



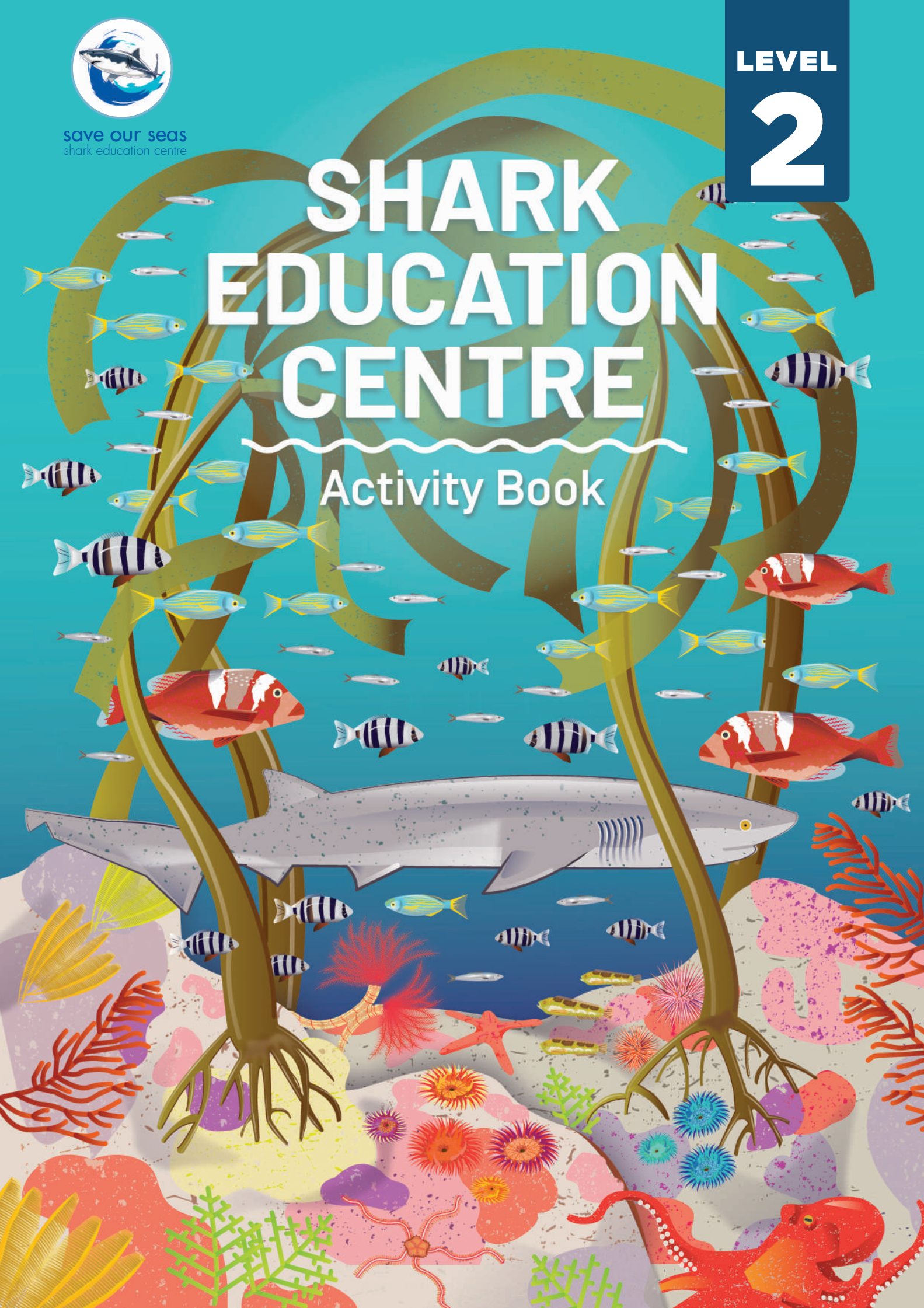
save our seas
shark education centre

LEVEL

2

SHARK EDUCATION CENTRE

Activity Book



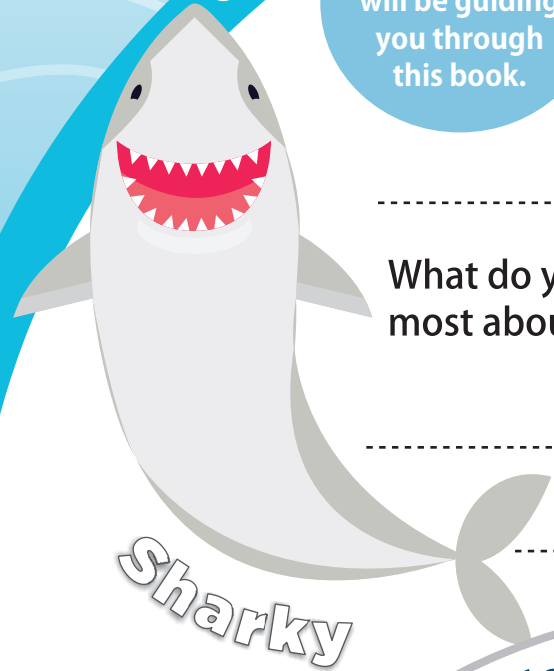
Welcome

to our Shark Education Centre Activity Book

My name is Sharky and I will be guiding you through this book.

Write your name here:

What do you like the most about sharks?



What do you know about sharks?

Mark (✓)

as TRUE or FALSE: TRUE FALSE

The oldest recorded shark lived for more than 200 years. TRUE FALSE

Some sharks can swim faster than dolphins. TRUE FALSE

Some people like to eat sharks. TRUE FALSE

There are over 500 species of sharks in the world's oceans. TRUE FALSE

Most sharks are greater than three metres in length. TRUE FALSE

What is a shark?

A shark is a type of fish. Most fish species have a skeleton made of **bone**. A shark has a skeleton made of **cartilage**.

Cartilage is softer than bone but harder than flesh. It gives shape to the shark's body but is also lightweight and very **flexible**. Human ears are made of cartilage.

