The sea turtle mission

Play

ENIGMATHICO

Co-funded by the European Union



Activities

Glossary

Bonus

Summary



Chapter 1

A big sea adventure begins



Chapter 2

Help needed



Chapter 3

The long journey of the sea turtle



Chapter 4

A safe nest

Bonus

Documentary about the Loggerhead turtle and Laganas Beach



Documentary in Greek, with automatic subtitles. The two first minutes can be played without sound for live footage of the turtles and hatchlings.

Animated short film about the dangers threatening sea turtles

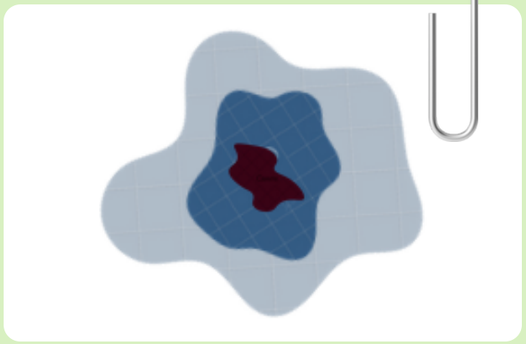


Trigger warning: death of one of the baby turtles

Short silent video about the Ocean Cleanup initiative

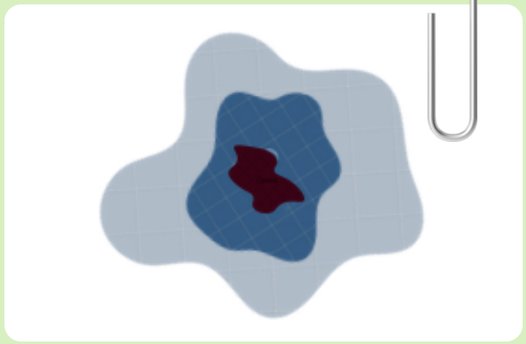


Activities - Level 1



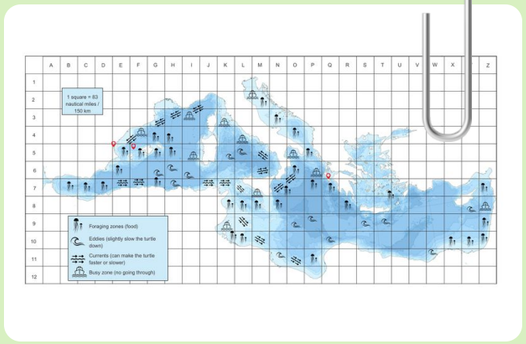
Activity 1

Mission sheet:
Oil spill estimates:
Surfaces



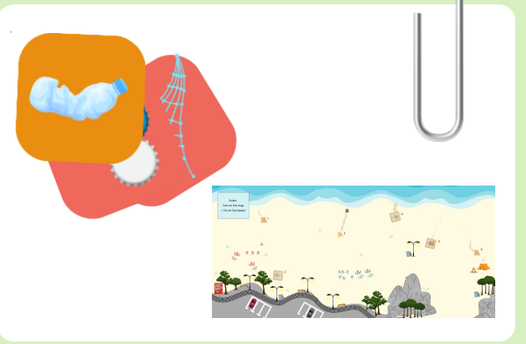
Activity 2

Mission sheet:
Oil spill estimates:
Volumes



Activity 3

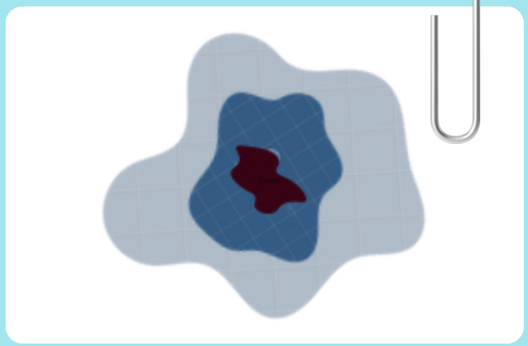
Mission sheet:
A long journey



Activities 4 & 5

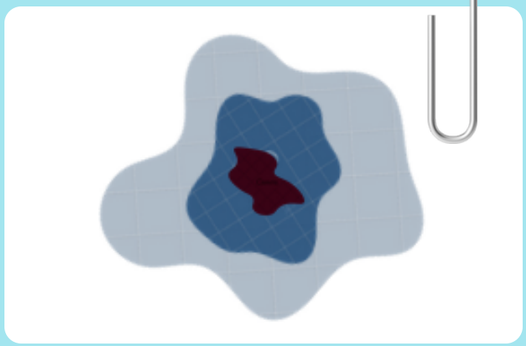
Mission sheet:
Operation beach patrol & Operation Safe Nest

