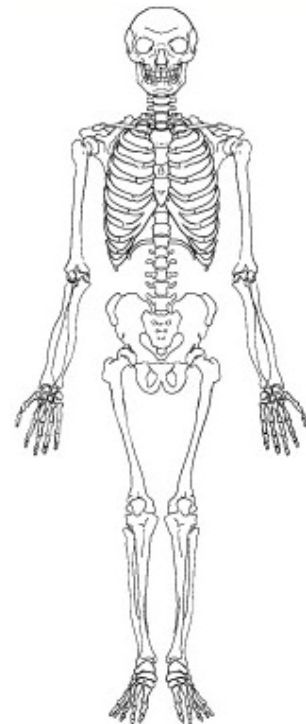
Invertebrates are all the animals that don't have a backbone. This represents a massive 97% of all animals and includes insects, spiders, snails, jellyfish, octopus, worms and many, many more!

Vertebrate Skeletons

The skeleton of most vertebrates (which includes us humans) is made of bone and is found inside the body – this is called an internal skeleton or '**endoskeleton**'.

Look at the picture of the human skeleton; using the wordlist can you label some of the bones?

Skull
Ribcage
Spine
Pelvis
Tibia
Fibula
Humerus
Femur
Radius
Ulna



Do you know any other bone names?

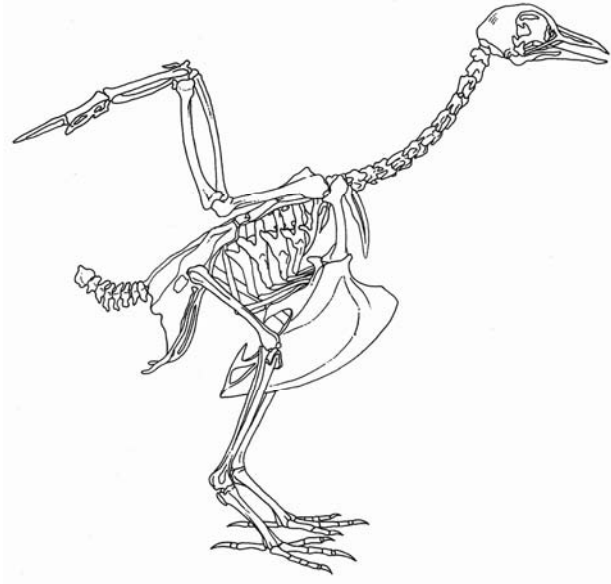
The skeleton supports the body and protects important body parts such as the heart, brain, and lungs. Bones are connected to each other by joints which allow the body to move.

Why do you think joints are important? What would happen if you didn't have any joints? How would you be able to move?

At birth, humans have approximately 300 bones but as we get older some of them fuse together so that an adult human has only 206 bones.

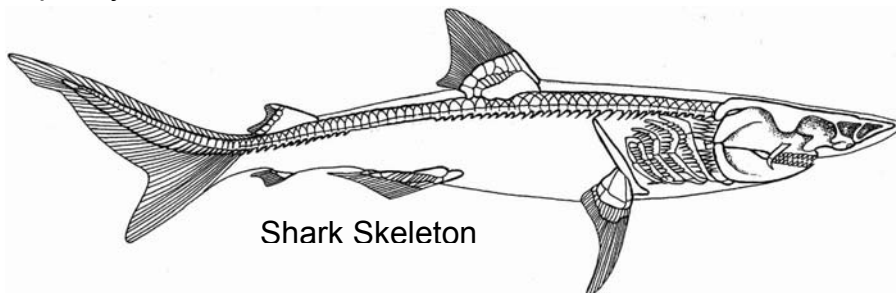
Unit 4A Moving and Growing Worksheet

Look at this picture of a **bird's skeleton**. The function of the skeleton is the same as a human's however there are differences too. A bird's skeleton is lightweight with thin, hollow bones. Why do you think that this is important?



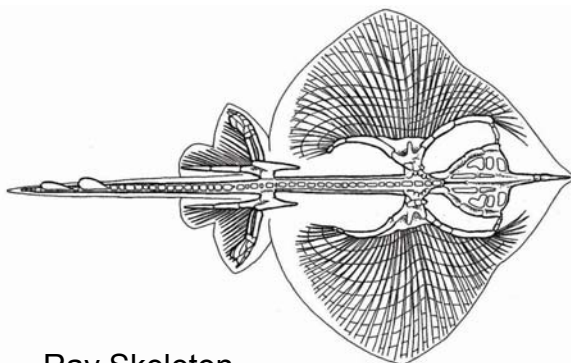
Label the bird skeleton using the wordlist on the previous page.

Sharks are vertebrates that have a different type of skeleton. The shark skeleton is made of cartilage – the same material that makes the top of your ears! Cartilage is very light, flexible and much softer than bone which means that sharks are very agile and can turn quickly.



Shark Skeleton

Take a look at the cartilage skeleton of a shark and ray.



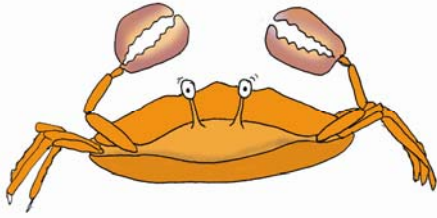
Ray Skeleton

Are there any similarities or differences between it and the bone skeleton?

Unit 4A Moving and Growing Worksheet

Invertebrate Skeletons

Many invertebrates, including insects, spiders and crustaceans (such as lobsters, crabs and shrimps) have an external skeleton called an '**exoskeleton**'.



An exoskeleton has the same function as an internal skeleton, to support and protect an

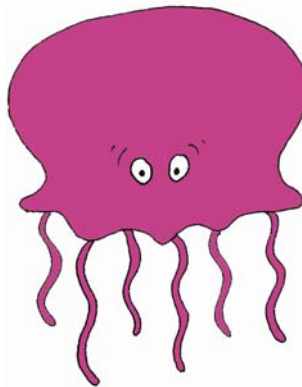
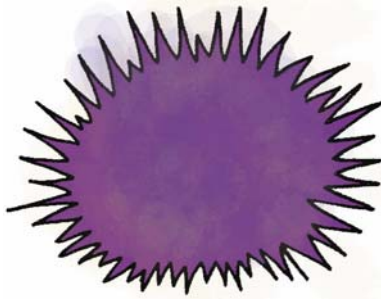
animal's body, but it is on the outside of the animal.

Because an exoskeleton is hard it is difficult for the animal to grow. When an animal that has an external skeleton wants to grow larger, it has to shed its skeleton, grow and replace their skeleton with a new, larger one.



Animals such as starfish, sea urchins, worms and jellyfish have a different skeleton altogether, a '**hydrostatic skeleton**'. Instead of bones supporting their body, these animals use fluid – like water – as their skeleton.

Animals with hydrostatic skeletons move by contracting the muscles surrounding the fluid-filled tubes creating pressure which causes movement.



