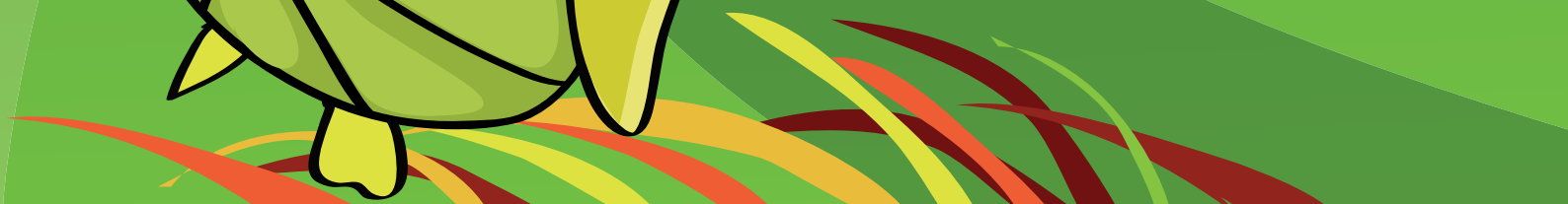
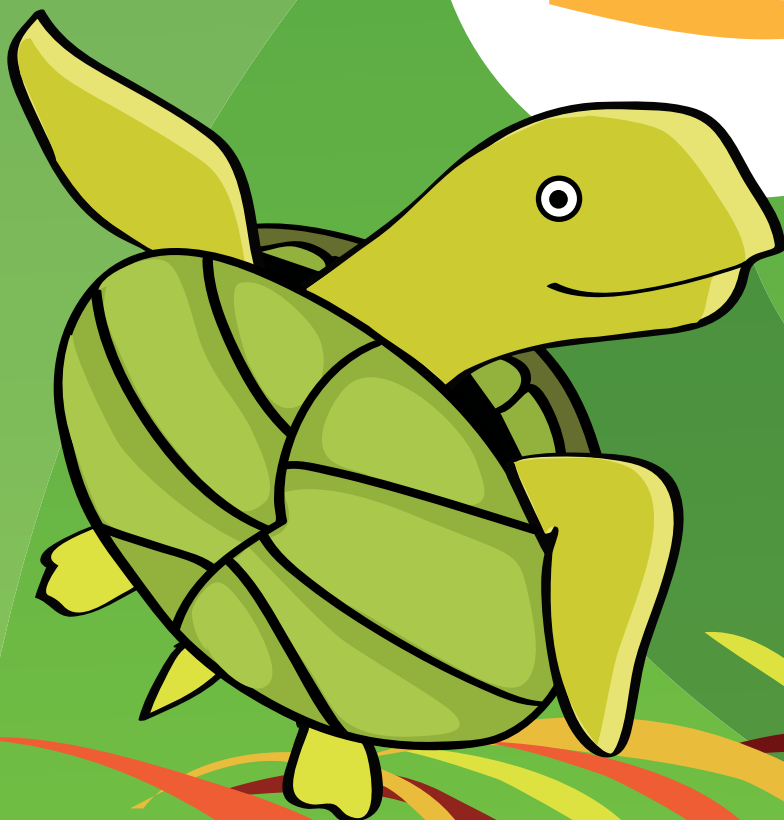




# Sea turtles

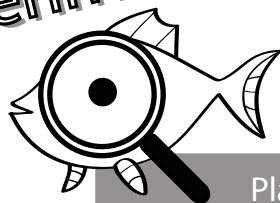




# Introduction

At first glance, the sea might seem like a big, monotonous chunk of water, spreading out into the distance until it reaches the horizon. However, if we take a look under the surface of this blue yonder, we are astonished by its depth and fullness of colours. The richness of different forms of life can be compared with the most colourful carnival, exposing the treasures of nature. Actually, nowhere else on Earth can we find so many different animal and plant species interacting and sharing their environment, with humans present only as occasional guests. Looking at the sea and all the life it supports, we can learn about its inhabitants, admire its harmony and compare ourselves to it. We might be tempted to try and learn how to swim like a dolphin or use sound to orient ourselves in the environment. In order to swim faster, we construct swimming suits resembling shark skin. We would like to hold our breath as long as sea turtles. We learn about ways sponges and starfish regenerate parts of their body or how planktonic sea algae create oxygen. People can learn a great deal from the sea, which is why we have to appreciate it and take care of it. Let's dive into the secrets of its inhabitants as real researchers of the marine world! Read the book, and have fun learning and playing!

## experiment



Play and learn!

In every chapter you'll find a section called "Play and learn!", with many interesting assignments to complete. These experiments make learning and understanding facts about sea turtles much easier and more amusing.



## contents

Sea turtles - reptiles in the sea.....	2
Body anatomy and adaptations.....	4
Evolution of sea turtles.....	6
Reproduction and life cycle.....	8
Migrations.....	12
Feeding habits.....	14
Hibernation.....	16
Threats.....	18
Protection.....	20