Activities - Level 2



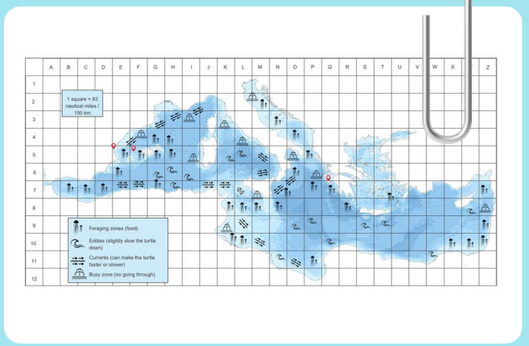
Activity 1

Mission sheet:
Oil spill estimates:
Surfaces



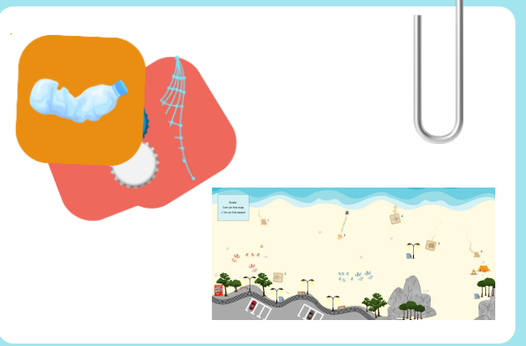
Activity 2

Mission sheet:
Oil spill estimates:
Volumes



Activity 3

Mission sheet:
A long journey



Activities 4 & 5

Mission sheet:
Operation beach patrol & Operation Safe Nest

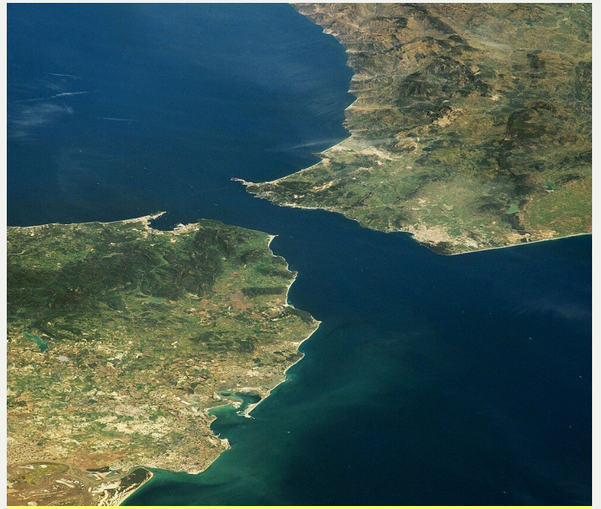
Glossary



Marine biologist



What is a compass and how does it work?



The strait of Gibraltar



Who cleans up and how?

Glossary



What are booms and nets used for in an oil spill?



Why is oil bad for sea animals?



Why do scientists track turtles with GPS?



Caretta Caretta turtle

Glossary



Sea turtles and memory



Where is Laganas and why is it important?



Plastic is not fantastic!

Archelon Sea Turtle Protection Society, WWF Greece

Glossary



Turtle eggs



Did you know?

What does a Marine Biologist do?

A **marine biologist** is a scientist who studies:

- the ocean
- the animals
- and plants

that live in it.

They explore how sea creatures live and what helps them stay safe.



What Is a Compass and How Does It Work?



A compass is a **navigation tool** that shows you where North is, so you can figure out which direction to go.
It has a **magnetic needle** that always points North.

Why? Because Earth acts like a giant magnet! The needle inside the compass is magnetised and lines up with the Earth's magnetic field. So, no matter where you are, the red part of the needle always shows North.

Once you know where North is, you can get the rest of the other directions:

- **East (E)** is to the right
- **South (S)** is opposite North
- **West (W)** is to the left

These directions are called the **cardinal directions**.

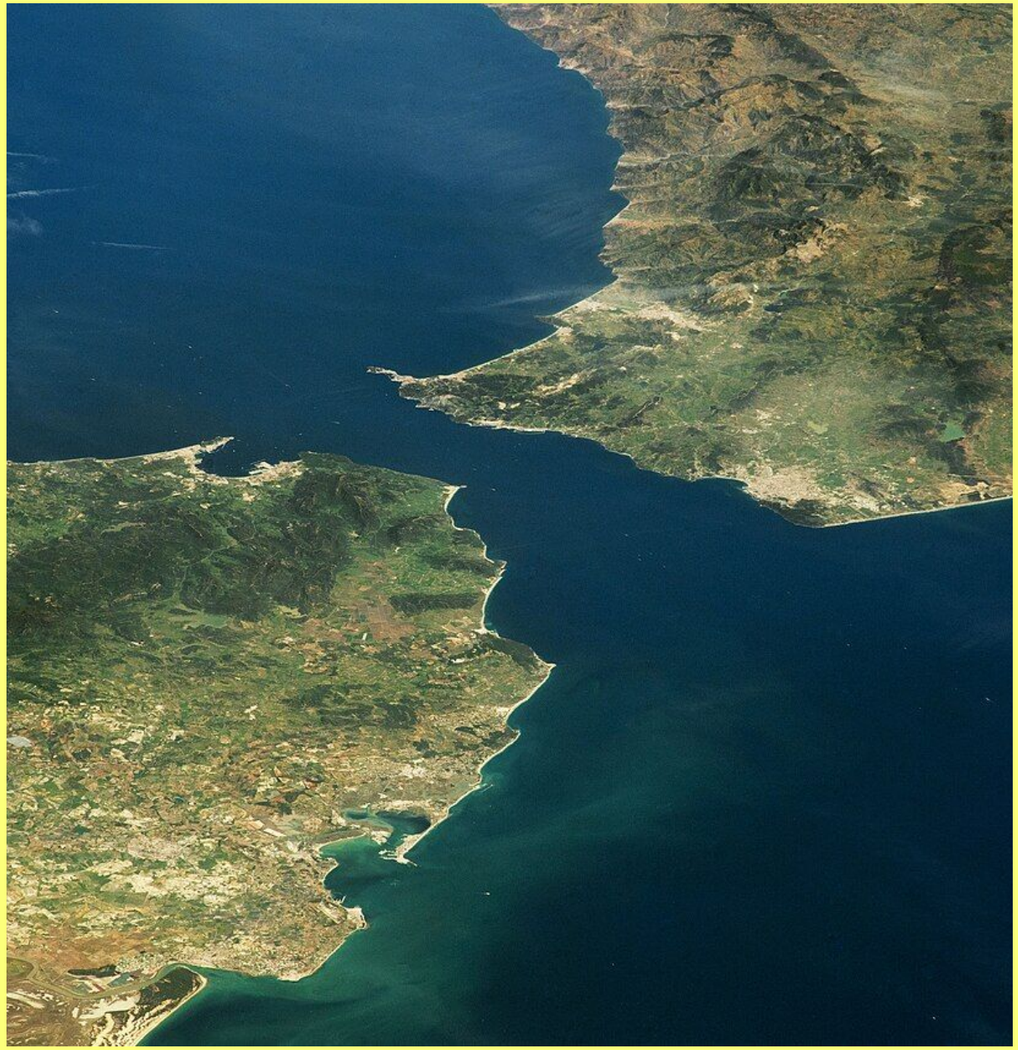
The strait of Gibraltar

A **narrow passage** between **two continents.**

The **Strait of Gibraltar** is the narrow sea passage that connects the Atlantic Ocean to the Mediterranean Sea. It separates Europe (Spain) from Africa (Morocco). At its narrowest point, it is only about 14 kilometres wide.