Imagine a balloon filled with water, if you squeeze one end the other end moves, this is just how these animals move! Try it yourself.

Unit 4A Moving and Growing Worksheet

Using the information you have just read decide whether these statements are 'True' or 'False'.

	TRUE	FALSE
JOINTS CONNECT BONES AND ALLOW US TO MOVE		
IN HUMANS, SOME OF OUR BONES FUSE TOGETHER AS WE GET OLDER		
NOT ALL SKELETONS ARE MADE OF BONE		
ALL SKELETONS ARE MADE OF THE SAME MATERIAL		
MOST OF THE ANIMALS IN THE WORLD ARE VERTEBRATES		
THE SKELETON SUPPORTS THE BODY AND PROTECTS IMPORTANT BODY PARTS		
HUMANS HAVE CARTILAGE IN THEIR EARS		
SOME ANIMALS HAVE A SKELETON MADE OUT OF FLUID		
BONE IS MADE FROM CHEESE		
ANIMALS WITH AN EXTERNAL SKELETON HAVE TO SHED THE SKELETON ON ORDER TO GROW		
SKELETONS ALLOW US TO MOVE		
THE SKELETON OF SHARKS IS MADE OF BONE		
HUMANS HAVE EXTERNAL SKELETONS		
ANIMALS WITH A BACKBONE OR SPINAL COLUMN ARE CALLED VERTEBRATES		
ADULT HUMANS HAVE 206 BONES		



Basil's Fact

The liver of a Basking Shark can weigh up to one third of the shark's body weight – that means that a 6 tonne shark could have a 2 tonne liver!

Unit 4B Habitats – Teaching Notes

These pages build on Units 2B & C and introduce predator-prey relationships and food chains.

Resources Associated with this unit:

- A4 and A6 Picture Cards of different animals and plants
- Empty habitat illustrations
- Habitat worksheets
- Food Chain worksheets
- Habitat and Food Chain Wordsearch
- Sharks Worksheets
- British Sharks Poster
- Sharks True and False
- Glossary

Resource use ideas

Using the habitat cards, discuss the different habitat types. What are the characteristics of each one? What species might you find in each?

Using the animal and plant cards:

- Which habitat do you think each organism fits into?
- What other species might you find?
- Group the species with similar characteristics (fins, wings, plants, shells)

Habitats Worksheet – investigates similarities between different organisms and how organisms are suited to the habitats in which they live.

Food Chain Worksheet – introduces food chains, predators, prey, producers and consumers.

Sharks Worksheet – provides information about some sharks commonly found in British waters and how they are adapted to survive in their environment. Introduces the idea that sharks are threatened and that it is important to care for the environment. Encourages children to write a letter to the Prime Minister expressing concern over the threats to sharks.

PSHE Themes

- Respect for animals
- Care for the environment
- Conservation

Opportunities for embedding English objectives within this Unit:

- Use more sources to investigate a habitat further. Make a chart of all the organisms in the habitat and how they interact.

www.sharktrust.org

Curriculum, resource and other links

Sc1 & Sc2

IT – make a graph to show how many organisms use each habitat.

Discussion Cards – information and discussion points about the main threats to sharks with associated activities.

PSHE – introduces ‘conservation’ and respect for animals and the environment

IT – Learn more about endangered species on the IUCNs Red List – www.redlist.org

IT – Learn more about recycling: www.recyclenow.com

- Illustrate what is important about the habitat that keeps the organisms content.
- Use the discussion cards to introduce some of the threats to sharks and the wider environment.
- Make a poster; write a poem or a play about the problems.
- In groups pick an environment/habitat and detail how they would manage it and protect the organisms within it.
- Write a letter to the Prime Minister about threats to the environment.

Unit 4B – Habitats Worksheet

Everything that is alive is called an **organism** – this includes all animals and plants. Looking at the picture cards, do you notice any similarities between any of the organisms?

Place the organisms into groups that have similar features and write the groups below.

Why have you separated the cards in this way?

Now, sort the picture cards into animals and plants. What are the differences between the two groups?

What do plants like to eat?

The place where an organism is usually found is called its **habitat**. Animals and plants are found where their favourite food is found and where they have protection from animals that want to eat them.

Use the habitat cards to work out which habitat each organism belongs to.

What makes each organism suited to the environment in which they are found?

What other animals might you find there?

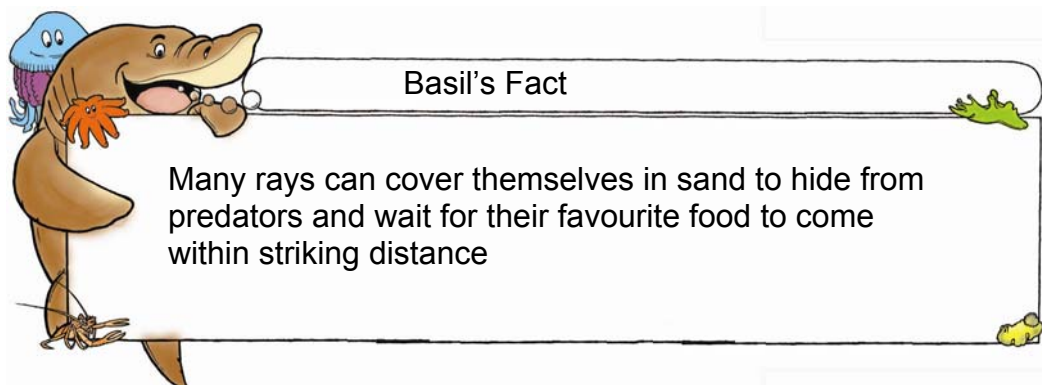
Unit 4B – Habitats Worksheet

Make a table that shows the organisms found in each habitat, and add any more organisms that you can think of.

Are there some organisms found in more than one habitat?

Make a graph to show how many organisms are found in each habitat.

What do you think makes an organism suited to the habitat where they are found?



Unit 4B – Food Chains Worksheet

Animals (including you and me) need to eat in order to stay healthy and to grow.

Animals that eat other animals are called '**predators**'.