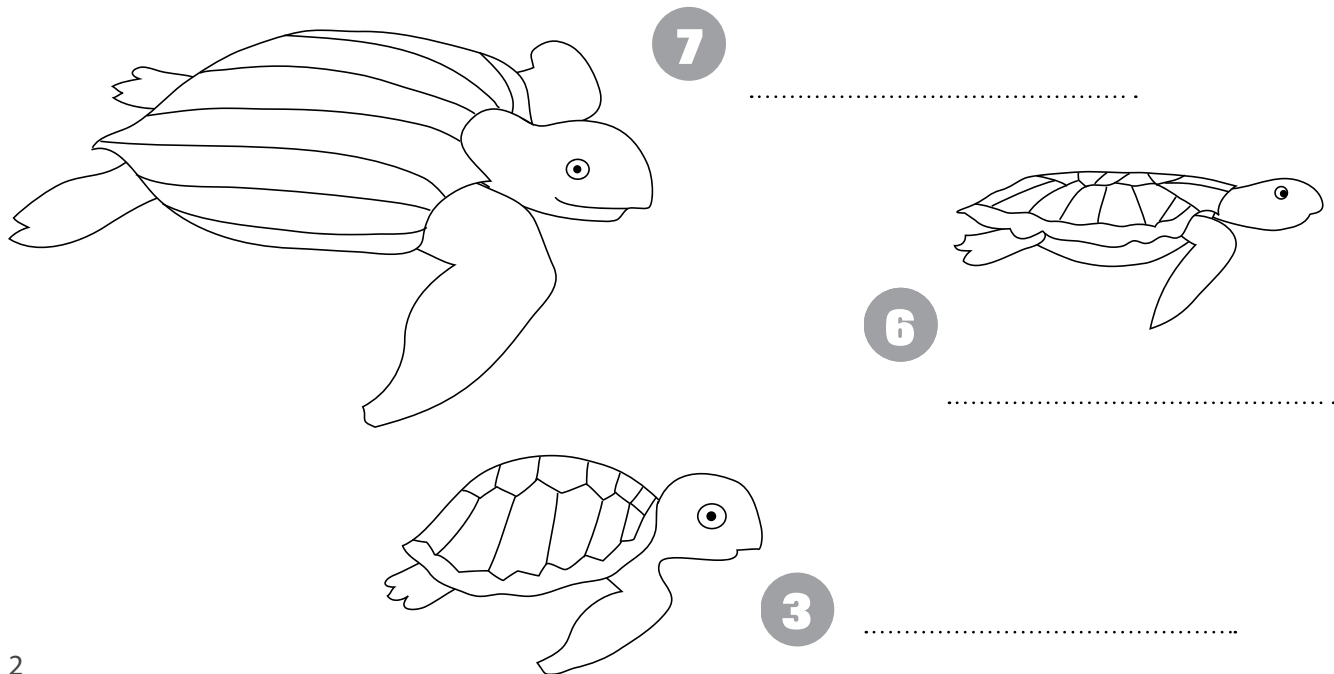
# Sea turtles - reptiles in the sea

There are seven species of sea turtles that, just like their terrestrial cousins, belong to the group of animals called reptiles. Sea turtles spend most of their lives in the sea. Reptiles are cold-blooded animals that breathe using lungs, which means that sea turtles have to emerge on the surface every time they want to take a breath.

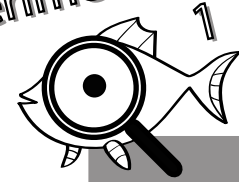
We can classify turtles by looking at the environment they live in. There are terrestrial, freshwater and sea turtles. Seven different sea turtle species have been described:

- |                             |                            |
|-----------------------------|----------------------------|
| 1. green sea turtle         | 5. olive ridley sea turtle |
| 2. loggerhead sea turtle    | 6. flatback sea turtle     |
| 3. hawksbill sea turtle     | 7. leatherback sea turtle  |
| 4. Kemp's ridley sea turtle |                            |

In the Adriatic you can often find loggerhead sea turtles, rarely green sea turtles and occasionally leatherback sea turtles.

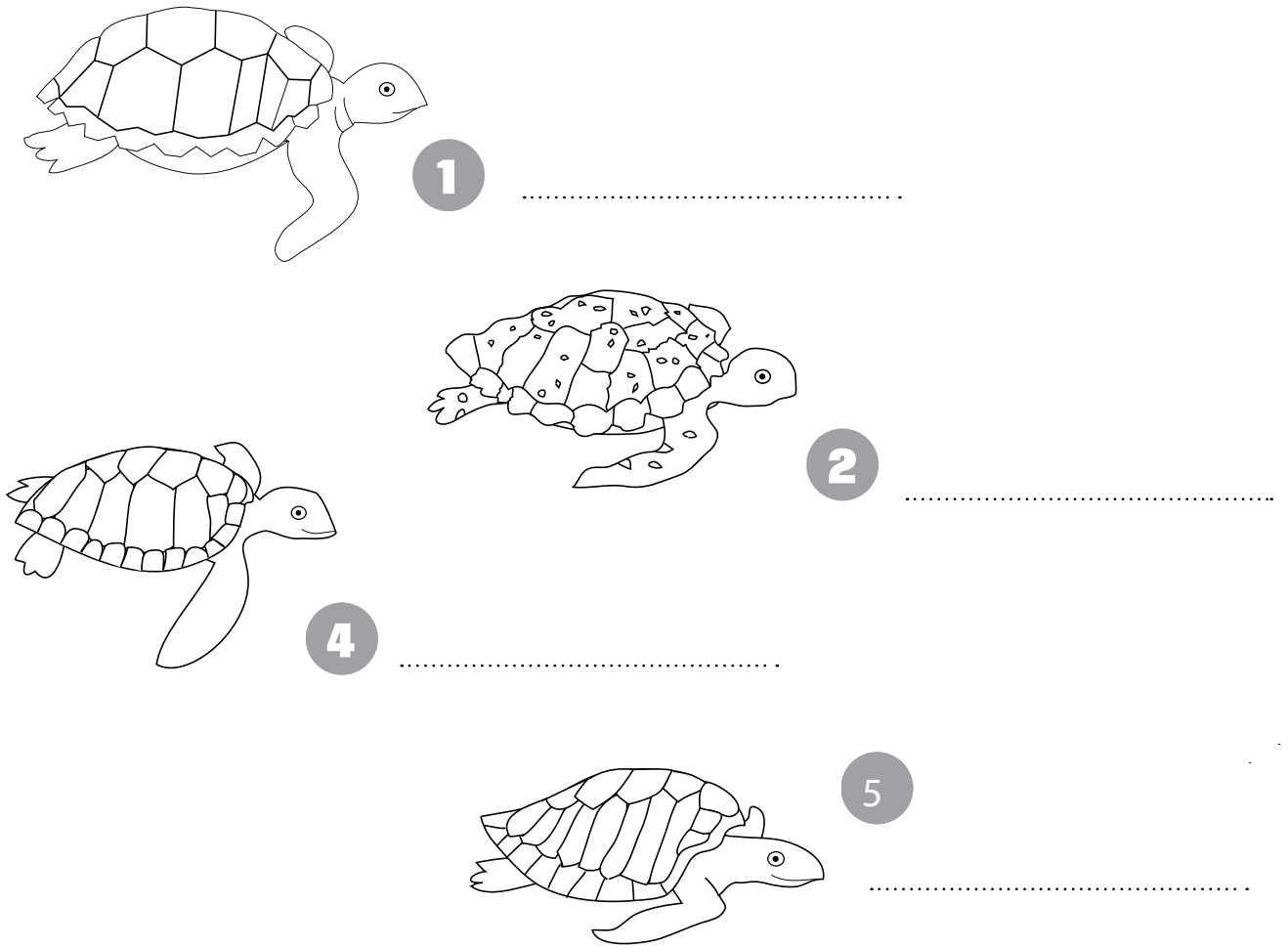


## Play and learn: experiment 1



Write down names of the seven species of sea turtles! Use the lines next to the drawings. You can recognize the species if you look at the number next to the name.