Because of its location, it’s one of the most important sea routes in the world: many ships pass through it every day!

Fun fact: In ancient times, people believed the Strait marked the edge of the known world.



Who cleans up and how?

When an oil spill occurs, the first step is to contain it at sea using floating barriers (called booms) and other tools. If the oil is not contained in time, it may reach the shore, and that’s when clean-up becomes much harder.

Rescue teams wearing full protective suits step in to handle the clean-up. Depending on the situation, they use different tools:

- absorbent pads to soak up the oil,
- skimmers for the water surface,
- shovels and buckets for polluted beaches.

The process can be long and difficult, but every action helps protect both the environment and the animals that live there.



What are booms and nets used for in an oil spill?

Booms are floating barriers.

They stop the oil from spreading further across the sea.

Nets and special tools help collect the oil and protect animals and beaches.



Why is oil bad for sea animals?

Oil can coat a turtle’s shell and skin, making it hard for them to swim, eat, or stay warm. It can also poison them if ingested.

Cleaning an animal should always be done by professionals.



© University of California, Davis.

Why do scientists track turtles with GPS?

Sea turtles travel thousands of kilometres across the oceans. By placing a GPS tracker on them, scientists can follow their journeys and learn where they feed, rest, and lay their eggs. This helps protect the places turtles need to survive.



Caretta Caretta turtle

The Caretta Caretta, or loggerhead sea turtle, is one of the largest sea turtles. It can live up to 50 years and travels thousands of kilometres across oceans to find safe beaches for laying eggs. They play an important role in keeping ocean ecosystems healthy by controlling jellyfish populations and helping maintain coral reefs.



Sea turtles and memory

Did you know?

Loggerhead turtles (Caretta caretta) have an incredible memory of places.
After travelling thousands of kilometres, they often return to the same beach where they were born to lay their eggs.



Where is Laganas and why is it important?

Laganas Beach, on the island of Zakynthos in Greece, is one of the most important nesting places for Caretta caretta turtles in the Mediterranean.
Every summer, many turtles return here to lay their eggs in the warm sand.
Today, the beach is part of a Marine Park that helps protect them.



Plastic is not fantastic!

Did you know?
Plastic bags float in the sea and look a lot like jellyfish, which turtles love to eat.

But plastic is not food: when turtles eat it, it can hurt their stomachs and make them sick.

That’s why keeping our oceans clean is so important!



Archelon Sea Turtle Protection Society, WWF Greece

Several organisations run programs in Zakynthos to monitor and protect turtle nests. Volunteers mark the nests, collect data, and raise awareness among visitors so the hatchlings have a better chance of survival.



Turtle eggs

A loggerhead turtle (Caretta caretta) lays about 80 to 120 eggs in a nest, usually at night.

The eggs stay in the warm sand for 50 to 60 days.

The temperature of the sand decides the sex of the hatchlings:

- Warmer sand → more females
- Cooler sand → more males

When the baby turtles hatch, they quickly crawl to the sea, guided by the light of the moon.



© North Carolina Aquarium

Did you know?

In real beach clean-ups, volunteers and other environmental teams don’t just collect trash.
They often count and record every item they find.

They use special forms or mobile apps to note the type and number of items, such as:

- Bottle caps
- Plastic bags
- Straws
- Fishing nets

This information is sent to scientists and environmental organisations.
It helps them understand what kind of waste is most common, where it comes from, and how to reduce it.



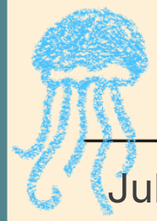

France
Croatia
Spain
Italy
Montenegro
Albania
Greece
Turkey
Morocco
Algeria
Tunisia
Libya
Egypt
40°
35°
30°
0
200 m
500 m
1000 m
1500 m
2000 m
3000 m
4000 m
-5.0°
0°
5°
10°
15°
20°
25°
0
(km)
0
(mi)

The explorer's diary

A special diary to take notes during the adventure!

Download





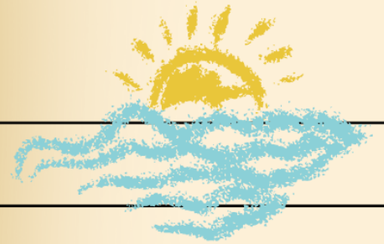
July 10th

We passed the strait of Gibraltar!

It was a bit scary because of the wind and currents, but we made it through!

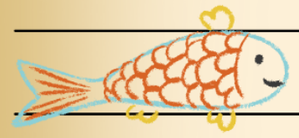
July 12th

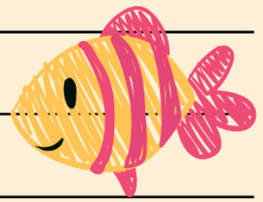
Staying in a pretty creek for the night!



July 13th:The sunset was pretty tonight!

Can fish sleep while swimming?





Chapter 1

A big sea adventure begins



It was summer, and the sun was shining brightly in the Spanish city of Cádiz.
Miguel and his little sister Isabel were getting ready for a special trip on their boat,
La Esperanza, which means Hope.
Their dad, Antonio, was not just the captain.
He was also a **marine biologist** who had dedicated his life to studying and protecting ocean life.



They were going on a journey across the Mediterranean Sea, all the way to Greece. Just before they set sail, Antonio handed Miguel and Isabel two special items:
a colourful map to guide them and a small notebook, their Explorer’s Diary.