Sharks use their gills to absorb oxygen from water. Water flows in through the mouth, over the gills and out through the gill slits.

Bony fishes have **gill covers**, but sharks have five to seven **gill slits** on the sides of their bodies.

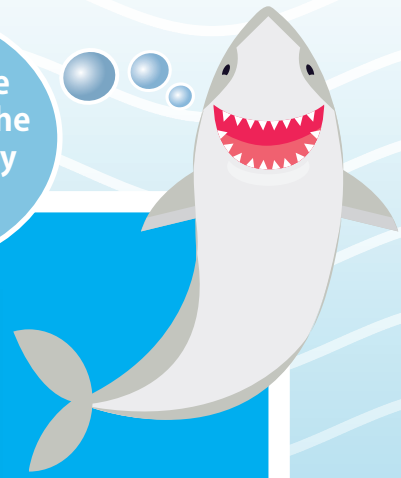
Rays and skates are close relatives of sharks as their skeletons are also made of cartilage. However, their gill slits are found underneath their bodies.

Dolphins and whales also live in water, but are **mammals with lungs**. They breathe air in and out through a **blowhole** on top of the head.

Sharks belong to a group of cartilaginous fish called chondrichthyans. This also includes rays, skates and chimaeras. There are more than 530 species of sharks that are currently recognised by scientists.

Some well-known chondrichthyans

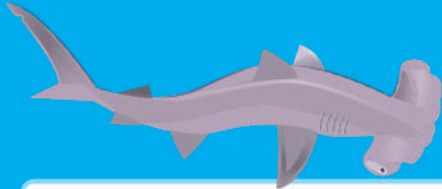
Do you recognise these animals? Fill in the gaps to correctly name each species.



W__te shark



M_n__r_y



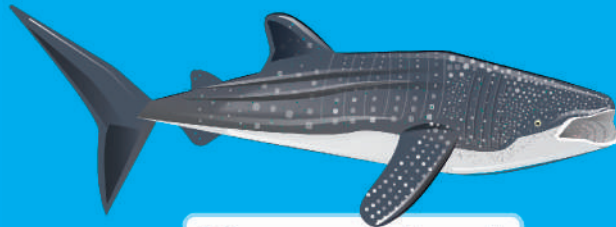
_____rh__ shark



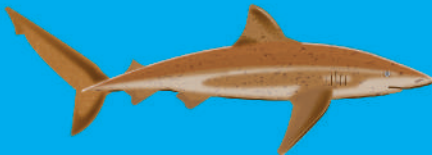
R_gg__oo__ shark



Shortfin m_k_ shark



W___e shark



B_on_e wh_l_r shark



Puf_ad__r shyshark



L__p__rd catshark



_yj_m_ catshark



S_ Jos___ shark



__gel shark



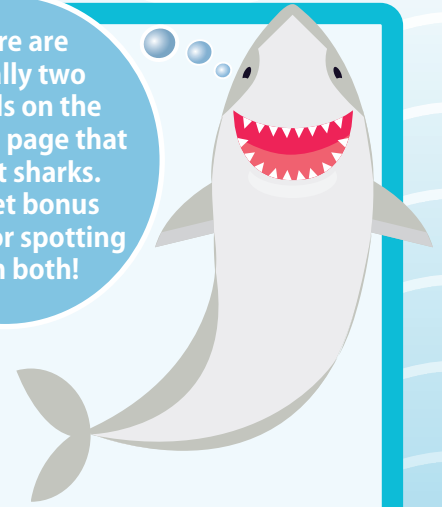
Sev__g_l_ cowshark



_ask__g shark

Contrasting chondrichthyans

There are actually two animals on the previous page that are not sharks. You get bonus points for spotting them both!



Find an animal on page 4 that is not a shark and draw a circle around it. How is the animal you circled different from a shark?

.....
.....

.....

How is it similar to a shark?

.....

.....

- The two largest shark species feed on tiny animals and plants called plankton. These sharks swim with their mouths wide open to collect as much water as possible. In order to feed their large bodies, they must filter a volume of water equivalent to two Olympic-sized swimming pools every day! The plankton is trapped when the water passes through filter-like structures called gill rakers inside their mouths and the remaining water exits through the gill slits.
- Draw **rectangles** around these two sharks on page 4.
- The shortfin mako shark is one of the fastest swimming shark species. It can swim at speeds of up to 60 kilometres per hour. This is even faster than the fastest swimming dolphin!
- The St Joseph shark (or Cape elephantfish) is actually a chimaera, not a shark. It uses its 'trunk' to dig for buried snails in the sand.
- The majority of shark species are smaller than most people expect. Most species of sharks are less than one metre long. Of the sharks found on page 4, this includes the puffadder shyshark, the leopard catshark and pyjama catshark.

My favourite shark is

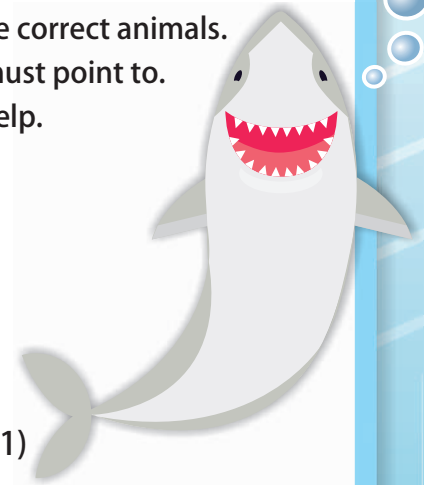
because

.....

What do you know about these four marine animals?

Sharks can look similar to other marine animals

Read the statements below. Draw arrows from each statement to the correct animals. The number in brackets tells you how many images the statement must point to. One arrow has been drawn for you. Look at the facts on page 3 for help.