### Recognise different species of sea turtles!

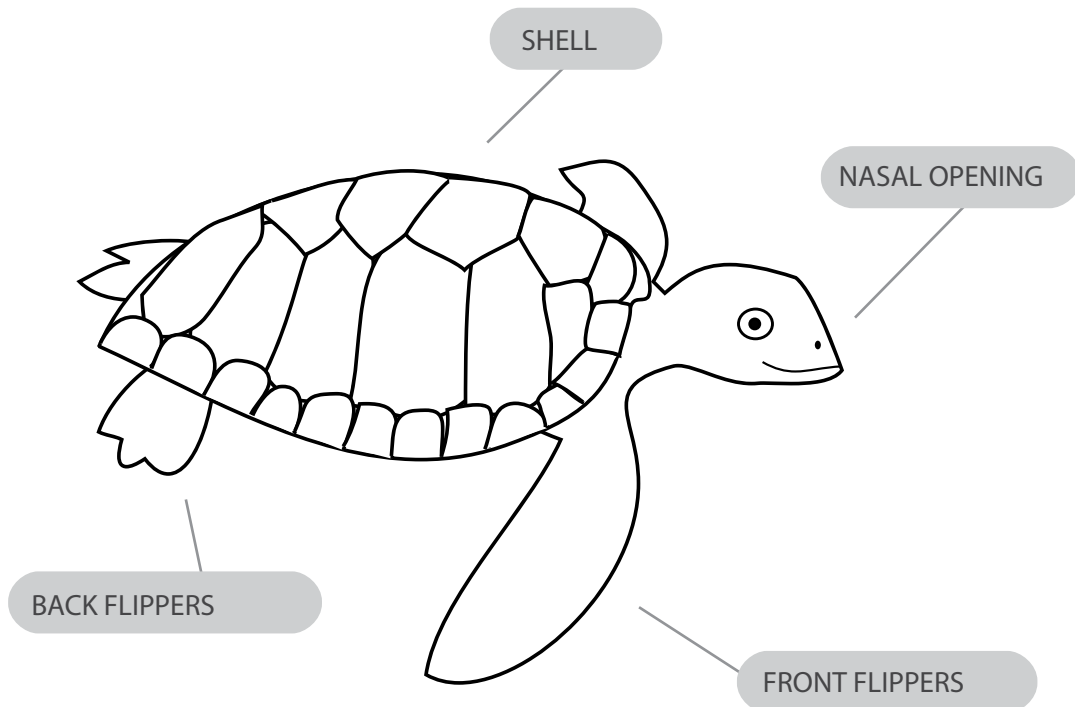


# Body anatomy and adaptations

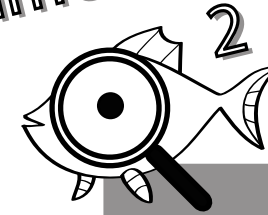
Sea turtles have adapted their bodies for easier swimming in the water. They have a very light, hydrodynamically shaped shell and strong flippers. Their front limbs evolved into big paddle-like flippers, used for swimming, while the hind limbs are used for maintaining course, like a rudder. Females also use their hind limbs for digging out nests in the sand.

Unlike their terrestrial cousins, sea turtles can't retract their head into the shell. They have nostrils on top of the head which are used for breathing air above the sea surface.

Sea turtles can see very well in water, but are near-sighted on land. Despite not having ears, they can sense low frequency sounds and vibrations. They have a really good sense of smell, helping them to find their food. It is also believed that sea turtles can use smell to find the beach they hatched on.



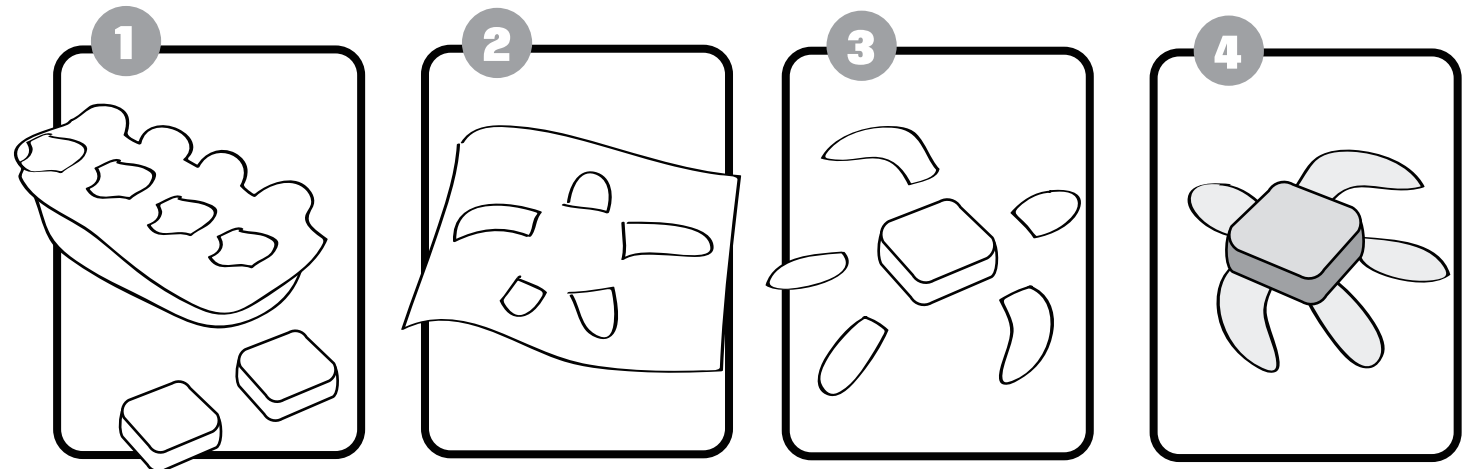
## Play and learn: experiment



Read the instructions and make a model of a sea turtle!  
It is necessary to prepare: an empty egg carton, 1 piece of hard paper or cardboard, scissors, glue, colours (crayons)