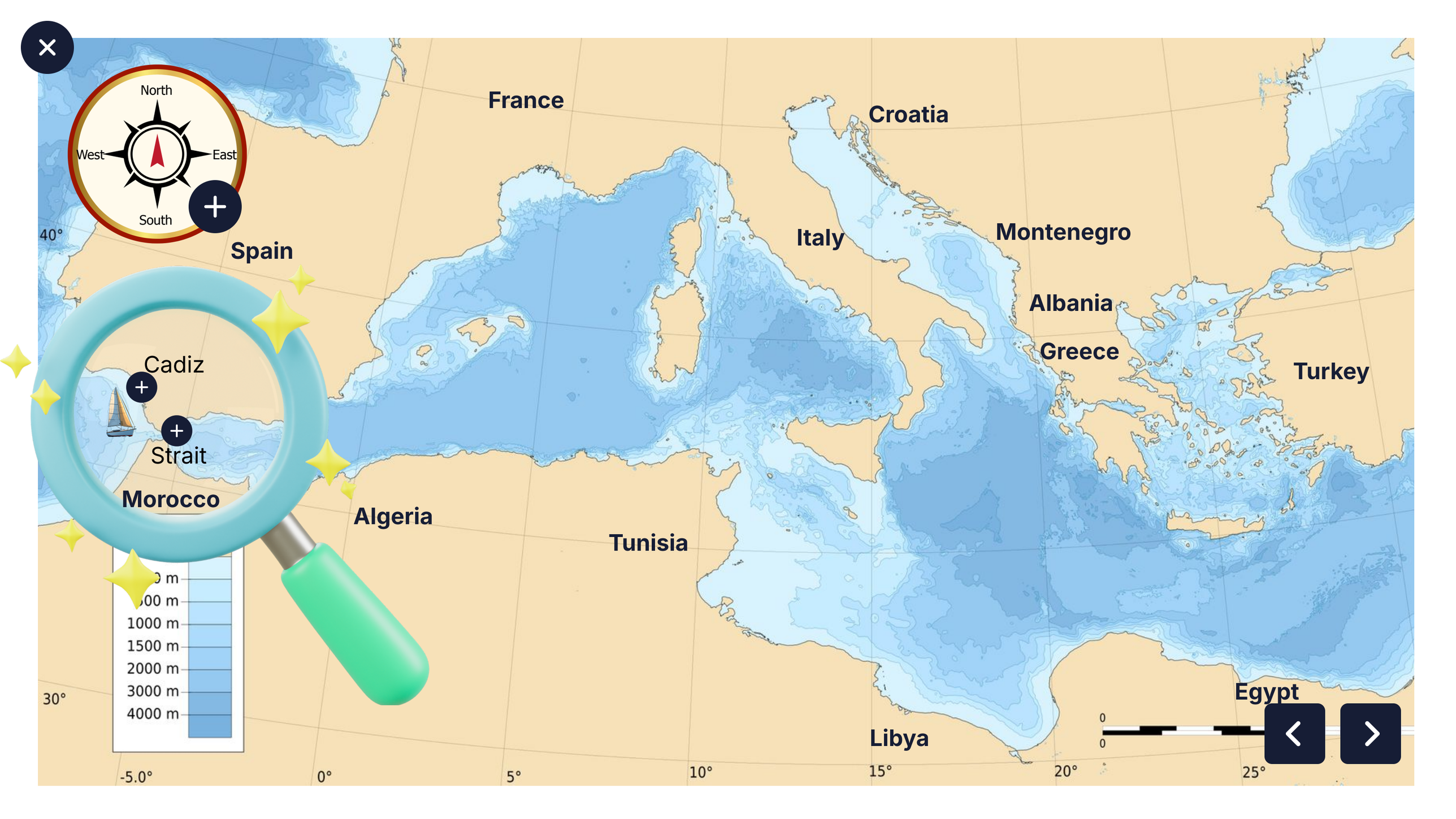


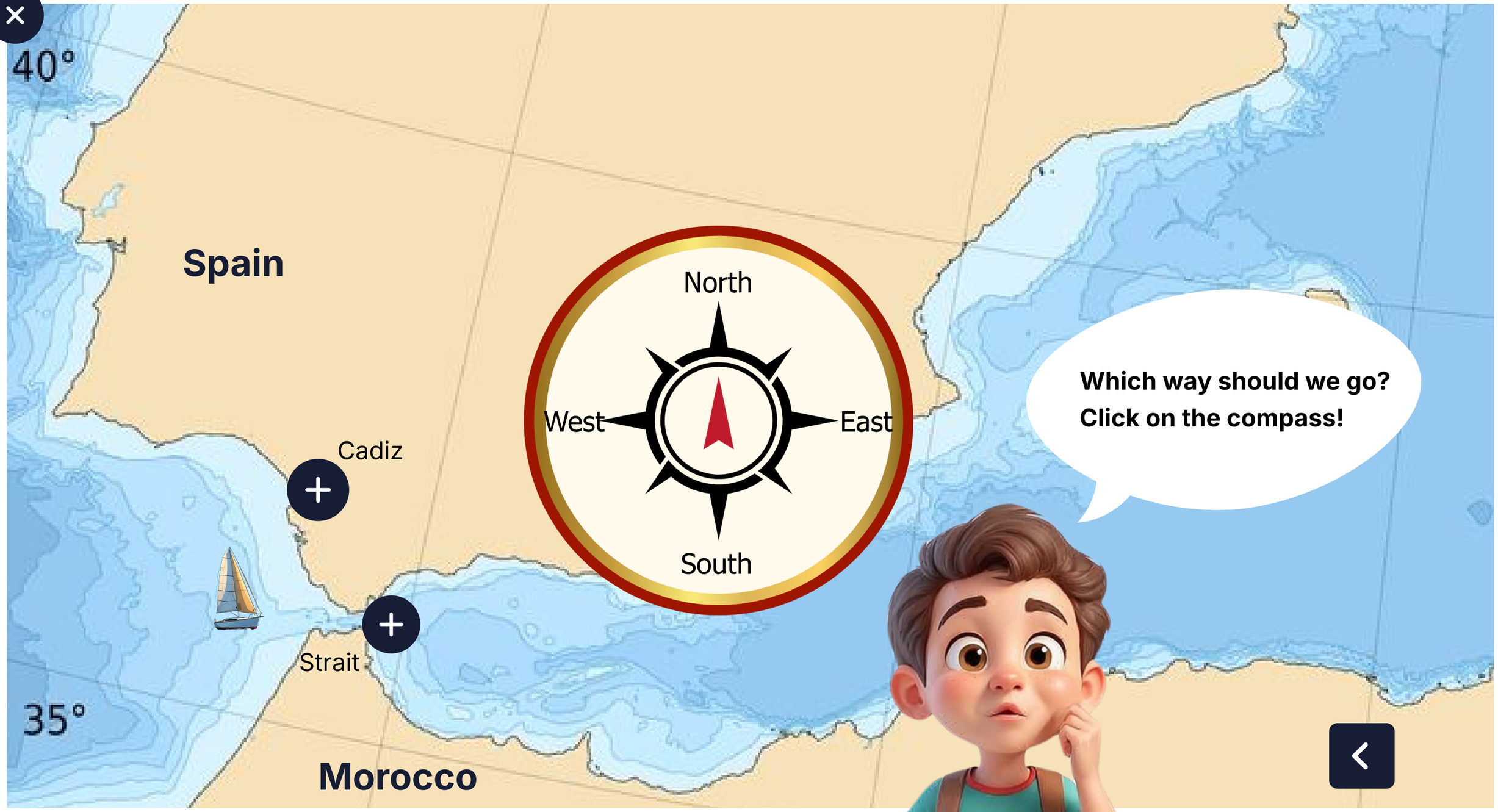
The weather was perfect. The sun shone brightly, and many seagulls followed their boat as it glided along the Spanish coast. Antonio had already taught Isabel how to steer the wheel and Miguel how to tie knots and trim the sails: they were becoming true sailors.