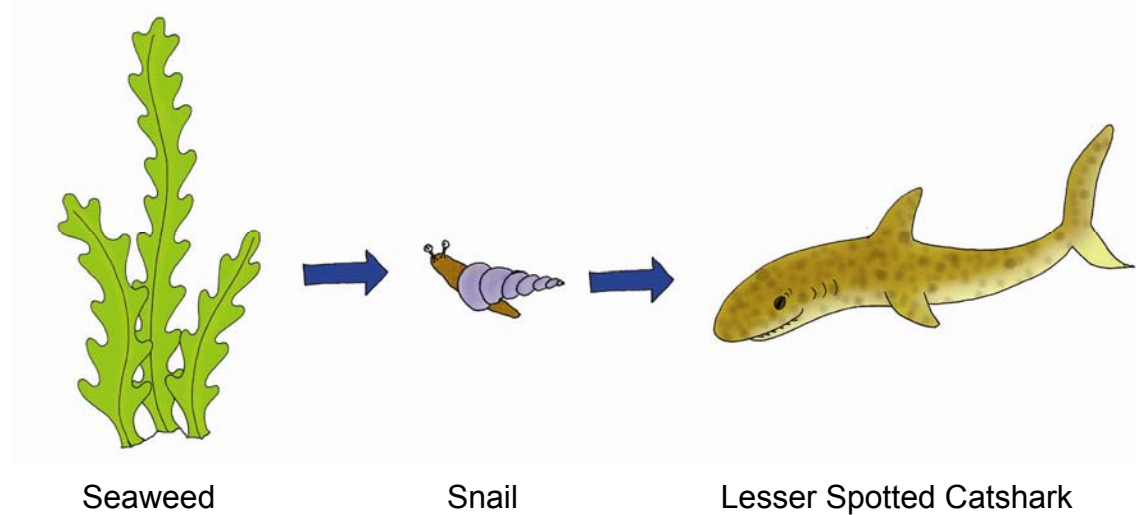
Can you write down the name of a predator?

Animals that are eaten by other animals are called '**prey**'.

Can you write down the name of a prey?

A '**food chain**' shows how organisms eat other organisms in order to survive.

In this food chain the catshark eats the snail and the snail eats the seaweed.



Means 'eaten by'.

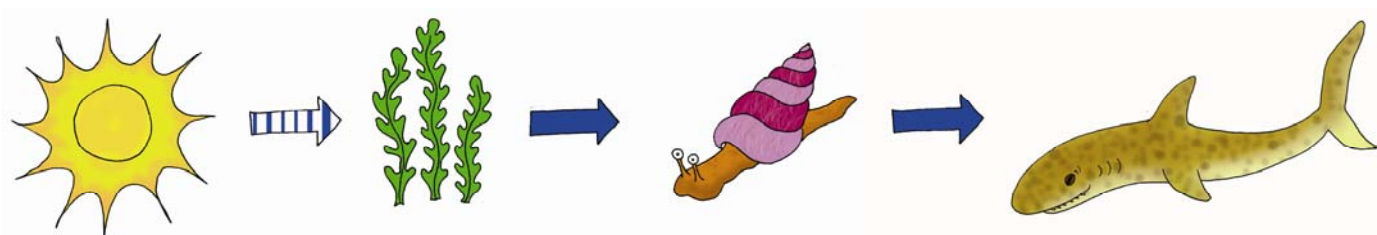
Can you label the **predator** and the **prey**?

Unit 4B – Food Chains Worksheet

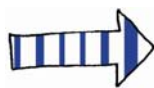
Most food chains start with a green plant. In the sea, that green plant is usually an '**algae**'. **Seaweed** is the largest green plant in the sea and can easily be seen when you go down to the beach. There are also microscopic algae floating throughout the ocean called **phyto-plankton**.

Green plants use energy from the sun to grow and are called '**producers**'. Animals that eat either green plants or other animals are called '**consumers**'.

Look at the food chain again, the catshark eats the snail, the snail eats the seaweed and the seaweed uses energy from the sun for nourishment.



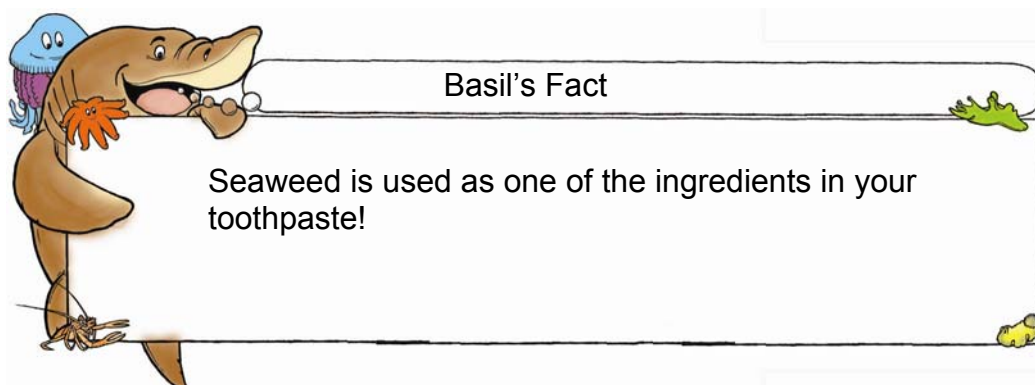
Means 'eaten by'



Means 'uses energy from the sun'

Can you label the **producer** and the **consumers**?
(Clue – There are two consumers and one producer!)

Using the species cards can you find another food chain?
Draw the food chain below and label the predator, prey, producer and consumers.

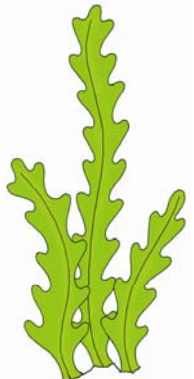
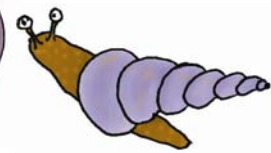
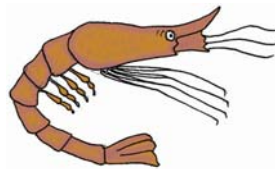
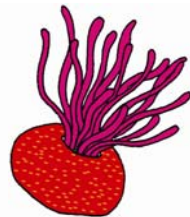
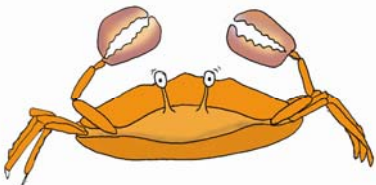
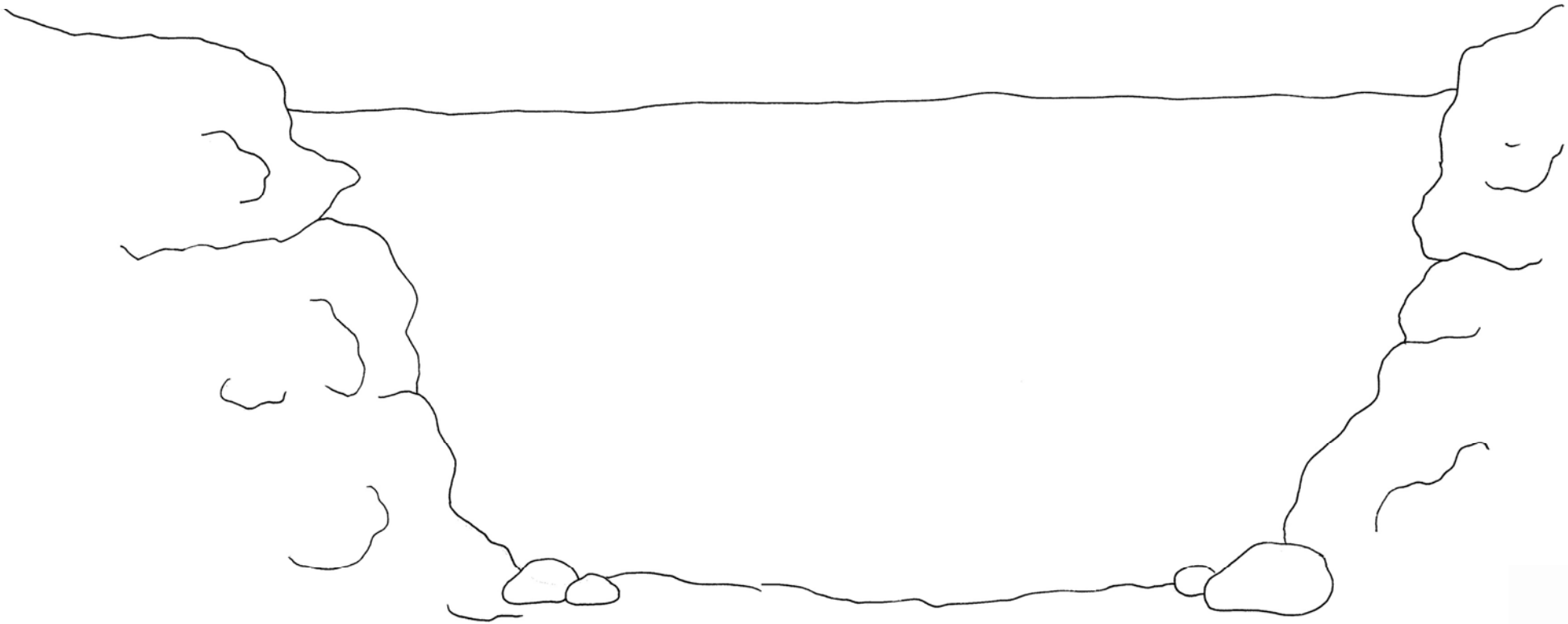