### Make a sea turtle model!

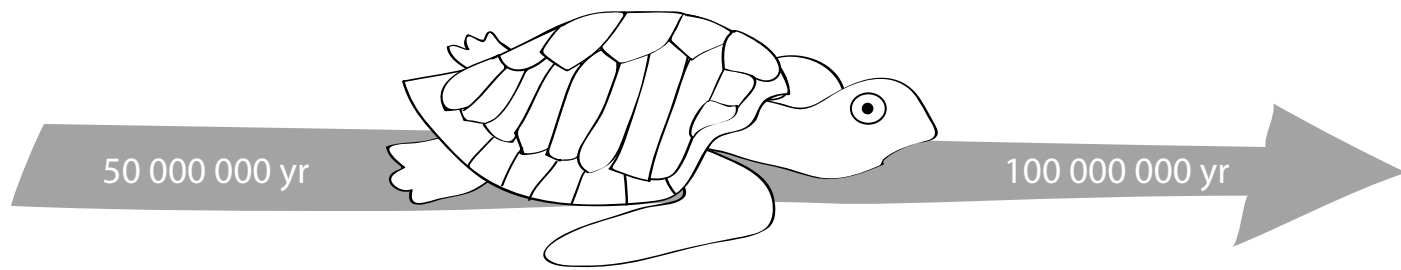
- 1 Cut out the tops of the egg compartments from the box.
- 2 Draw the head, front and back flippers on a piece of cardboard or hard paper.
- 3 Cut out the parts and glue them together to form a sea turtle.
- 4 Take the crayons and colour your first sea turtle!!



# Evolution of sea turtles

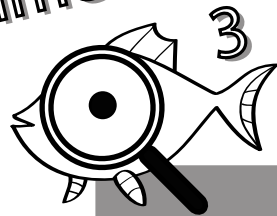
Sea turtles developed from their terrestrial ancestors about 150 million years ago, when they took off to the sea. At first, they hardly resembled species we can see today. Evolution has taken care of the changes and adaptations to marine life in the following 50 million years. Limbs became flippers, the shell became flattened and hydrodynamic, and the ability to retract the head and limbs was lost.

Present sea turtle species did not change at all in the last 100 million years. This means they are well adapted to their environment. They out-lived the dinosaurs and survived the ice age. The negative influence of people on the marine environment has led to the drastic decrease in the number of all sea turtles in the last hundred years.

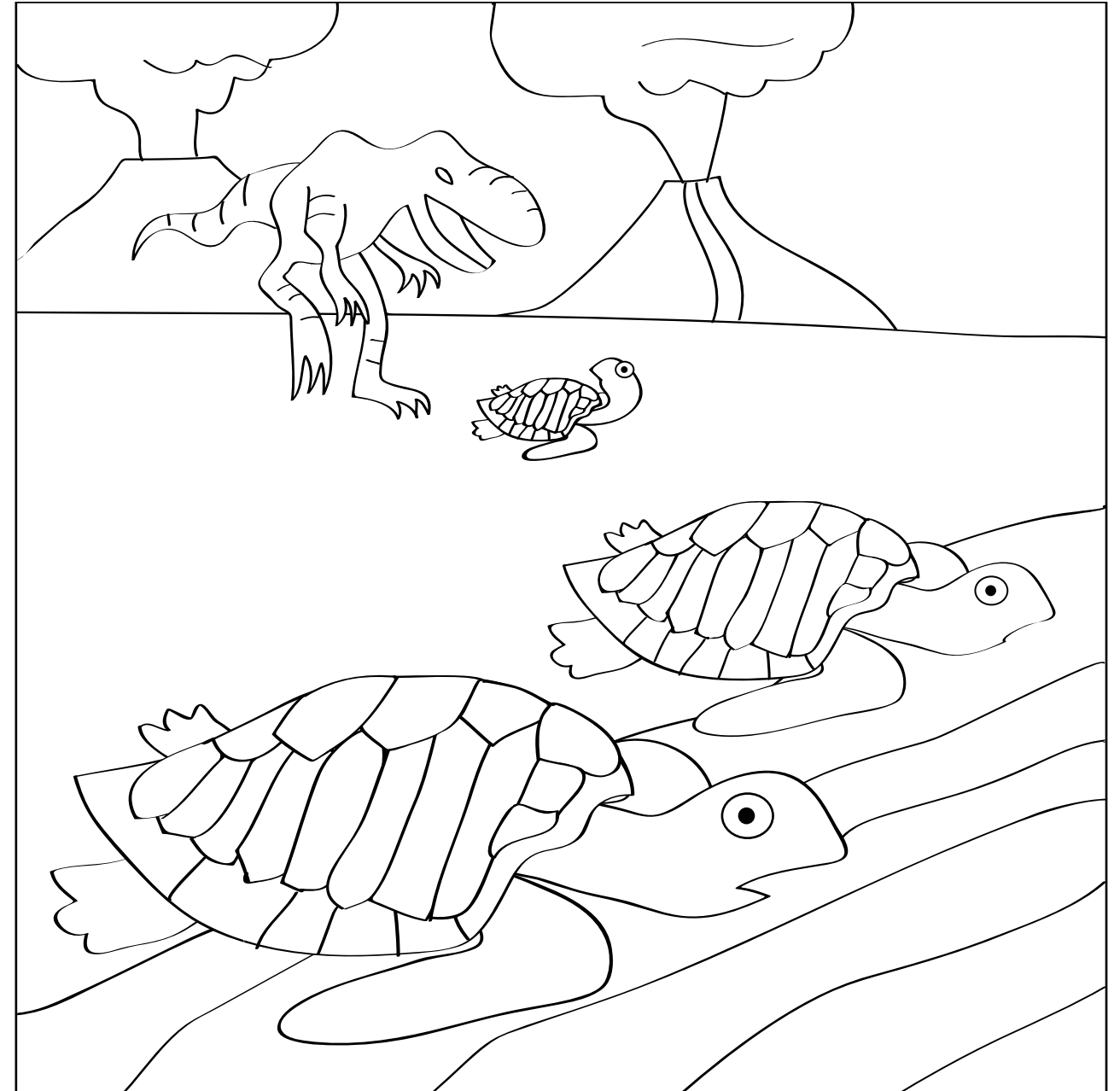


Play and learn:

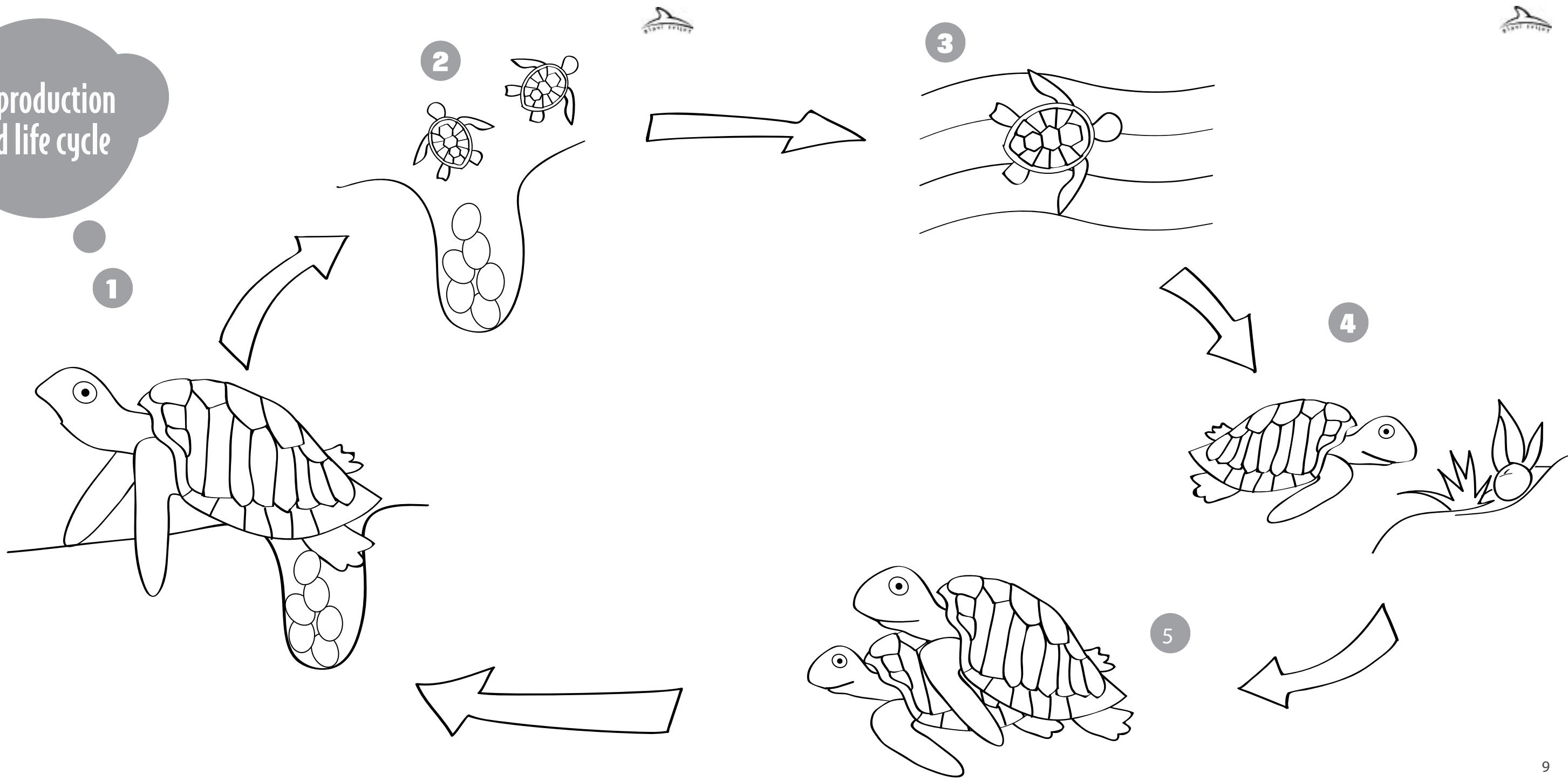
experiment



Colour the drawing on the next page!

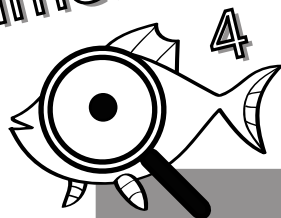


Reproduction and life cycle



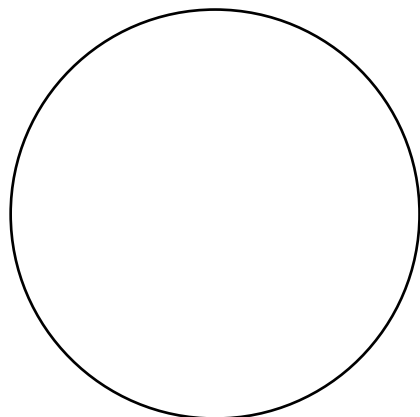


# experiment



Draw pictures showing different life stages of sea turtles in the right order to demonstrate their life cycle.

Draw the lifecycle of a sea turtle!



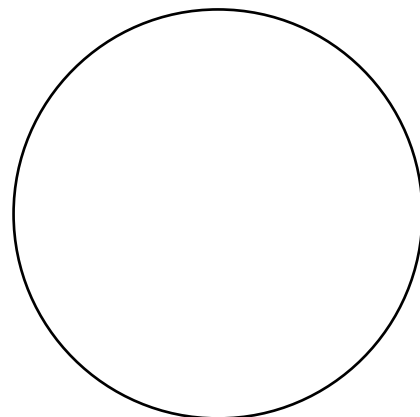
1

When loggerhead females between the ages of fifteen to thirty years reach sexual maturity, they are ready for mating. They swim back to the exact sandy beach they hatched on, and mate with the nearby males. Scientists are still not sure how they find the right route to their beaches after so many years of roaming the oceans.

The females emerge onto the beach after mating. In the cover of darkness, they use their back flippers to dig a nest 50 cm deep, in which they lay a hundred or so eggs, covering them with sand. They return to the sea after nesting, and will mate again in two or three years.

2

Fifty to sixty days later the little sea turtles hatch from the eggs. The sex of the hatchlings depends on the temperature at which they are incubated. Females will hatch from eggs incubated at higher temperatures, usually just beneath the covering sand. Males will hatch from eggs incubated at lower temperatures.



3

Sometimes hatchlings require up to two days to dig through the sand and get out on the beach. They stop digging when they feel warm sand because they know it is daytime. Small turtles can dry out or overheat on their way to the sea. They wait for nightfall and the sand to cool down before they emerge from the nest. At night, the threat from waiting predators is also decreased.