This is a shark (1)

This is a fish (3)

This is a mammal (1)

Has gills and breathes from water (3)

Has lungs and breathes from air (1)

Tail moves from side to side (2)

Tail moves up and down (1)

Has gill slits on the side of the body (1)

Has gill slits under the body (1)

Has a gill cover (1)

Has a blowhole (1)

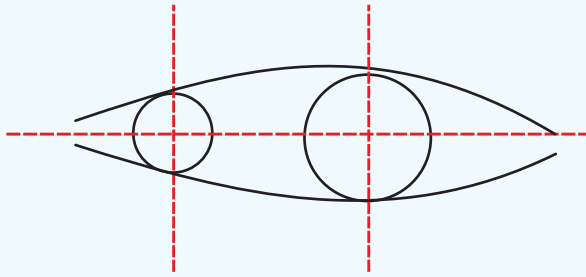
Has a skeleton made of bone (2)

Has a skeleton made of cartilage (2)

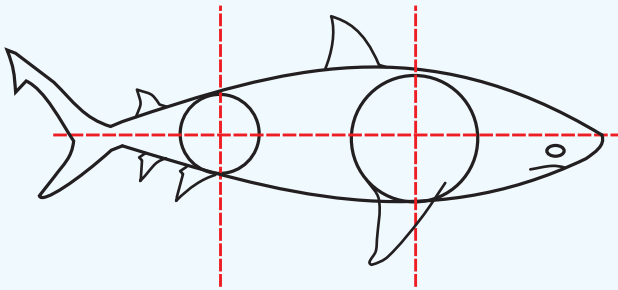
How to draw a shark

Follow these four easy steps to draw a shark.

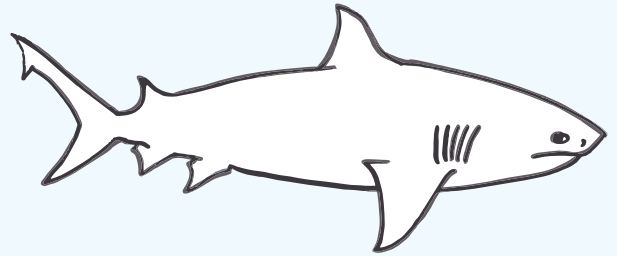
Step 1



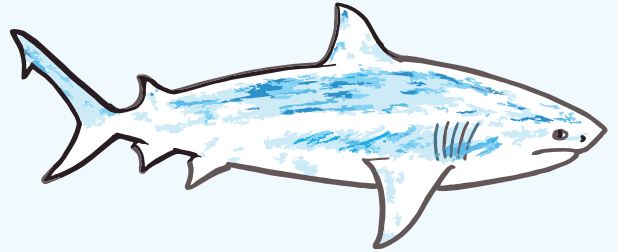
Step 2



Step 3



Step 4



Now it's your turn to try. Draw a shark in the space below.

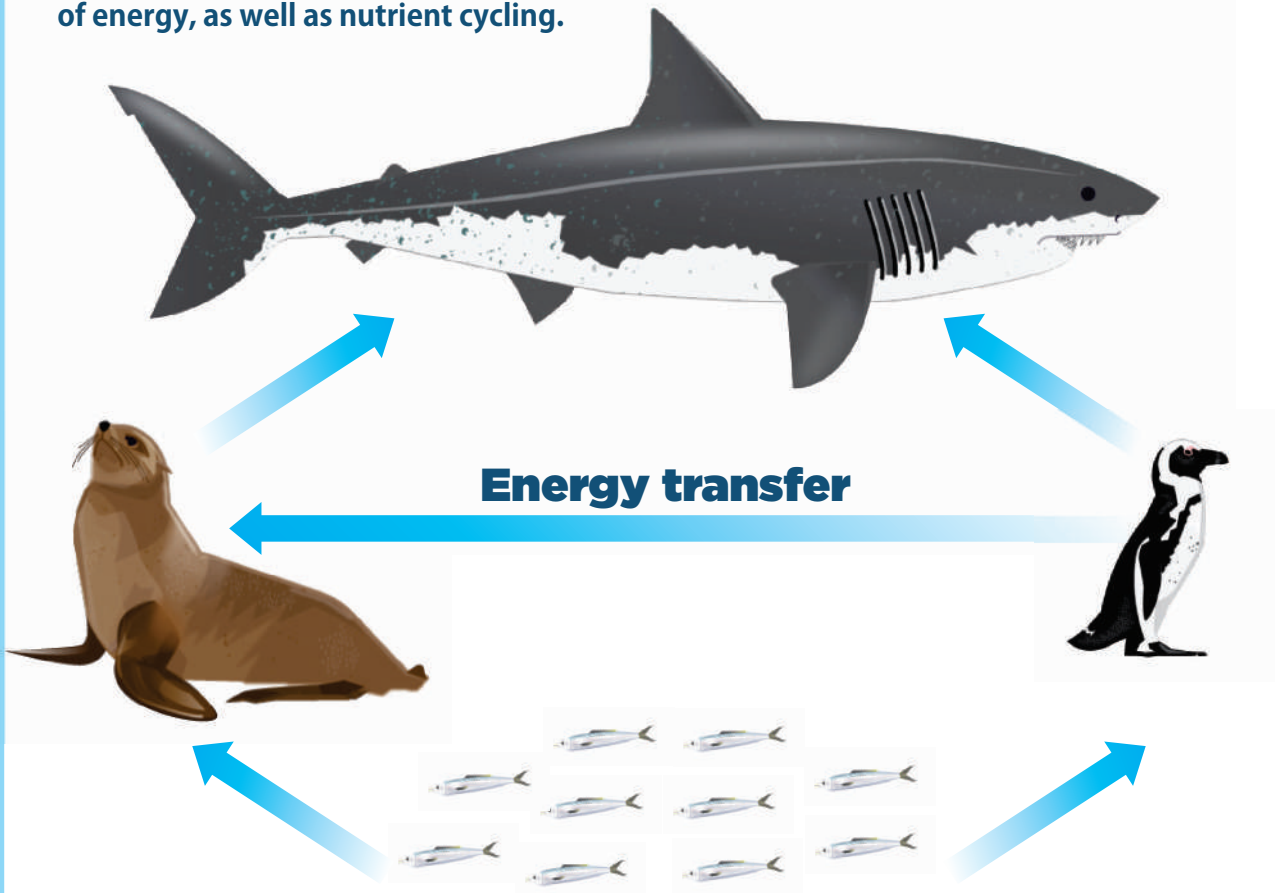


Did you know?