Rockpool

Rockpools are found where water from the sea is left in dips in the rocks when the tide goes out.

Unit 4B – Habitats Worksheet

Using the habitat pictures draw in the organisms you might find there. Can you see any food chains? Draw in the arrows to show who eats who.

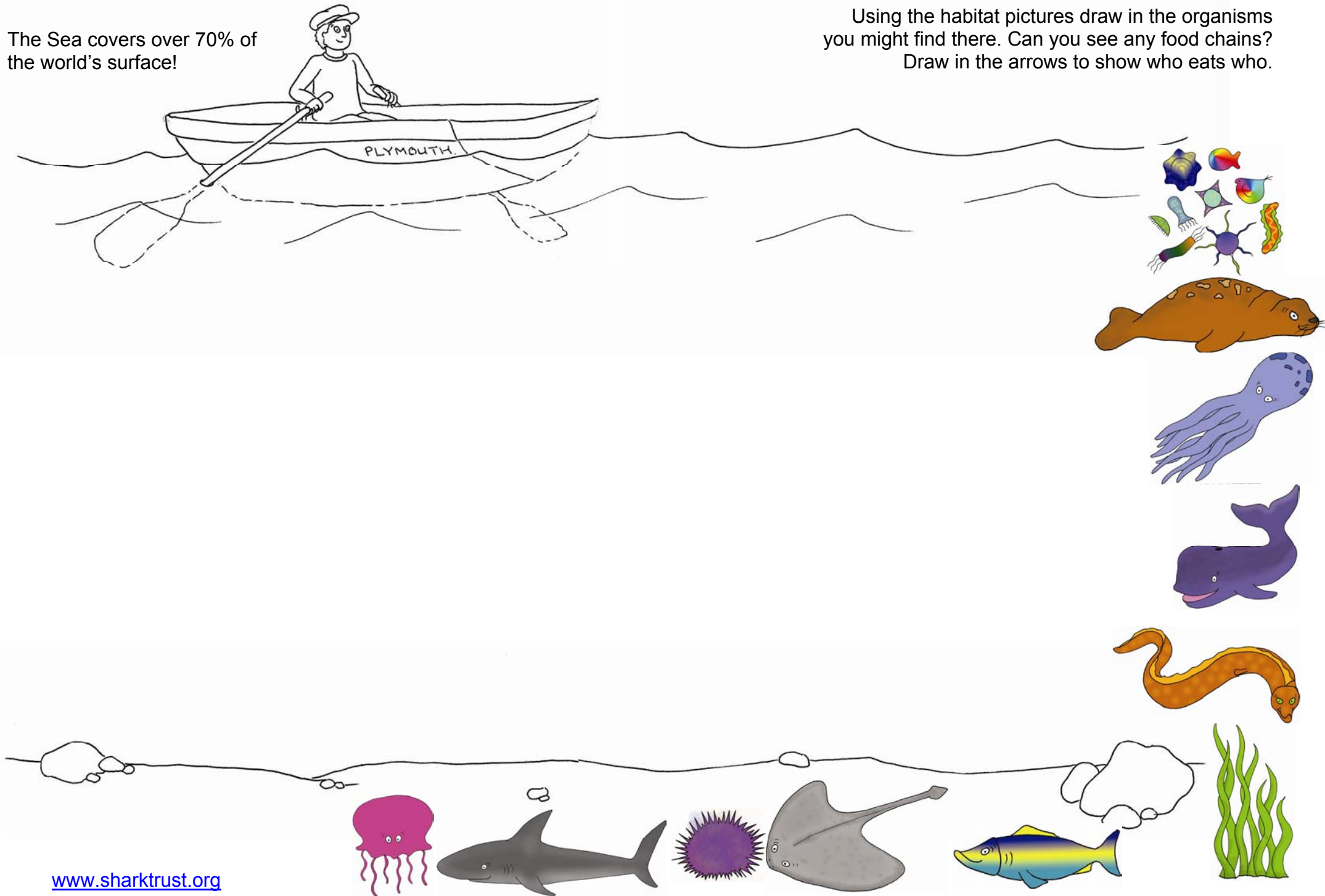


The Sea

The Sea covers over 70% of the world's surface!

Unit 4B – Habitats Worksheet

Using the habitat pictures draw in the organisms you might find there. Can you see any food chains? Draw in the arrows to show who eats who.



Unit 4B – Habitats Worksheet

Using the habitat pictures draw in the organisms you might find there. Can you see any food chains? Draw in the arrows to show who eats who.

Beside the Sea

Some seabirds spend all of their time at sea, only coming ashore to lay their eggs!



Unit 4B – Sharks Worksheet

Sharks are a type of fish. Unlike most fish, that have a skeleton made out of bone, sharks are different because their skeleton is made from cartilage – the same material that the top of your ear is made of!