That morning, Antonio had just shown them how to read the compass when he stepped away to adjust the sails. Suddenly, the needle flickered.
Miguel looked uncertain.




North
West
East
South
France
Croatia
Italy
Montenegro
Albania
Greece
Turkey
Spain
Cadiz
Strait
Morocco
Algeria
Tunisia
Libya
Egypt
1000 m
1500 m
2000 m
3000 m
4000 m
40°
30°
-5.0°
0°
5°
10°
15°
20°
25°


40°
Spain
North
West
East
South
Which way should we go?
Click on the compass!
Cadiz
Strait
35°
Morocco


Oh no, it looks like we are lost! Let's look at the map again!


Great job, Explorers! We found the right direction!

A day later, they reached the Strait of Gibraltar. On the left, they saw the huge Rock of Gibraltar standing tall like a silent guard. On the right, the coast of Morocco appeared far away, wrapped in a soft mist. As they approached the strait, Antonio told them old stories. He spoke about sailors and pirates who sailed there long ago. He also told them the legend of Hercules, who is said to have made the strait by breaking a mountain.



Crossing the Strait was not easy. The water moved fast and pushed the boat. Suddenly, a strong wind blew. Antonio gave quick instructions, and both children jumped into action. Isabel and Antonio turned the wheel with all their strength, while Miguel adjusted the sails and tied the ropes tight. After a long hour of effort, the sea finally calmed. They looked at each other, tired but proud.



Each evening, Miguel and Isabel added something new to their diary. They felt like real explorers. But they didn’t know that soon the sea would need their help.

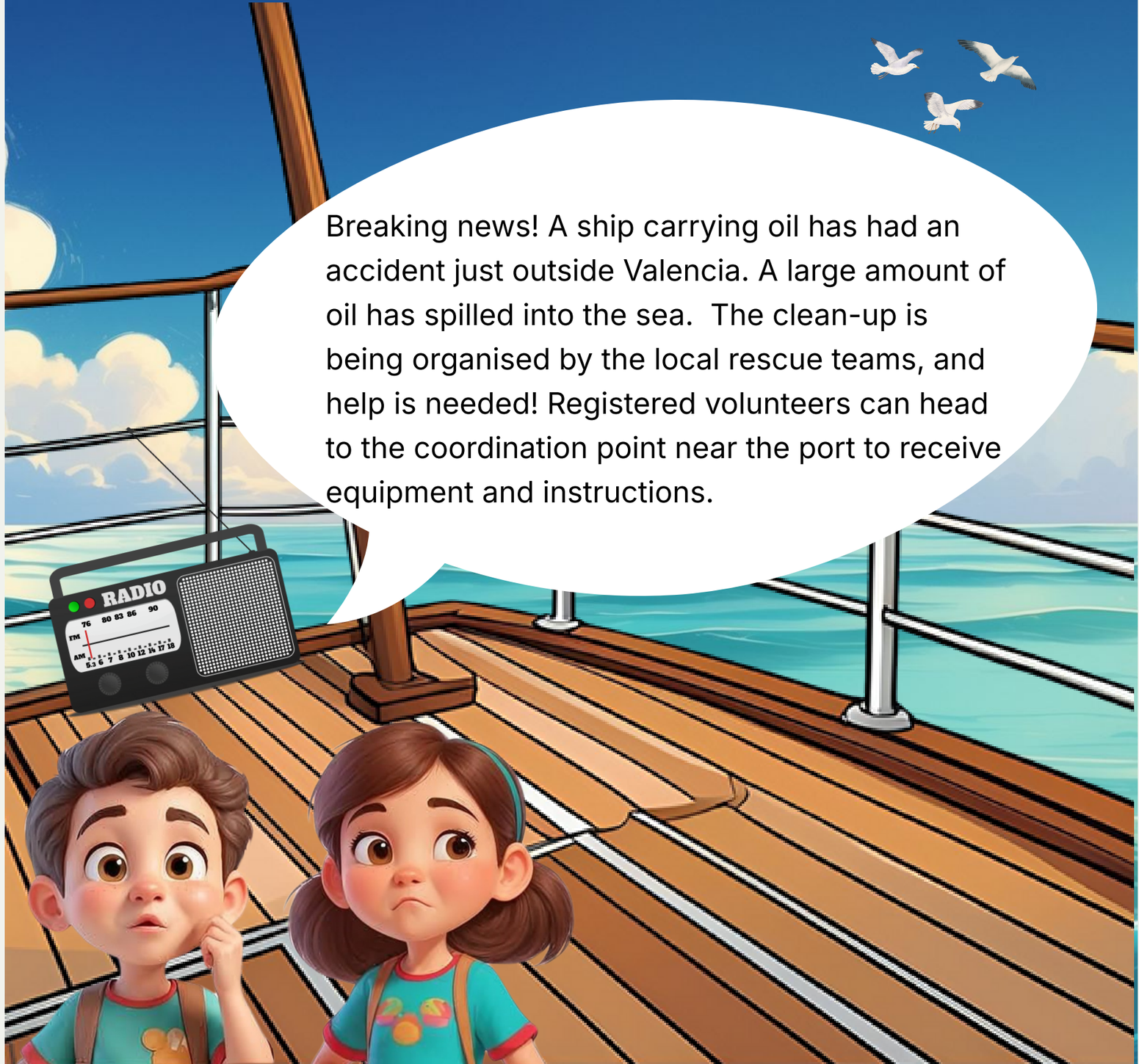


Chapter 2

Help needed



Everything seemed perfect, and the family continued to enjoy their adventure.
That morning, as they were having breakfast near the port of Valencia, Miguel and Isabel were listening to their small travel radio.Suddenly, the music stopped.
A serious voice came through the speaker.