The first sharks appeared in our oceans around 450 million years ago. That's more than 200 million years before dinosaurs existed!

Sharks are important

Some large shark species are apex predators, responsible for maintaining a balanced ecosystem. They can also be scavengers, feeding on the carcasses of dead animals. In this way they are involved in the transfer of energy, as well as nutrient cycling.



Study the food web above. Can you describe what would happen to the following animal populations if predatory sharks were removed from the ecosystem?

- a) Seals:
-
- b) Sardines:
-
- c) Penguins:
-

Rocky shore food web

The ocean is filled with living things that depend on each other to survive.

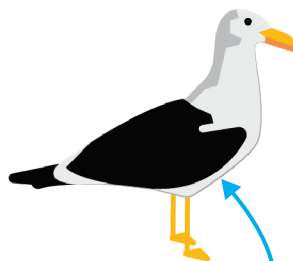
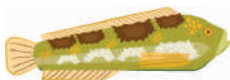
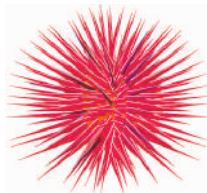
Algae and phytoplankton need the sun and water to photosynthesise. They are called **producers**.

Marine animals depend on producers for food and oxygen. **Consumers** feed on producers or other animals.

Do you know how energy is transferred in the drawing below?

- Draw arrows joining each species to its energy source.

Most animals eat a variety of things so you could have many arrows pointing to the same animal. Arrows should point in the direction that energy flows, as shown between the mussel and the kelp gull.



Your completed drawing is known as a **food web**.

The rocky shore habitat

The edge of the sea might be popular with humans, but it is a harsh place for marine animals to live because it keeps changing. The tides go up and down throughout the day.

When the tide is low, the animals are exposed to the air.

- Their small bodies can dry out in the sun and wind.

When the tide is high, the animals are underwater.

- Strong waves crash onto the rocks and can wash the animals away or injure their soft bodies.

Animals that live in the intertidal zone (the area between high and low tide) have many adaptations:

- They have gills that allow them to breathe underwater.
- Many animals are covered by a hard shell that protects them from strong waves and predators. The shell also helps the animals trap water and survive through low tide.
- Many keep their place on a rock by sucking down firmly with their large foot or by gluing themselves to the rocks.

HIGH TIDE



What are these animals doing at high tide?

LOW TIDE



What are these animals doing at low tide?

What other differences do you notice between the two drawings?

Are animals more active during high or low tide?

High tide



Low tide



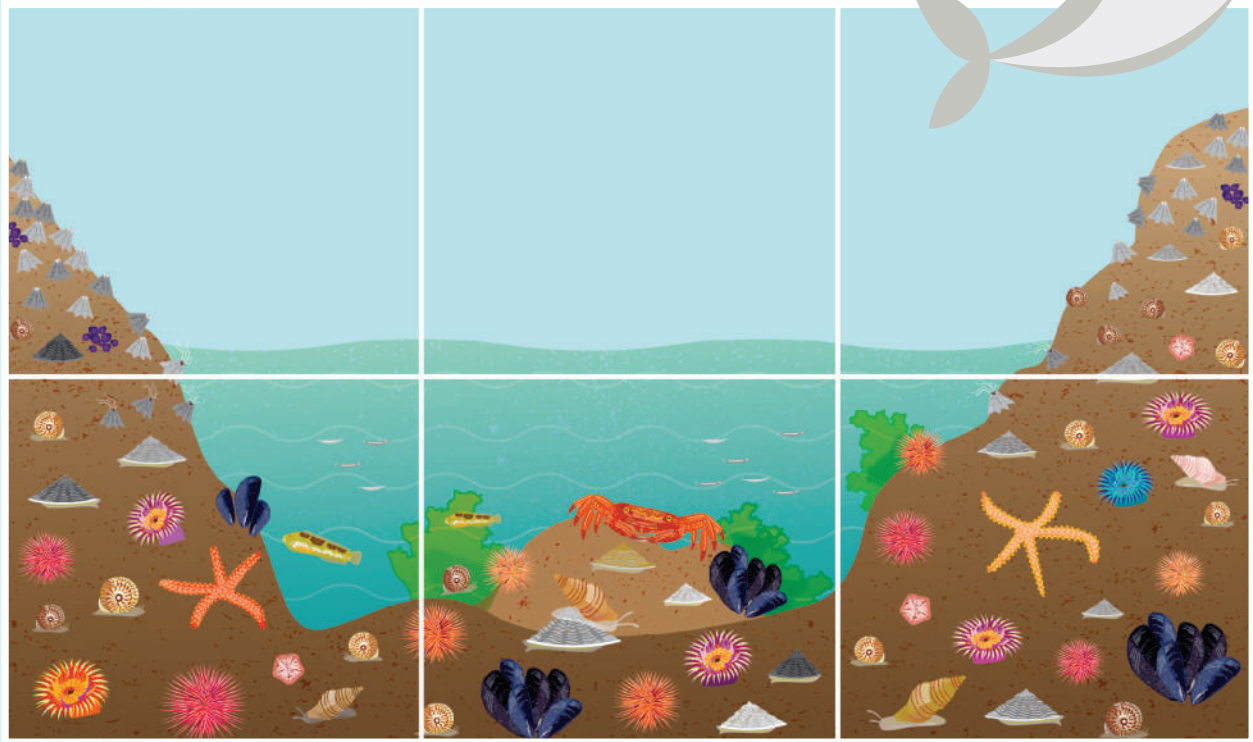
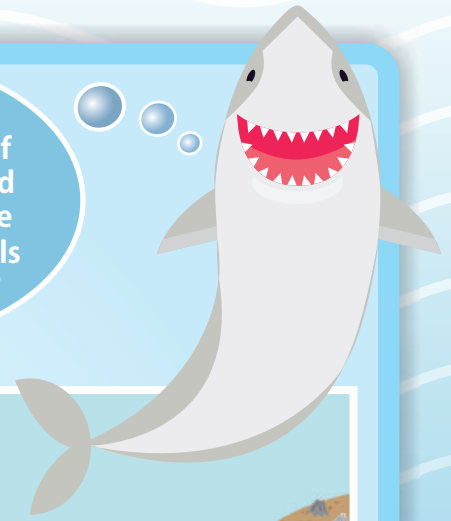
Rocky shore puzzle

Cut out the algae and animals and place them next to their names in the top picture. We suggest cutting around the dotted lines and gluing them down when they are all in the correct place.