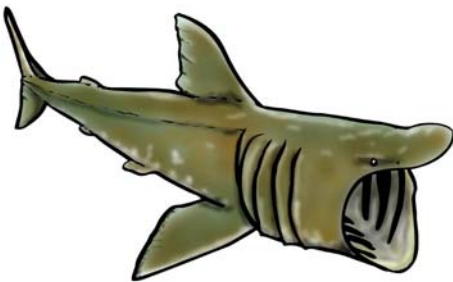
Sharks have been swimming in the oceans for around 400 million years. That's 100 million years before the dinosaurs and 386.5 million years before us humans! Sharks have been around for such a long time that they have become highly adapted to succeeding in their environment. There are flat sharks that live on the seabed, strong powerful sharks that are excellent at chasing down fish and giant sharks that feed only on microscopic plankton drifting about in the ocean to name just a few.

There are over 500 different species of shark in the world ranging from the small Spined Pygmy Shark – which can fit into the palm of your hand – to the massive Whale Shark – which grows up to 18 metres long.

In the waters around the UK there are 19 different species of shark. Read on to find out a little more about some of them.

Have a look at the British Sharks poster to see all of the different types.

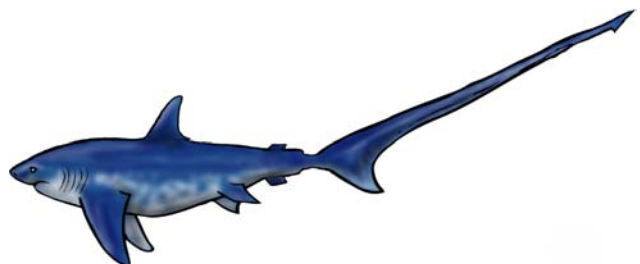
The UK's biggest fish, the Basking Shark can grow up to 10 metres long – that's longer than a bus! During the spring and summer months they cruise along at the surface of the sea using their gills to filter tiny plankton out of the water. Basking sharks swim with their giant mouth wide open eating plankton – tiny animals and plants measuring little more than 1 mm long!

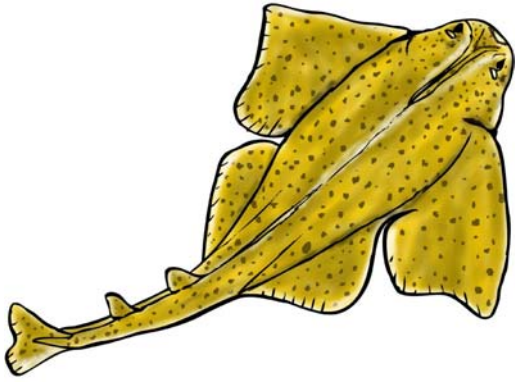


On calm days if you look out to sea you might be lucky enough to see the fins and nose of a Basking Shark poking out above the sea surface.

The Shortfin Mako Shark is the fastest shark in the world. Reaching speeds of nearly 35 kilometers an hour when hunting, Mako Sharks swim around the open ocean looking for their favourite foods – fish and squids. As the sea is so big, the Mako Shark is adapted to be successful here. It has strong powerful fins and tail for cruising long distances and for quick bursts of speed for chasing down prey. If you think about a really fast car, it is shaped in a way which makes it go faster. Many sharks, especially the Mako Shark, are 'hydro-dynamic', which means that they are pointed and streamlined which allows them to move through the water quickly and easily.

The Thresher Shark also lives in open water and likes to eat fish. Rather than relying on speed alone, the Thresher Shark has a very long tail – almost the same length as its body – which it uses to catch fish. Using it like a giant whip, the Thresher Shark stuns fish making them easy to catch and eat. This tail is so powerful that the Thresher Shark can leap right out of the ocean! That's impressive, next time you are in the sea or the swimming pool see if you can do it!





The Angel Shark is a different shape to many sharks, rather than a round body the Angel Shark is flat. This is because the Angel Shark spends most of its time on the sandy seabed where it covers itself in sand. It uses the sand as a camouflage to hide away from predators but also to wait for its favourite food to come close enough to shoot out and capture it.

The Lesser Spotted Catshark is a very common shark found all around the UK coastline. It has a long, windy body and is often found resting underneath rocks and boulders in the sea either on its own or in groups of sharks all laid on top of each other. Underneath the rocks and boulders you are also likely to find other animals such as crabs, snails, mussels and worms – some of the catsharks' favourite food.

All of the sharks in UK waters are under threat from **overfishing**, **habitat destruction**, **pollution** and **bycatch**.

Use the discussion cards to find out more about each of these threats.

In groups pick one of the discussion topics and make a poster showing the problem and report back to the rest of the class.

What do you think would happen if an animal's habitat was destroyed?

What might happen if all of the sharks were removed from the ocean?

Do you think that this is a problem?

What do you think that we should do about it?

Unit 4B – Sharks Worksheet

Conservation is the management of the threats to animals and plants in order to protect them from becoming **endangered** – or worse still – **extinct**.

Anyone can get involved in conservation, including you! By thinking about the environment you can help protect it, and the organisms within it, for the future.

Look at the picture of all of the litter on the beach.

Do you think that it is a good thing? Where do you think the litter has come from?

There are many things you can do to help protect the environment, and you don't have to do much to make a big difference. Here are some ideas:

- Recycle as much as possible.
- Put your litter into the bin.
- Try not to waste water – turn the tap off while you are brushing your teeth.
- Save energy – when you leave a room, don't forget to turn the light off.
- Make a poster informing people of the threats to the environment
- Tell people about the problems faced by an organism or habitat

Can you think of any more ideas?



Using the information about sharks and what you know about the threats faced by them, write a letter to the Prime Minister telling him about the problem and what you think should be done about it.

Unit 4B – Sharks Worksheet

True and False

	TRUE	FALSE
THERE ARE OVER 500 DIFFERENT SPECIES OF SHARK IN THE WORLD		
SHARKS ARE NOT AFFECTED BY HABITAT DESTRUCTION		
THE WHALE SHARK GROWS TO LONGER THAN 15 METRES		
THE SMALLEST SHARK IN THE WORLD IS THE SPINED PYGMY SHARK		
THERE ARE 19 SPECIES OF SHARKS IN UK WATERS		
CONSERVATION WORKS TO PROTECT ANIMALS AND PLANTS		
WASTING WATER HELPS THE ENVIRONMENT		
THE ANGEL SHARK IS THE BIGGEST SHARK IN THE WORLD		
THE THRESHER SHARK CAN LEAP RIGHT OUT OF THE OCEAN		
THE LESSER-SPOTTED CATSHARK LIKES RESTING UNDERNEATH ROCKS.		
ONE WAY TO HELP PROTECT THE ENVIRONMENT IS TO RECYCLE		
SHARKS WERE HERE BEFORE THE TIME OF THE DINOSAURS		
POLLUTION IS HARMFUL TO THE ENVIRONMENT		
OVERFISHING IS A GOOD THING FOR SHARKS		
SHARKS HAVE BEEN HERE MUCH LONGER THAN WE HAVE		
THE BASKING SHARK'S FAVOURITE FOOD IS FISH		
THE FASTEST SHARK IN THE WORLD CAN SWIM UP TO NEARLY 35 KILOMETRES AN HOUR		



Basil's Fact

The Zebra Shark has stripes when it is born but they turn to spots as the shark gets older.