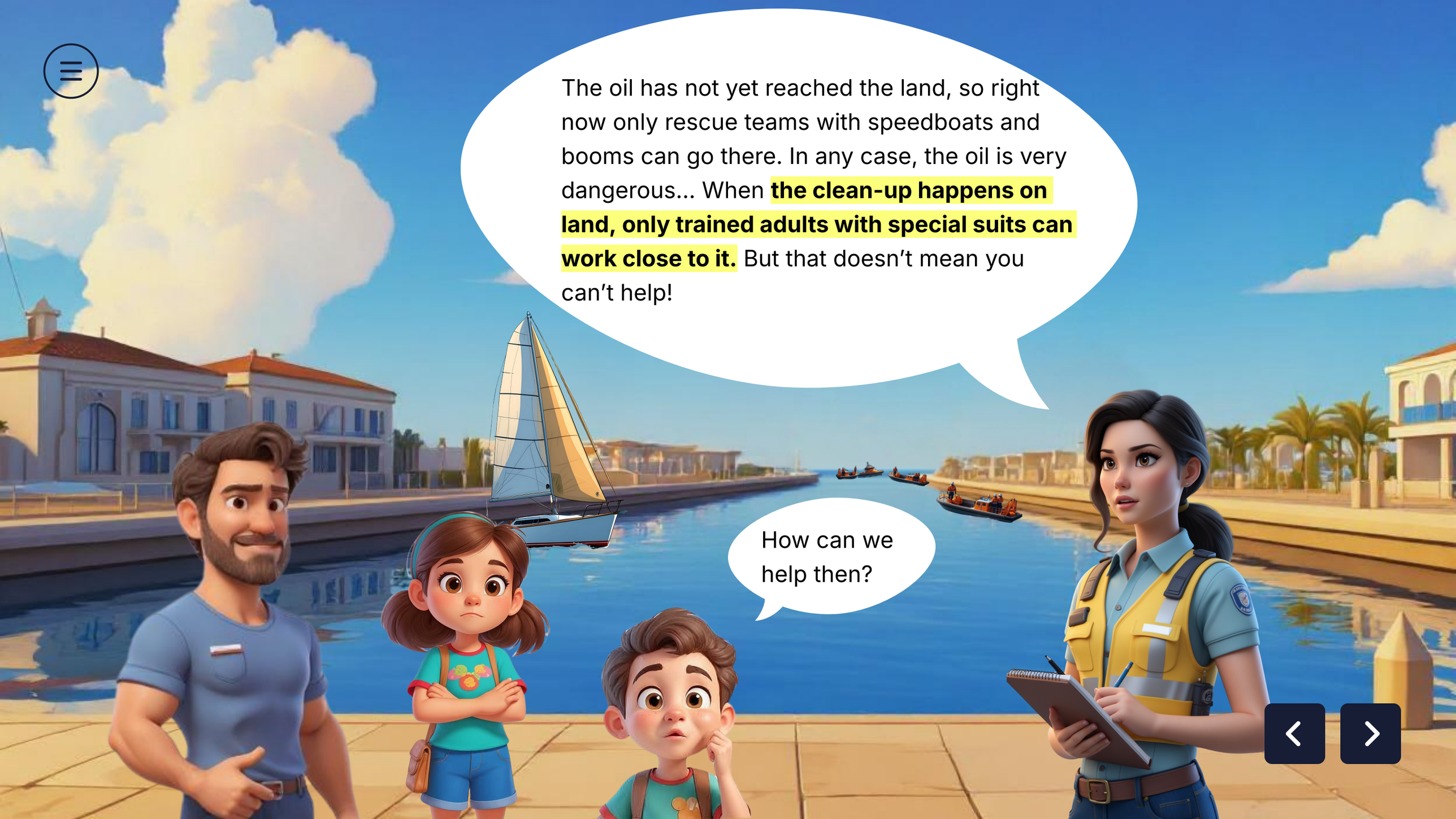



What is an oil spill exactly?
It’s when oil accidentally leaks into the sea from a ship or a platform. The oil floats on the surface and spreads quickly, like a blanket. This layer blocks sea animals from moving, breathing, or staying warm. That’s why it’s so dangerous.


We have to help!
But that's really bad! Can we do something?
Yes, we can. But we have to do it safely. The professionals will handle the dangerous part, and when we reach the port, we'll see how we can help.
RADIO
FM
AM

As they arrived at the coordination point near the port, the volunteer coordinator, Ajar, welcomed them and explained what was happening. The air smelled different: salty and sharp, mixed with the faint scent of oil. Around them, **rescue teams prepared equipment and organised volunteers. Large vehicles unloaded booms, nets, and special tools.** Further away, the sea sparkled with floating orange lines stretching along the surface.




The oil has not yet reached the land, so right now only rescue teams with speedboats and booms can go there. In any case, the oil is very dangerous... When **the clean-up happens on land, only trained adults with special suits can work close to it.** But that doesn't mean you can't help!
How can we help then?


See these pictures? They’re taken by drones that fly above the spill. They show us where the oil is and how far it has spread. I need your help to figure out how big it is and how to organise the clean-up on time.
That sounds like a real mission!


Here is your mission pack! It will help you estimate the size of the spill, calculate how much oil is in the sea, and plan the cleanup so it can be completed in time. Once you've finished your mission, come and find me!
Let's get started!

Isabel and Miguel opened the mission pack. They leaned closer, eager to see what it was about.