The puzzle consists of two main sections. The top section is a rocky shore with various organisms labeled. The bottom section shows 20 different organisms in dashed-line cutouts, including a crab, a starfish, a gull, a limpet, a mussel, a sea slug, a sea slug, a sea slug, a sea slug, a sea slug, a sea slug, a sea slug, a sea slug, a sea slug, a sea slug, a sea slug, a sea slug, a sea slug, a sea slug, and a sea slug.

Counting on the rocky shore

Have you noticed the huge numbers of different animals and algae that live on the rocks and in rockpools on the rocky shore?



How many times do you see each of the living things in the drawing above?

- | | | | | | | | |
|------------|----------------------|----------|----------------------|-------------|----------------------|------------|----------------------|
| Limpet | <input type="text"/> | Mussel | <input type="text"/> | Anemone | <input type="text"/> | Sea urchin | <input type="text"/> |
| Whelk | <input type="text"/> | Crab | <input type="text"/> | Sea lettuce | <input type="text"/> | Sea star | <input type="text"/> |
| Periwinkle | <input type="text"/> | Klipfish | <input type="text"/> | Barnacle | <input type="text"/> | Topshell | <input type="text"/> |

The drawing above is divided into six squares. Scientists use quadrats (square frames) as a tool to count the animals and algae they see. These are counted in the quadrat that covers most of their body.

How many animals are there in the top left quadrat?

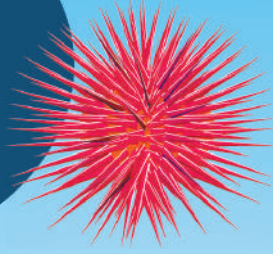
How many algae are there in the bottom middle quadrat?

How many animals altogether?

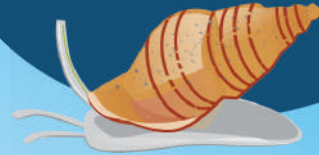
How many more animals are in the bottom left quadrat compared to the top right quadrat?

Rocky shore animal behaviours

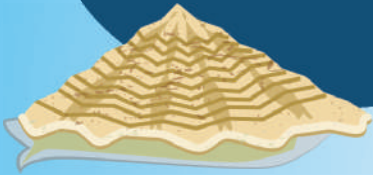
Sea urchins have long thin suckers between their spines, called tube feet. They use the tube feet to move around, stick onto rocks and to catch algae drifting in the water.



Whelks are carnivorous snails that glide around on a large foot. They drill a hole through the shells of limpets and feed on their soft flesh.



Limpets, topshells and periwinkles are types of herbivorous snails that feed on algae. They use a large foot to move and attach to rocks.



Barnacles glue their shells to the rock, so they don't move around. In order to feed, they stick their feathery legs out of the top of the shell and filter plankton out of the water. This is called filter feeding.



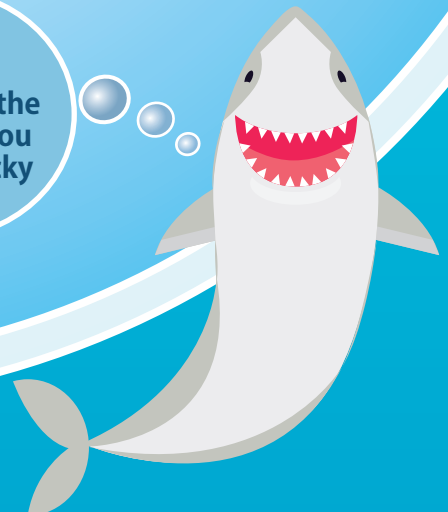
Kelp gulls tear mussels loose from the rocks with their beaks. They fly up in the air and drop the mussels until the shell breaks open. Then they eat the flesh inside.



Spiny sea stars are carnivores that mainly eat mussels. They crawl onto their prey and pull the shells apart using tube feet. Their mouth is at the centre of the body. They can push their whole stomach out of their mouths to digest their prey.

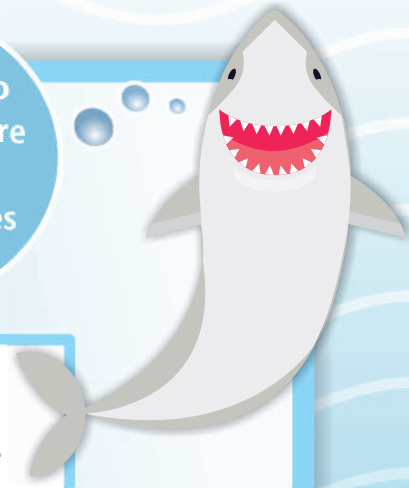


Look out for these behaviours the next time you visit the rocky shore.



Next time you visit the sea

Take time to look closely into a rockpool. There are some weird and wonderful creatures to discover!



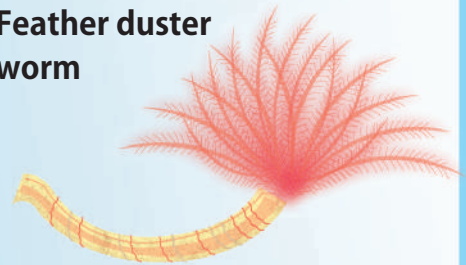
Sea slug



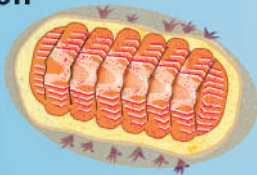
Many sea slugs are only a couple of centimetres long. They can be very colourful. Their bright colours warn other animals that they may have poisonous flesh.