Unit 5B Life Cycles – Teaching Notes

These pages build on the reproduction topics from Units 2B & C and the habitat/habitat loss topics from Unit 4B

Resources associated with this unit:

- Life Cycles Worksheet including human, bird, frog and shark life cycles
- Life Cycle Wordsearch
- Glossary

Resource use ideas

- Draw and label the stages of an animal's life cycle. Cut into individual stages and shuffle together. Each student should take a picture and find the other students with the remaining stages of the life cycle of that organism. The groups must then reassemble the drawings into the correct order so as to illustrate the life cycle of the animal.
- Compare the life cycles of different species, including similarities and differences.
- Hands-on experience:
 - Place mealworms in a jar/aquarium. Provide them with a slice of raw potato or apple. Observe the life cycle as the larvae turn into beetles.
 - Place fertilised frog spawn into an aquarium and observe each day as they develop.
 - Don't forget to wash your hands after touching any of the animals or food
 - Please return the animals to the wild after you have finished your experiment and if possible return the tadpoles back to the pond where you removed the spawn
- Pretend you are one of the creatures that you have observed or learnt about. Research that individual and write your life story, making sure to include the different developmental stages.
- Investigate the Basking Shark and how it is being studied and protected

Opportunities for embedding English objectives within this Unit:

- Discuss why it is important for species to reproduce. Link in the information on the discussion cards about threats to the environment. Which animals would be affected the most? Why could they die out? What should we do about it?
- Write, as the Basking Shark, about the threats they faced by fishing and what their life is like now.

Curriculum, resource and other links

Sc1 & Sc2

IT – www.baskingsharks.org

Explore the subject further

Unit 5B – Life Cycles Worksheet

Living organisms change and grow throughout their lifetime – imagine what you looked like when you were one year old and what you look like now, is there much of a difference?

A '**Life Cycle**' is the order of the stages an animal goes through during its life. All animals **reproduce** to create young which will in turn grow up to become a mature adult. This adult will then reproduce and the cycle continues.

An organism's life cycle describes the various developmental stages from the moment an individual is born, through the body's extreme changes until they are a mature adult that can give birth to a new individual. All living things go through the same basic process of being born, growing, changing, consuming food and water, reproducing and finally dying.

If individuals did not reproduce what do you think would happen?

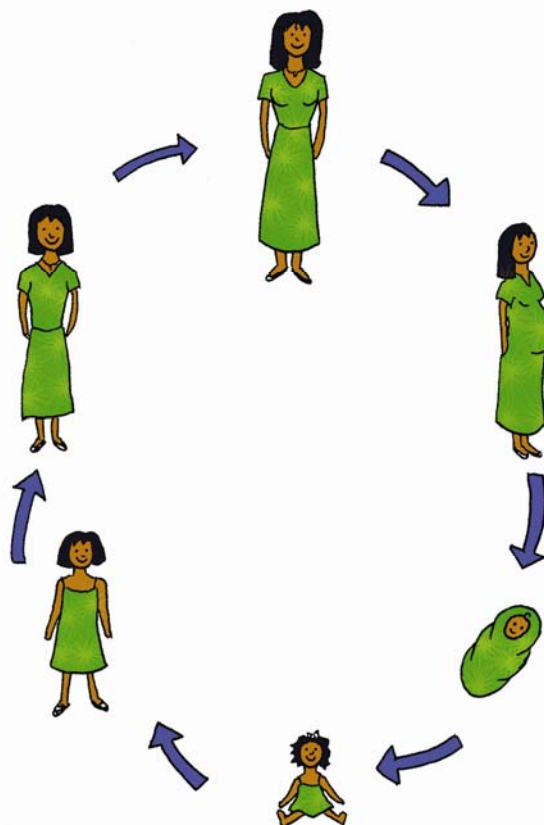
Why is reproduction important to an animal and plant?

Species	Humans	Sharks	Bird	Frog
Gestation period	9 months	9 – 22 months	21 days	10 days
Number of young born each time	1 - 3	1 - 100		19 - 4000
Maturity	16 years	6 – 18 years		4 years
Average life span	70 years	40 years		4 – 14 years

Human life cycle

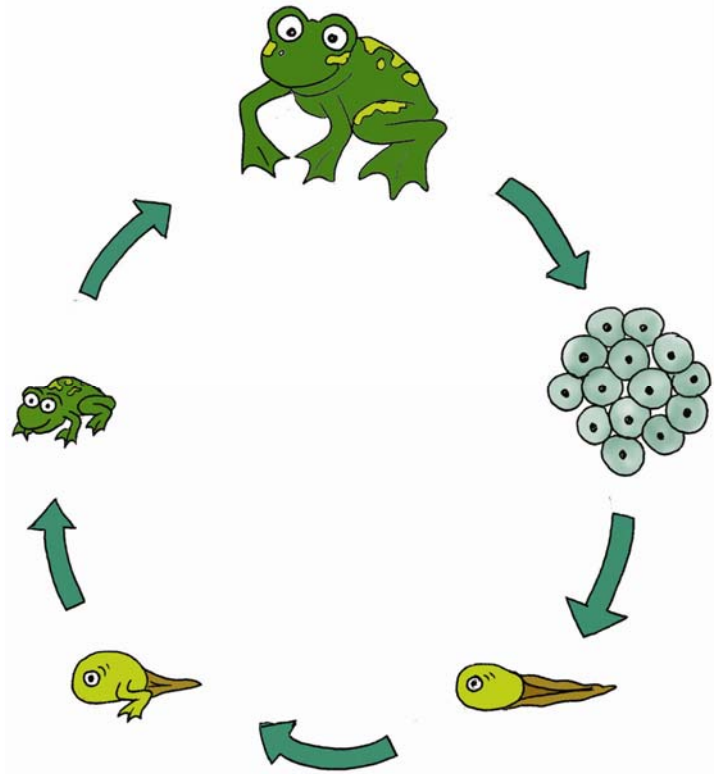
There are four main stages to the human life cycle.

1. Infancy: from being born to 2 years of age. Changes that will be experienced include learning to walk and talk and teeth growing rapidly.
2. Childhood: from 2 years of age to adolescence. Bones and teeth grow rapidly and changes such as teeth being replaced occur. Intellectual skills develop, such as improved reading and writing.
3. Adolescence: the body becomes sexually mature. Changes include increased growth and changing body shape.
4. Adulthood: the body slows down and changes such as hair falling out and decreased physical activity.