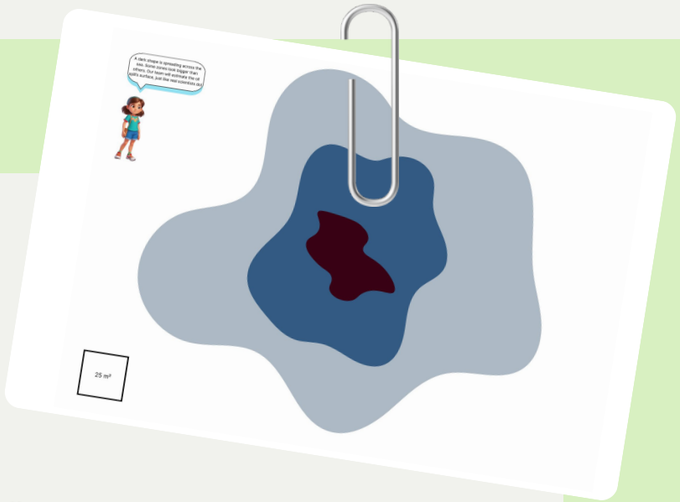


Activity 1

Mission sheet: Oil spill estimates

Mission 1: Surface estimates

Download



Team roles

Navigator

Helps the team decide where to place the shapes

Counter

Keeps track of how many shapes are used

Recorder

Calculates the area in m^2.

Presenter

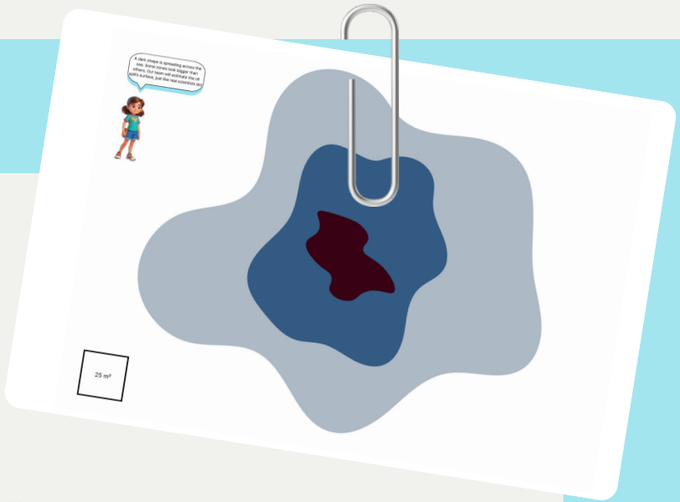
Shares the team's results with the class

Activity 1

Mission sheet: Oil spill estimates

Mission 1: Surface estimates

Download



Team roles

Navigator

Helps the team decide where to place the shapes

Counter

Keeps track of how many shapes are used

Recorder

Calculates the area in m^2.

Presenter

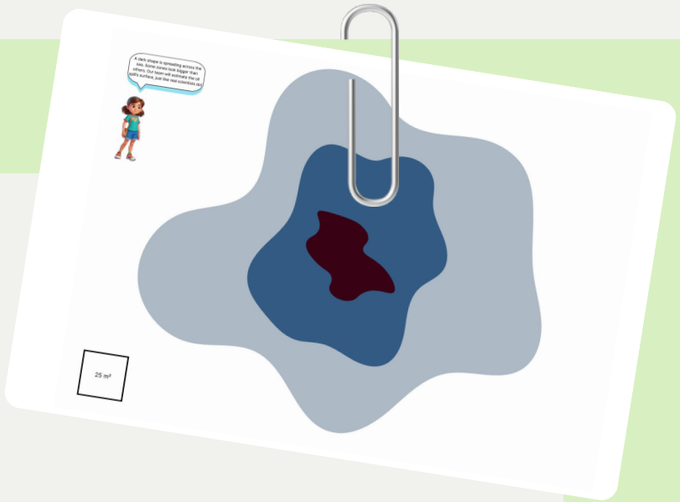
Shares the team's results with the class

Activity 2

Mission sheet: Oil spill estimates

Mission 2: Volume estimates

Download



Team roles

Navigator

Helps the team decide where to place the shapes

Counter

Keeps track of how many shapes are used

Recorder

Calculates the volume in litres.

Presenter

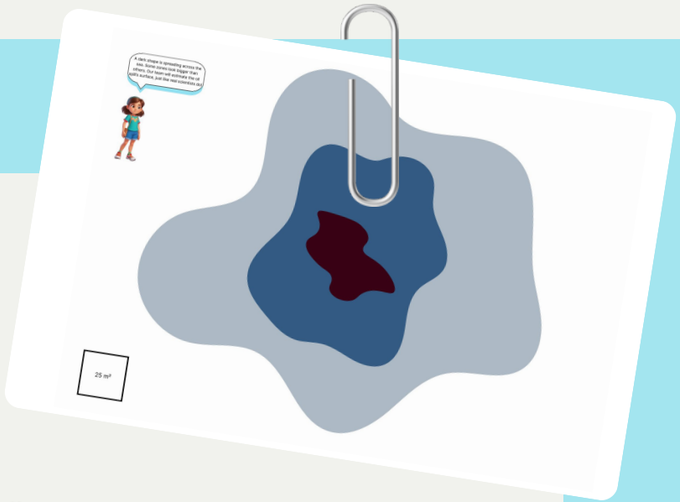
Shares the team's results with the class

Activity 2

Mission sheet: Oil spill estimates

Mission 2: Volume estimates

Download



Team roles

Navigator

Helps the team decide where to place the shapes

Counter

Keeps track of how many shapes are used

Recorder

Calculates the volume in m^3.

Presenter

Shares the team's results with the class


Well done, team! You estimated the oil spill, calculated its volume, and planned the cleanup like real scientists!

Chapter 3

The long journey of the sea turtle



As the days went by, La Esperanza sailed smoothly across the Mediterranean. One bright morning, the sea was peaceful and the sun warm. Miguel and Isabel enjoyed the rhythm of their journey, until Isabel suddenly noticed something moving in the water...




It is a turtle! But it’s covered in oil... It can’t swim well like that. We need to help it!