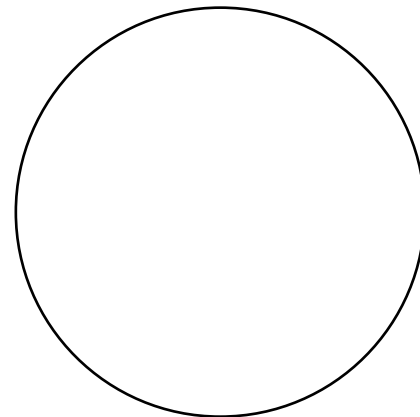
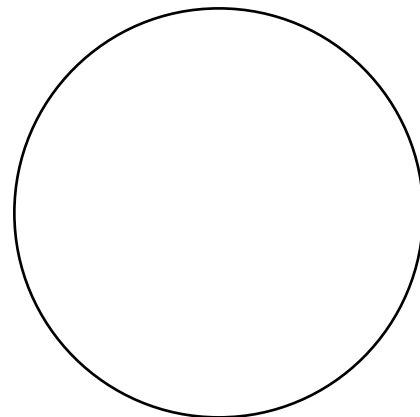
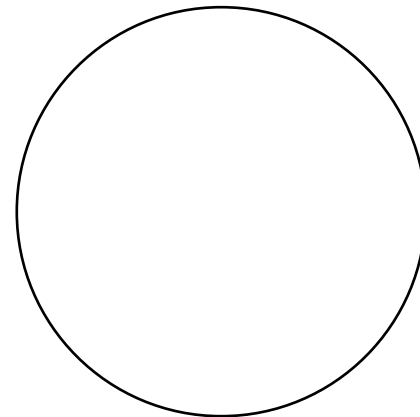
When they are finally out in the open, hatchlings start their challenging race to the sea. They are able to find their way without any difficulties, moving towards the moonlight reflected from the sea surface. If there is a hotel, nightclub or road near the nesting beach, hatchlings can get confused by their lights, and can get hurt heading in the wrong direction.

4

The most capable and enduring hatchlings get to the sea and swim continuously for a day until they arrive to the open sea, where they can relax floating in the sea currents.

5

They spend years maturing, travelling and foraging for food until they are ready to mate. At this point, they travel back to "their" beach and nest.



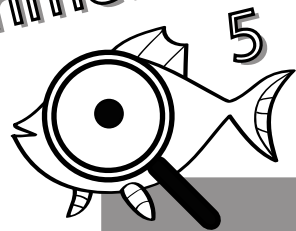
# Migrations

Movement of animals in search of food, places to breed and partners is called migration. Sea turtles are among the greatest travellers in the animal kingdom, travelling long distances between feeding and mating areas. Some species migrate several thousands of kilometres. The journey is long and difficult because sea turtles swim pretty slowly. They find their way using stars, the Sun and chemical substances in the seawater.

Loggerheads living in the Adriatic are coming mostly from nesting beaches in Greece, Turkey, Tunisia and Cyprus. The north Adriatic is one of the main feeding and wintering areas for young sea turtles.

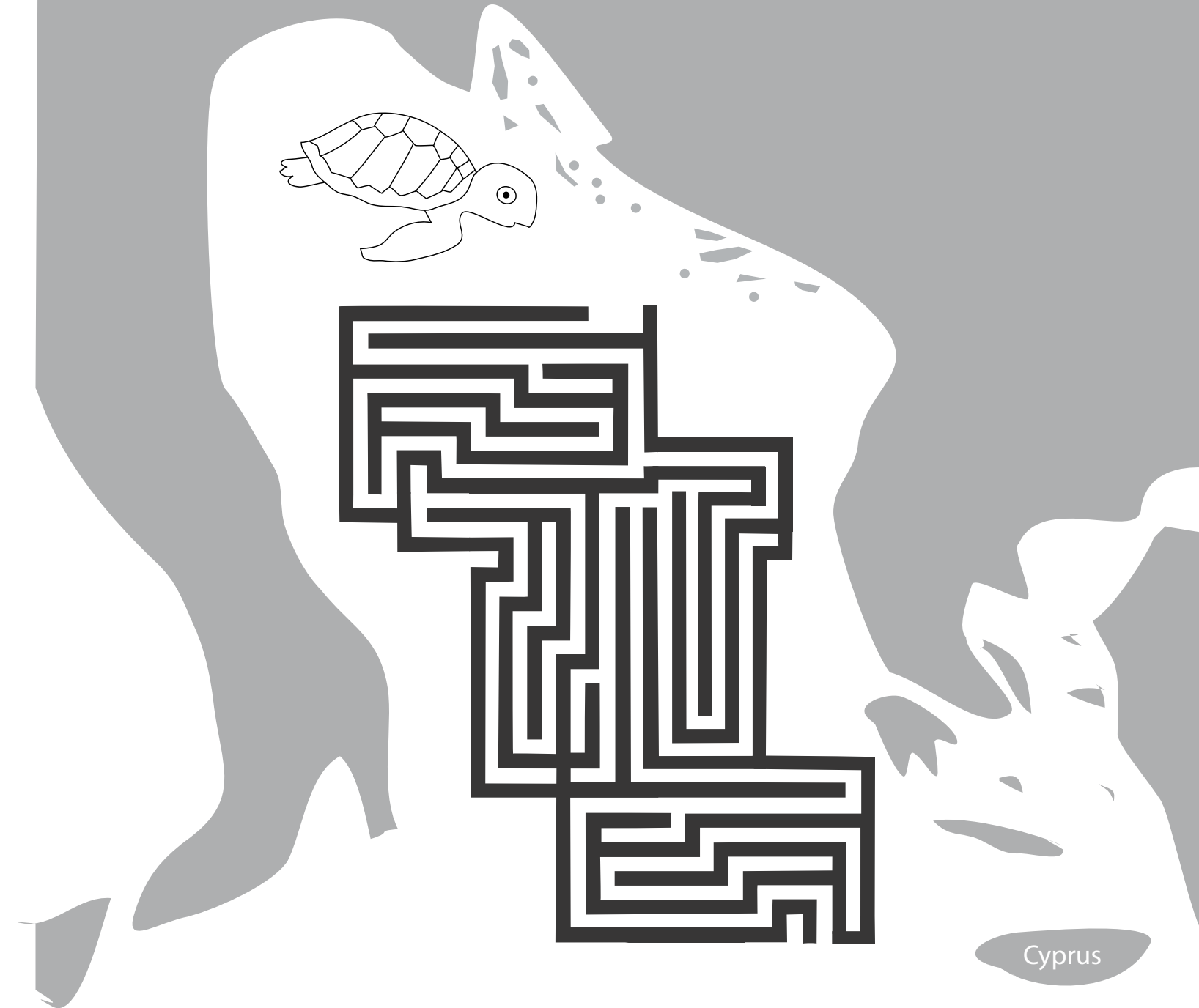
Play and learn:

experiment



Help this loggerhead find the way through the labyrinth from the north Adriatic to its nesting area on Cyprus.