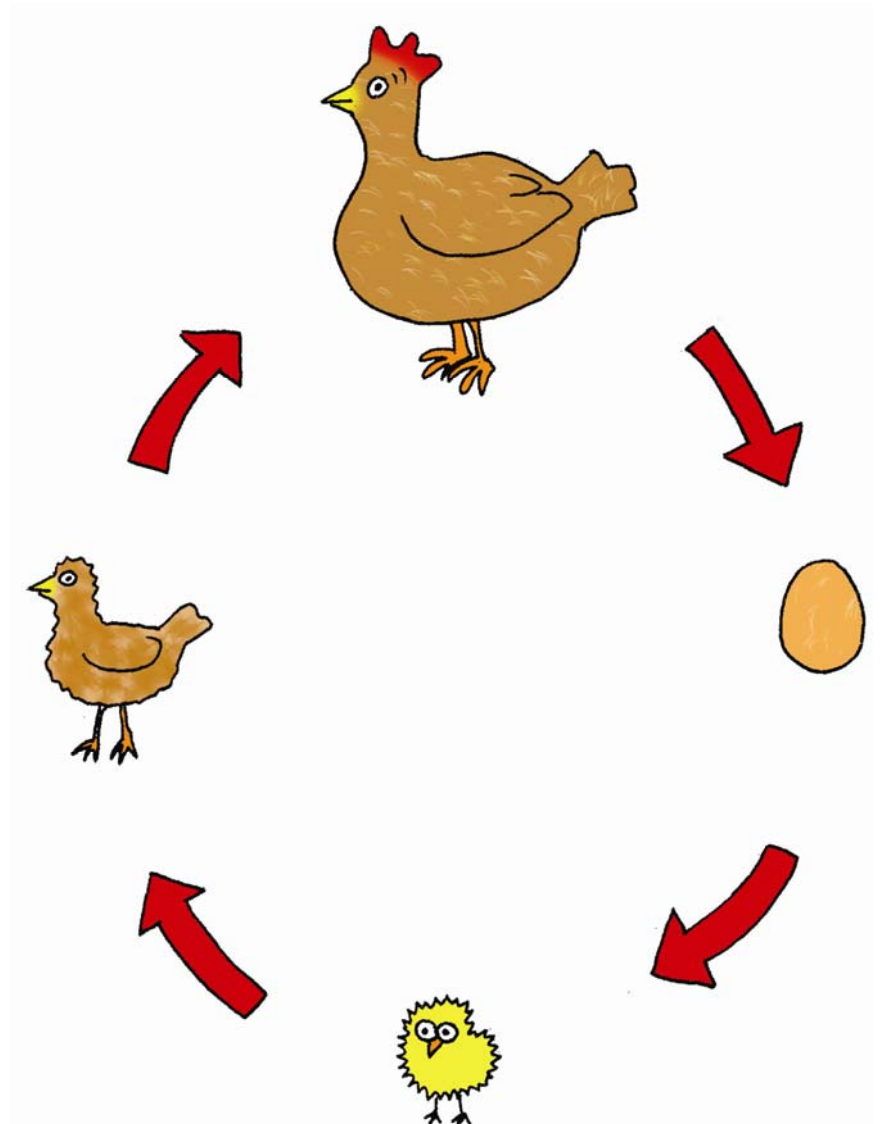
Frog life cycle

1. A frog will lay her eggs in water, sometimes in a clump of up to 4,000 eggs. The soft, jelly-like eggs fill with water and float to the surface of the water where they will receive warmth from the sun. A number of these will be eaten by predators, and so laying such a large number of them ensures that some will survive. These are known as tadpoles
2. After 10 days, a tadpole will wriggle out of each egg and continue to breathe and move around as if it were a fish, by using its gills and tail. They feed upon algae in the water.
3. 5 weeks later the tadpole loses its gills and the lungs develop. The lips and teeth will develop soon after, and they will move on to eating solid plants.
4. After 7 weeks the tadpoles begin eating insects
5. 2 months later the back legs begin to appear and by 3 months the front legs appear. The tail will soon disappear. Their green colour provides the baby frog with camouflage so other animals won't eat them.
6. The froglet will stop growing after 3 years and become a true adult. It is thought that they can live anywhere between 4 and 14 years.



Bird life cycle

1. Eggs are produced by the adult female, they contain everything needed to form a new animal.
2. The content of the egg is protected by a shell or outer covering. This keeps the egg inside from drying out and protects the new animal that is growing inside it.
3. When the animal has grown enough (approximately 21 days), it breaks out of the egg, this is called hatching.
4. The new chick quickly grows into an adult, which will then lay its own eggs and continue the life cycle.



Shark life cycle

Fish can have a range of life cycles; taking place in a small area such as a pond (goldfish), to a large area covering thousands of miles from stream to ocean (salmon), or in the ocean itself (sharks). The reproductive strategies of fish also vary greatly, for example, sharks have three different reproductive strategies.

1. **Viviparity:** A shark's embryo stays inside the mother's body for several months to develop. They receive nutrients and oxygen through the umbilical cord. After the gestation period the mother gives birth to live pups, which are immediately independent and so swim away from the mother.
2. **Oviparity:** Sharks lay eggs. The mother deposits her eggs in the ocean. The embryo inside the egg grows and emerges when it is fully developed. Egg cases are referred to as "mermaid's purses" and can vary in size depending on species, but are tough in order to protect the developing baby. The mother does not provide any aftercare for the eggs once they have been laid.
3. **Ovoviviparity:** Sharks produce eggs and carry them internally. They receive food and nutrients from the yolk stored in a sac attached to the body. The embryos will then eat any unfertilised eggs and the smaller, weaker pups.



Sharks reproduce slowly and produce relatively small numbers of young which they carry for a long period of time before giving birth – this is the gestation period. This means that it takes a long time for more sharks to be produced.

Sharks, and other slow reproducing animals and plants, are very vulnerable to problems such as **habitat destruction**, **overfishing** and **bycatch**.

As a result, many shark species are facing extinction because they are being killed before reaching maturity and not having any babies.

The Basking Shark is considered to be an endangered species. For many years Basking Sharks were caught by fishers primarily for oil found in their liver which was used as lamp oil, a lubricant and as an ingredient in cosmetics. However the populations of Basking Sharks collapsed because too many were taken by the fishers.

Now, it is illegal to catch and sell Basking Sharks in the UK and there are many conservation programmes working to protect the Basking Shark.

Take a look at www.baskingsharks.org for more information about Basking Sharks, their protection, and how they are being studied and conserved by scientists and conservationists.

www.sharktrust.org

Unit 6A – Interdependence and Adaptation

This unit builds on Unit 2B Plants and Animals in the Local Environment, 2C Variation and 4B Habitats.