These worms have no head. They live in tubes and stick out a fan that looks like a feather duster. The fan filters particles of food from the water.

Feather duster worm



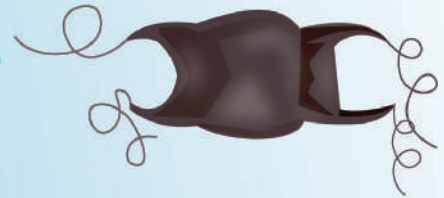
Chiton



These animals glide on a large foot, like snails. They graze on seaweed and are covered with eight overlapping shell plates. Some have prickly bristles along their edges.

Many sharks lay eggs. The egg case containing the pup can look like a piece of seaweed. The case protects the baby shark while it develops, feeding from the yolk.

Shark egg case



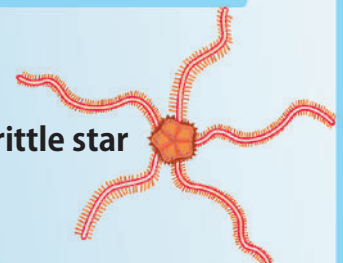
Sea cucumber



These animals are shaped like little sausages. They stick frilly tentacles out one end to filter particles of food from the water.

These animals look like tiny sea stars but their five arms are much thinner. Their arms grab pieces of food that float nearby.

Brittle star



Feather star



These animals also look like sea stars but have many arms with delicate branches that look like feathers. They eat bits of food that are caught in their arms.

Echinoderm tangle

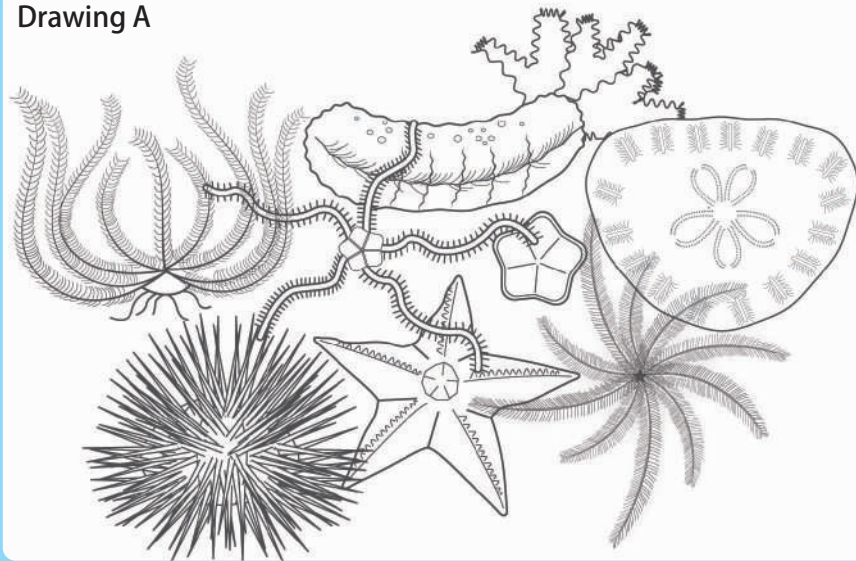
Echinoderms are a group of animals that have radial symmetry. Radial symmetry is the arrangement of body parts around a central axis. Radially symmetrical animals have top and bottom surfaces, but no left and right sides, or front and back. Echinoderms do not have eyes.

The group includes sea stars, sea urchins, pansy shells, brittle stars, sea cucumbers and feather stars.

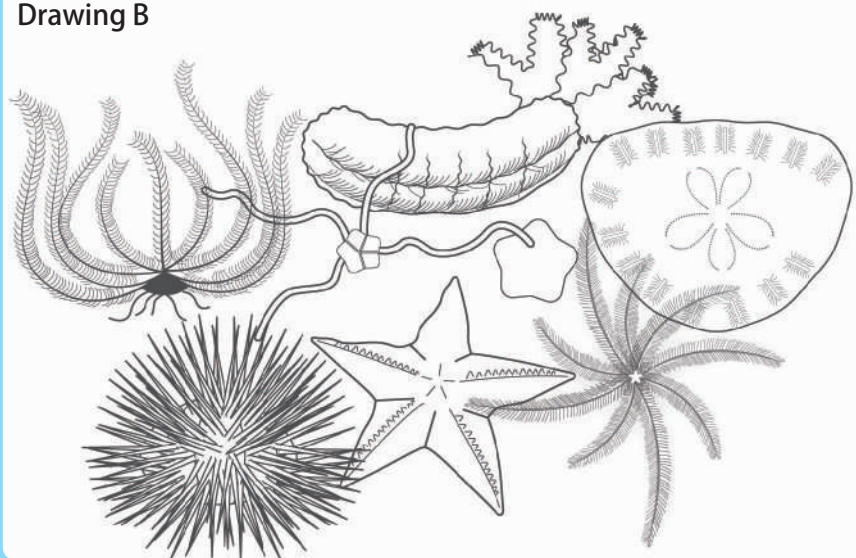
When marine biologists identify animals, they have to be very observant and look for small differences between them.

- Practise your skills by spotting 15 differences between drawing A and drawing B.
- On drawing A, use a pencil to draw circles around the differences you see.

Drawing A



Drawing B



- Find out the names of each animal and colour them in drawing B. One of these animals is shown from two different angles.