Show the loggerhead how to get to Cyprus!







# Feeding

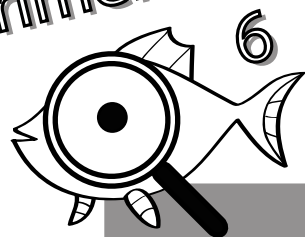
Most sea turtles feed on marine invertebrates like squid, jellyfish, crustaceans, bivalves, sea urchins and sponges they find while slowly swimming near the surface, or at the sea bed. Sometimes they eat small fish as well. Unlike other species, the green sea turtles are herbivorous and eat only algae and seagrass. Green turtles have a green fat layer beneath their shell because of the chlorophyll in their diet.

Sea turtles have a sharp beak-shaped mouth, with a biting force considered to be one of the most powerful among all animals. It helps them crush hard shells, such as the ones belonging to shellfish, snails and urchins.

During feeding, sea turtles take up big amounts of salt, which they are getting rid off by excreting salty tears.

Play and learn:

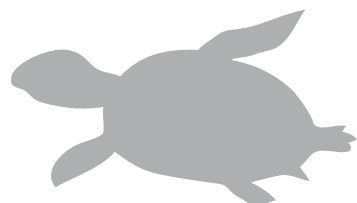
## experiment



Look at the crossword and find the names of all the species sea turtles eat.

Find the hidden words!

- ALGAE
- CRAB
- JELLYFISH
- MUSSEL
- SEAURCHIN
- SPONGE
- SQUID
- STARFISH



H	S	I	F	R	A	T	S	H
Y	S	E	N	M	E	S	S	L
E	E	V	G	A	Z	I	W	E
C	Y	L	G	N	F	X	C	S
J	R	L	U	Y	O	B	Y	S
A	A	A	L	P	Q	P	U	U
D	M	L	B	N	P	M	S	M
S	E	A	U	R	C	H	I	N
J	J	S	Q	U	I	D	D	Z



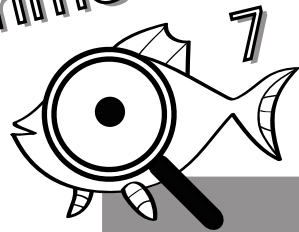
# Hibernation

Just like other reptiles, sea turtles are cold-blooded animals, which means their activity depends on the temperature of the environment. This is why sea turtles are resting on muddy sea bottom during winter months, when the sea is coldest. This resting condition is called hibernation. During this period they are expending minimal energy and rarely emerge to the surface to breathe.

Sea turtles resting or hibernating on the bottom often end up in the fishing nets of bottom trawlers. The inactive animal can fall into a state of shock when quickly pulled to the surface. It is very important to know how to act appropriately when that happens, and allow the turtle to recover before it is returned to the sea.

Play and learn:

## experiment



Read the instructions on how to deal with an inactive sea turtle

Learn to deal with inactive sea turtles!

1

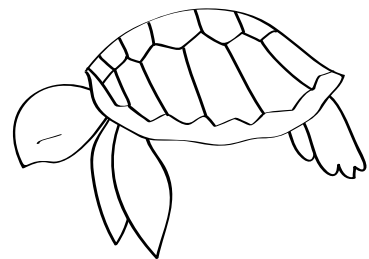
How to recognize an inactive sea turtle?

Inactive sea turtles can't hold their head or flippers horizontal. When you pick them up, the head and flippers will hang on the body, facing downwards.

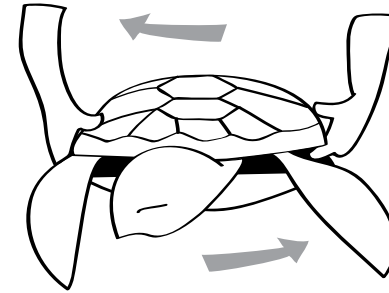
Recovery techniques are not causing a reaction.

When you pull a flipper or press on the neck, there is no reaction.

It doesn't try to move when it is set on the boat deck.



2



Revival

Hold the turtle on each side of the shell, lift one about 10 cm, and then lift the other. Shake it slowly from left to right, and from right to left.

3

If the sea turtle is inactive leave it on the deck and:

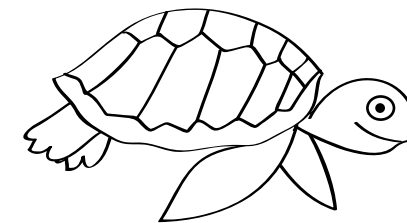
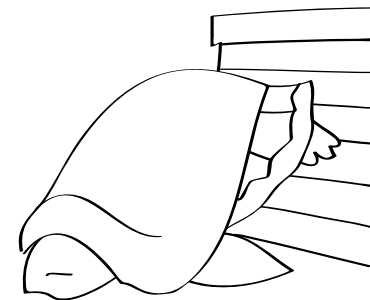
Leave it in a shady, quiet place. If it is cold outside, make sure its not directly exposed to wind.

Raise the back side of the body about 20 cm above the deck level.

Keep the turtle moist with a wet cloth. Never put an inactive sea turtle into water-filled containers.

Monitor the animal and apply recovery techniques every 2 hours, until the turtle shows any sign of being alive. Do this for at least 24 hours as it can still recover, even after such a long time.

If the sea turtle shows at least one sign of recovery, it is considered to be injured. Leave it on the deck for a few hours and you can then return it to the sea.





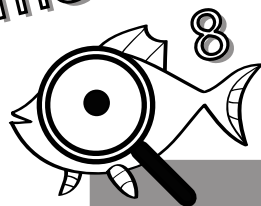
# Threats

Sea turtles are among the most threatened organisms on Earth. The presence of sea turtles indicates a healthy and conserved marine environment. Despite that, there are many threats to their existence in the Adriatic and around the world.