Resources associated with this unit:

- A4 and A6 Picture Cards of different animals and plants
- Empty habitat illustrations
- Unit 4B Food Chains Worksheet (to re-introduce subject)
- Food Web worksheet
- Food Chain and Habitat Wordsearch
- Unit 4B Sharks Worksheet
- Senses Factsheet
- Glossary

Resource use Ideas

Re-introduce food chains, predators, prey, consumers and producers using the **Food Chains Worksheet** from Unit 4B

Go into further details using the **Food Web Worksheet**.

Use the **habitat illustrations** to hypothesise food webs and the links between each organism

Sharks Worksheet – Read about how sharks are adapted to live in their environment. Uses the **Senses Factsheet** to learn more about how sharks are specialised

PSHE Themes

- Respect for animals and the environment
- Conservation

Opportunities for embedding English objectives within this Unit:

- Why do you think sharks are so well adapted? Research a shark species and make a poster showing how it is adapted to live in its environment.
- Discuss the impact of species removal from an environment – use the discussion cards to identify ways in which this could happen.

Links to other areas of the national curriculum

Sc1 & Sc2

IT – Research a shark species

Unit 6A – Food Web Worksheet

Animals and plants in a habitat are **interdependent**. They depend upon each other and, in doing so, maintain a balance in the environment.

Organisms in a habitat eat and are eaten by other organisms. If you drew a line indicating who eats who in a habitat you would see the '**food web**' showing how each species is connected to another.

Animals can be classified by the food that they eat:

Herbivores eat plants

Carnivores eat meat

Omnivores eat both meat and plants.

Make a food web using some or all of the animals listed below.

Use → to mean 'eaten by' and - - - → to mean 'uses energy from the sun'.

Seaweed

Snail (herbivorous)

Mussel (filter feeder)

Mackerel (carnivorous)

Gannet (carnivorous)

Crab (omnivore)

Starfish (herbivorous)

Shark (carnivorous)

Plankton

Human (omnivorous)

Make a list of organisms that are:

Predators

Prey

Producers

Consumers

What might happen if one of the organisms were removed?

Unit 6A – Food Web Worksheet

Sharks are '**apex predators**'. This means that they are at the top or end of the chains as there are very few animals that will feed upon them.

Apex predators help to maintain a balance of organisms in a habitat.

Read this news article about the decline of shark numbers in the North Atlantic:

FISHING TIMES

Fishing Down The Food Chain

Overfishing has caused some species to become almost extinct in some areas of the world.

For many years, scientists have warned that sharks are being overfished in the North Atlantic sea. Sharks grow very slowly, and do not produce many young, so the high demand for shark fins and meat has led to overfishing of many shark species. Some shark populations in this area have declined by over 90%.

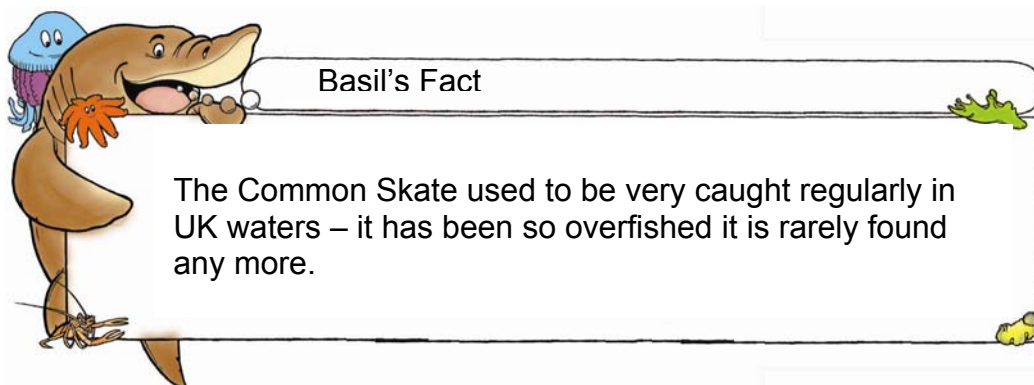
Sharks are important predators, so the decline in their numbers has led to increased numbers of the species that they feed on. The number of skates and rays has increased as their main predator has been removed from the food chain. This has in turn affected the species that the skates and rays feed on – scallops. With more hungry skates and rays around, there are fewer scallops left for the fishers that make a living from the scallop fishery.

The human impact of overfishing sharks has had knock-on effects for the whole food chain, and ultimately has also had a negative impact on other fishers. This shows how human activities can affect the natural balance of the marine environment.

The removal of one species has a big impact on the structure of the food web.

Pick a habitat and create a food web within it. Draw the relationships between each species.

What would happen if you removed one of the species?

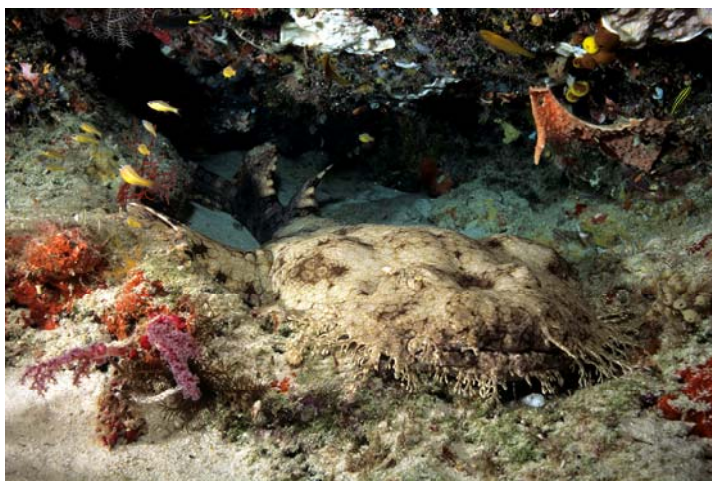


Unit 6A – Sharks Worksheet

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Sharks have been around for around 400 million years. That's 100 million years before the dinosaurs and 386.5 million years before us humans! Because they have been around for such a long time sharks have become highly adapted to succeeding in their environment. There are flat sharks that live on the seabed, strong powerful sharks that are excellent at chasing down fish, and giant sharks that feed only on microscopic plankton drifting about in the ocean to name just a few.

Sharks are also experts at camouflage. Most sharks are dark coloured on their backs (their 'dorsal' side) and light coloured on their stomachs (their 'ventral' side). Predators or prey items looking down don't always see them against the dark ocean, similarly for predators or prey items looking up the sharks light stomachs blend in with the lighter surface of the ocean. Furthermore, some shark species have taken camouflage even further. The Wobbegong sharks live on colourful coral reefs and so their bodies are multicoloured and they have frilly barbells to blend in with the reef. Epaulette sharks are small coral reef dwelling sharks. Like many butterflies and caterpillars they have two large eye spots on their back to scare away larger predators.



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Basking Sharks can detect the levels of plankton in the water and travel hundreds of miles to feed in areas that have high levels of plankton.

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Basil's Fact

The Shark Trust works to conserve sharks, skates and rays, check out their website for more information on how you can get involved: www.sharktrust.org.