- Use this colour key:

Sea urchin

Cushion star

Pansy shell

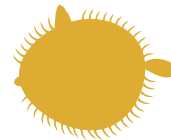
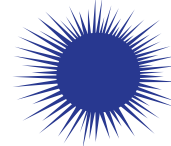
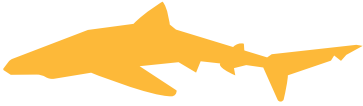
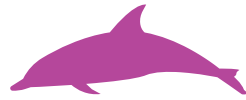
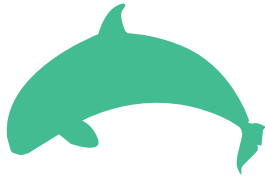
Brittle star

Sea cucumber

Feather star

Sea star

Can you name these animals?



Animals that live in the sea are called animals.

One animal above does NOT live in the sea. Which one?

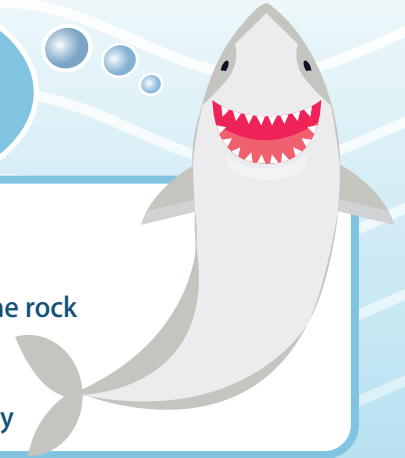
Sea turtles are not fish or mammals.

- What group do they belong to?
- Do turtles have gills or lungs?

Draw a **circle** around the animals that do not have a spine (known as invertebrates).

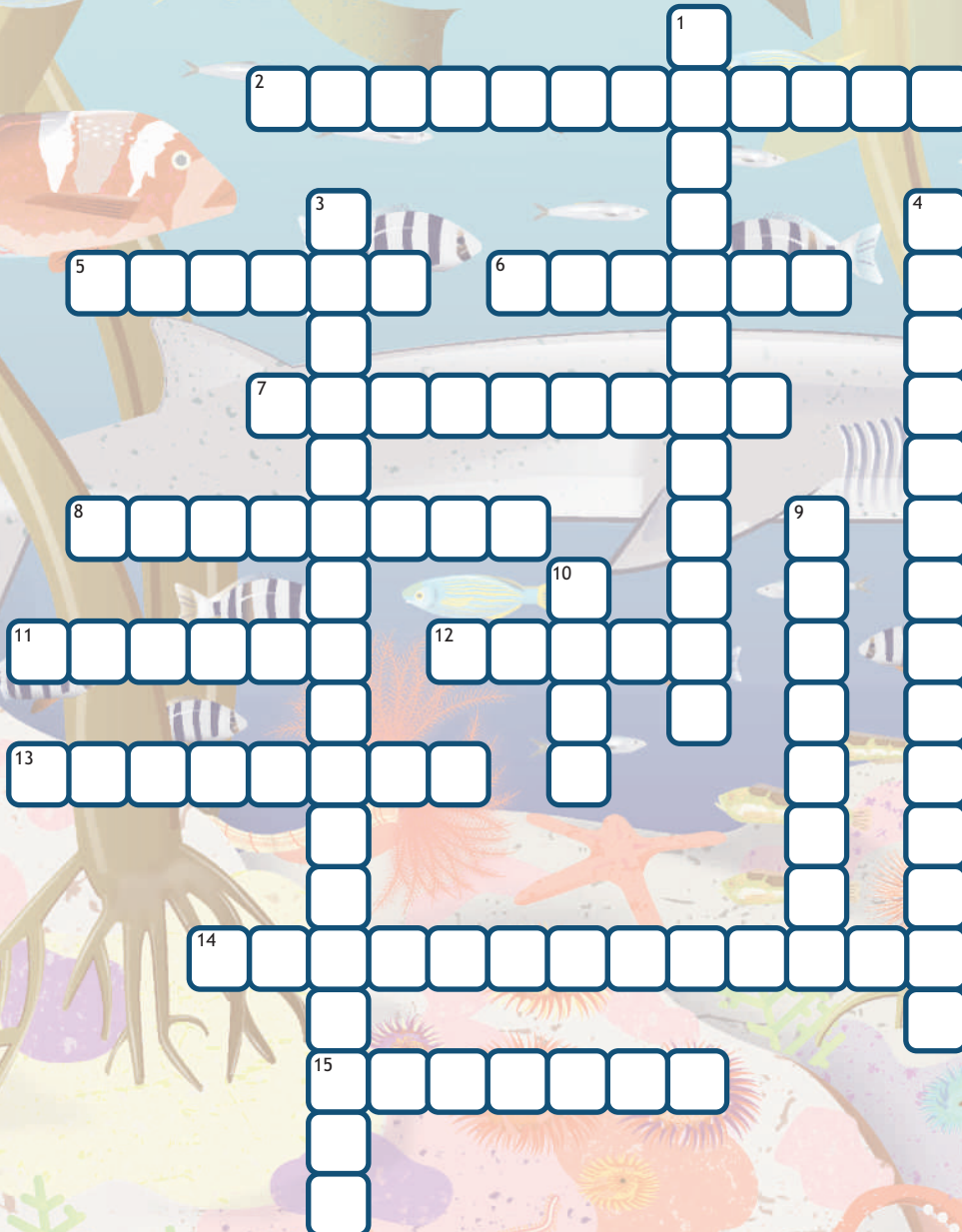
Puzzle time

Fill in the crossword puzzle. Use the clues to help you find the answers.



Across

- 2. A metallic-coloured shark
- 5. A snail with a shell that grazes on algae
- 6. An animal with eight overlapping shell plates
- 7. An animal covered in spines
- 8. A bird that drops shells from the air
- 11. An animal with two shells
- 12. A carnivorous snail
- 13. An animal that is glued to the rock
- 14. A black bird with a long red beak and red legs
- 15. An animal that stings its prey

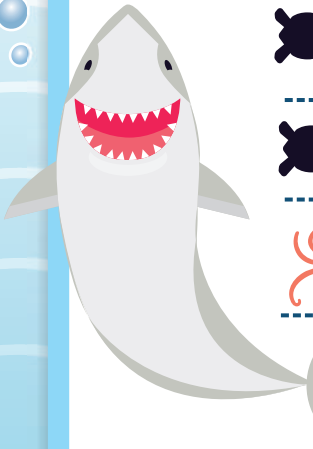


Down

- 1. The fastest swimming shark
- 3. A shark with the most number of gill slits
- 4. A small shark with stripes
- 9. Fish found in rockpools
- 10. Fast-growing algae that can grow as tall as trees

See if you can solve these puzzles!