The major threats to sea turtles come from human activities such as fishing. Turtles are accidentally caught in fishing nets or on fishing hooks. In

Play and learn:

## experiment



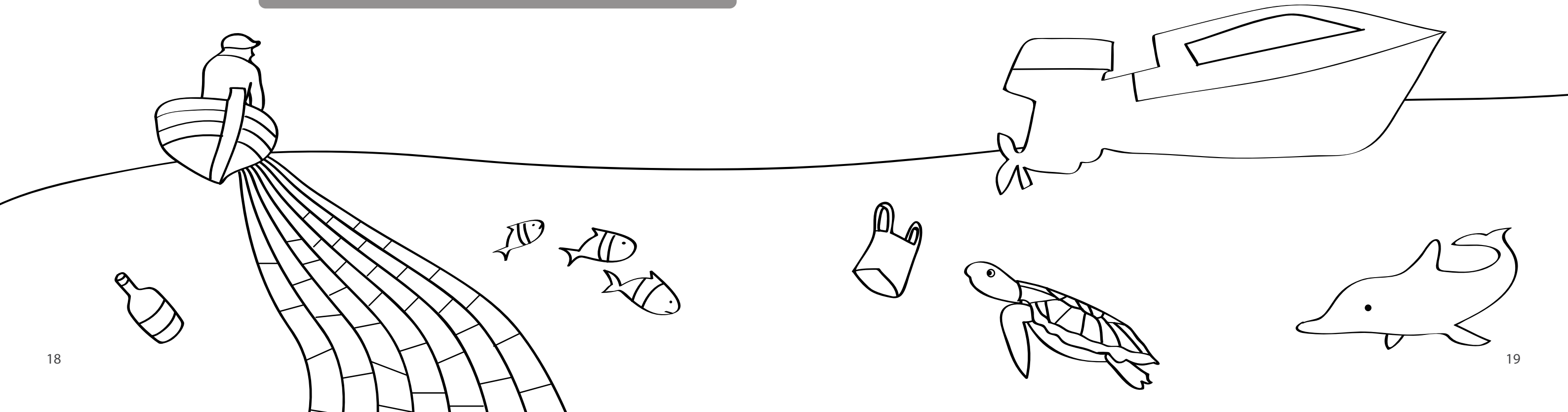
Find the threats to sea turtles on the picture!

some parts of the world people still purposely kill sea turtles. They use their shell, skin and oil for various purposes, while their meat and eggs are food sources.

Many sea turtles eat marine debris such as plastic bags. Large amounts of plastic in their stomach can cause death, while smaller amounts cause serious problems and have a big impact on the health and behavior of the animal. Pollution with oil and other chemical substances can also have a negative influence on the health of marine animals.

The development of tourism and uncontrolled building in the coastal area result in the disappearance of sandy beaches turtles need for nesting. Global warming impacts the natural sex ratio and life cycle of these cold-blooded animals. Raising sea levels will lead to the destruction of many nesting beaches.

By protecting sea turtles and their habitat we protect many other species and help to conserve biodiversity in the seas and oceans of the world.



# Protection

1

Everyone can contribute to the protection and conservation of living organisms on Earth through education and responsible behaviour. It is very important you learn as much as you can about the biology of different species, and their immediate threats. Provide scientists with information you are able to gather as it may prove to be very helpful in protecting the animals.

2

Researchers mark sea turtles with plastic tags placed on front and/or back flippers in order to determine how far the animals travel and which routes they use. If the turtle is caught in a fishing net or is nesting on a beach, we can use the tags to find out where it came from. Please let us know if you find a marked turtle! Nowadays, satellite tags are often used in addition to plastic tags. They are attached to the shell and send out a signal that can be downloaded to the computer and used to track the animal.

3

If you find an injured sea turtle, make sure you call the nearest veterinary station and sea turtle rescue centre as soon as possible. The animal can be rescued if you act quickly enough. It will receive proper care, and return to the sea after it is fully recovered.

4

Never throw rubbish in the sea, and make sure you don't leave it on the beach!

5

Avoid buying souvenirs made out of endangered marine animal body parts such as products made out of sea turtle shells, shark teeth, noble pen shells, etc. In addition to being illegal, buying these encourages further poaching of these animals.



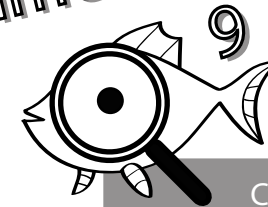
6

Act in ways that decrease unnecessary consumption of water and energy! Use public transport, turn off the tap while you are brushing your teeth, turn off the lights when exiting a room and buy domestic products that need not be transported from other parts of the world, etc. Think about the environment that is all around us!

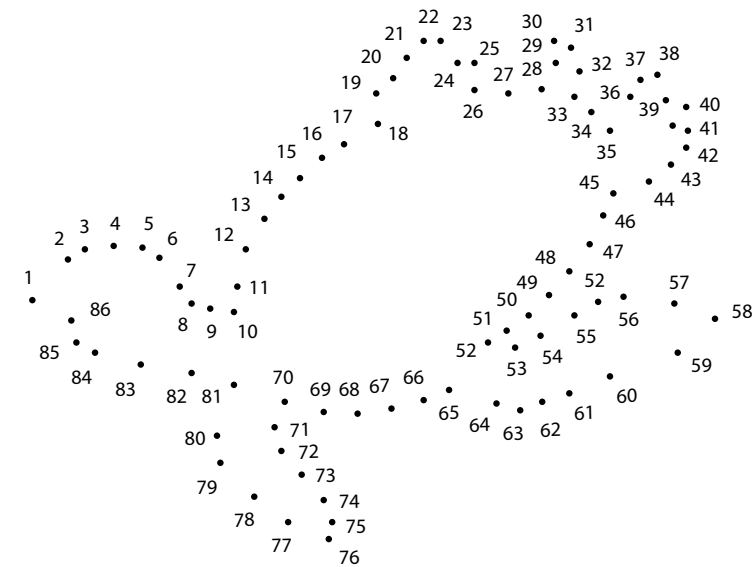
7

Participate in programs taking care of the environment and support the organisations involved!

## Play and learn: experiment 9



Connect the dots and discover what is in the picture!





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