Marine mathematics fun



$$\text{Turtle} + \text{Octopus} + \text{Shark} = 36$$

$$\text{Turtle} + \text{Shark} + \text{Shark} = 46$$

$$\text{Octopus} + \text{Shark} + \text{Sea star} = 20$$

$$\text{Turtle} + \text{Turtle} + \text{Turtle} = 60$$

How many points is each animal worth?

Turtle

Shark

Octopus

Sea star

Work out: $\text{Turtle} + \text{Octopus} + \text{Sea star} = \text{[]}$

$\text{Turtle} + \text{Turtle} + \text{Turtle} + \text{Turtle} + \text{Shark} + \text{Shark} + \text{Shark} + \text{Sea star} = \text{[]}$

Crazy shark shiver



How many sharks are swimming to the left?

How many sharks are swimming to the right?

How many sharks altogether?

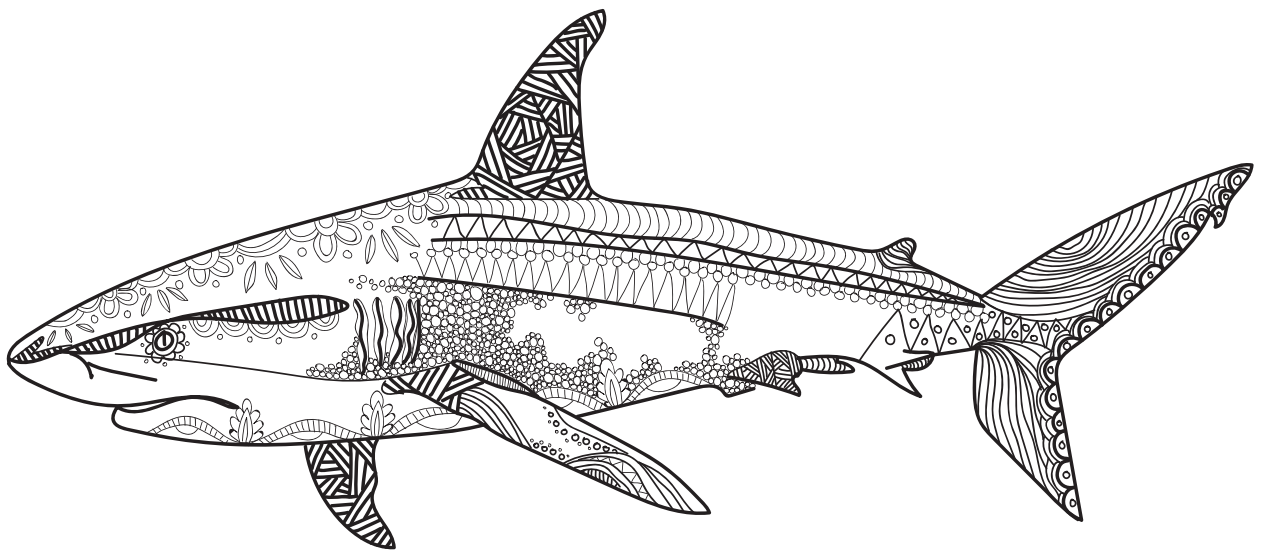
Multiply the number of sharks swimming to the left by the number of sharks swimming to the right.

X =

Did you know?

A group of sharks is called a shiver.

Colour me in



Plastic pollution

Look at this terrible mess on the beach!

Humans are hurting the marine environment with all the plastic and litter we throw away. Plastic does not decompose like natural fibres so it litters our environment.



Stormwater drains carry water directly from our streets to the oceans, while bathroom and kitchen water is discharged into the ocean once it has been treated at a wastewater treatment plant. When we throw litter in the street or pour chemicals or oil down a drain, it ends up polluting the sea and killing the animals and plants that live there.



Marine animals can mistake our plastic waste for food. The plastic gets stuck in their stomachs and kills them.



Animals can become entangled in plastic strapping. It cuts into their bodies and can prevent them from swimming and feeding.

How can you help to clean the environment?

We should use plastic less often and recycle our garbage to throw as little as possible away.



- Vegetables and fruit can be bought loose.
- Aim to pick up five pieces of litter every day.
- Don't buy new plastic bags every time you shop. Instead take reusable bags or reuse a plastic bag from last time.
- Don't use new plastic straws, knives, forks and spoons every time you eat fast food. Carry your own with you!
- Don't buy drinks or food in styrofoam packaging.

Pictures tell a story



A

Tick the boxes if you agree with what the person is doing in the photographs.

What would you say to the person in picture A?

.....

.....

.....

.....



B

What would you say to the person in picture B?

.....

.....

.....

MY PLANET



Humans need to take care of the Earth. It is our home to share with all living things. What can you do to help the Earth be a cleaner place for all?

Write down
5
ideas of how
YOU can help
the planet.

1. _____

2. _____

3. _____

4. _____

5. _____



It is time for me to say goodbye. I hope you have enjoyed this book. Find out how to contact or visit us on the next page.



save our seas

shark education centre

Come and visit us to learn all about sharks, the ocean and the local False Bay environment. We offer:

- School/group outings and programmes
- Public visits to explore the interactive exhibits and displays

Ask your teacher to book an outing by e-mailing us at bookings@saveourseas.com.

Ask your parents to follow us on social media, where we advertise when we are open for public visits.

All our programmes and public visits are free.

For further details:



<https://saveourseas.com/sosf-shark-education-centre>



<https://www.facebook.com/sharkcentre>



<https://www.instagram.com/sharkcentre>



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