Antonio steered the boat closer. With Miguel’s help, he used a soft net to lift the turtle and placed it gently on a damp towel in the shade.

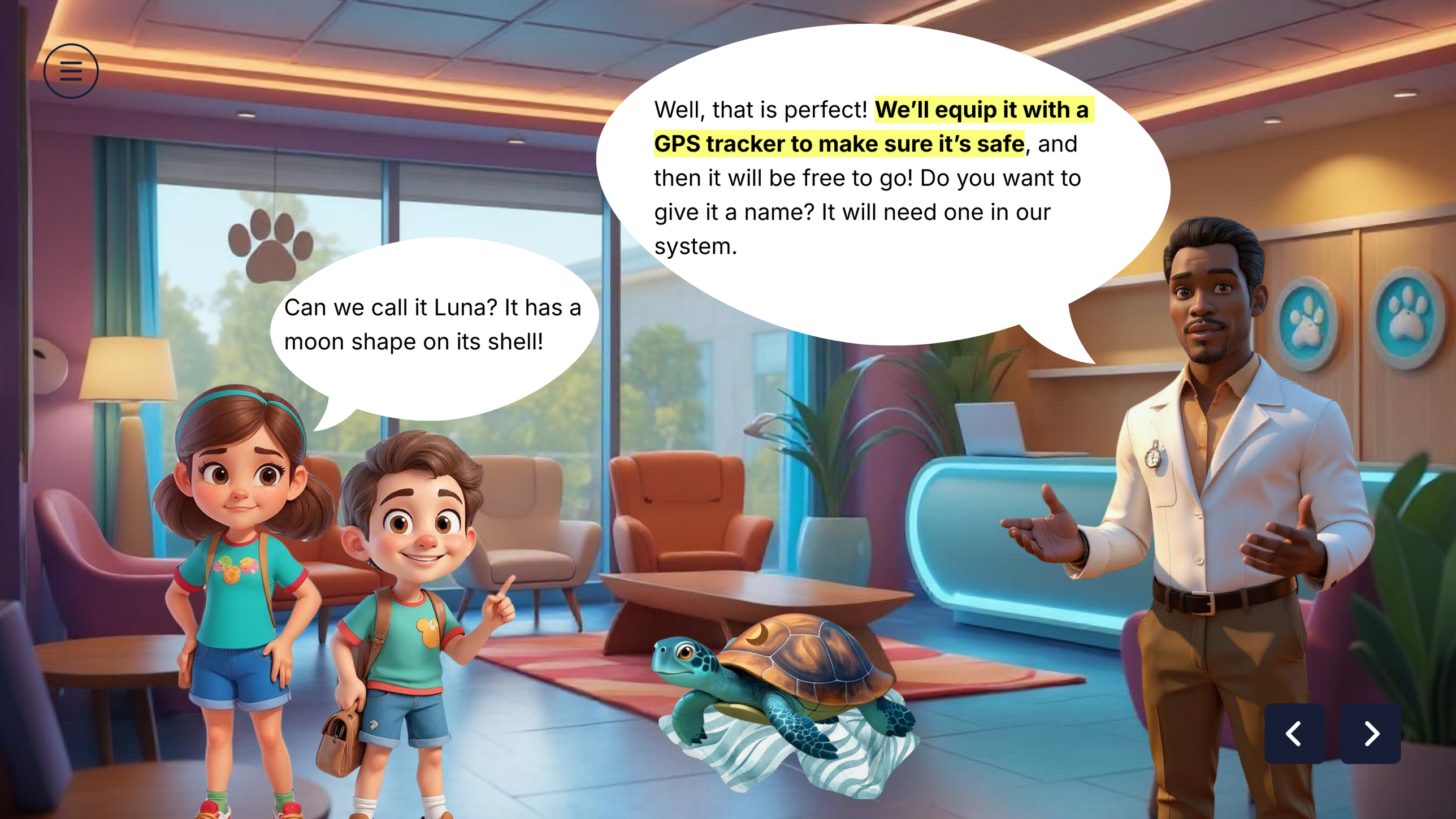


They rushed to the nearest port, where a vet was waiting. Miguel and Isabel carefully carried the turtle inside, their hearts full of worry. Doctor García welcomed them and began his work. With soft brushes and sponges, he gently cleaned the oil from its shell and flippers. The children watched, hoping it would recover soon.



The family stayed at the port for a few days while the vet cared for the turtle. Miguel and Isabel visited it every day, watching closely as it slowly regained its strength. Their worry turned little by little into hope. Finally, Doctor García smiled and shared some good news.




Can we call it Luna? It has a moon shape on its shell!
Well, that is perfect! We'll equip it with a GPS tracker to make sure it's safe, and then it will be free to go! Do you want to give it a name? It will need one in our system.

The next day, Doctor García brought Luna back to La Esperanza. He wished them a safe journey and showed them the right place to release it. Antonio and the children left promptly, trying to make the journey pleasant for Luna, by covering it with damp towels and keeping it in the shade.



When they arrived at the right GPS location, they lowered Luna gently into the sea. She then turned and waved her flipper.



Luna swam further into the open sea. Miguel and Isabel watched it closely, their hearts filled with both hope and worry. Luna's journey would be long and uncertain.

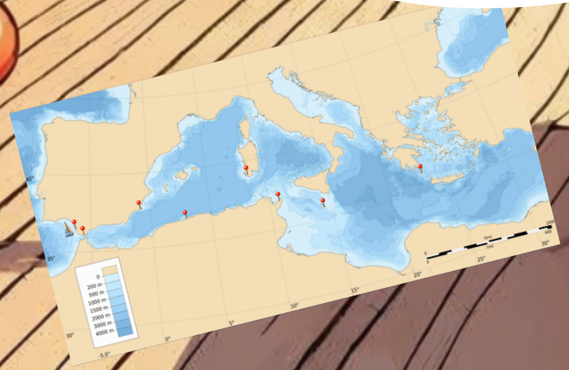


Antonio looked at Luna’s GPS data on his tablet, then unrolled their large map of the Mediterranean and spread it out on the deck.



The map only shows dots... but not the whole journey!

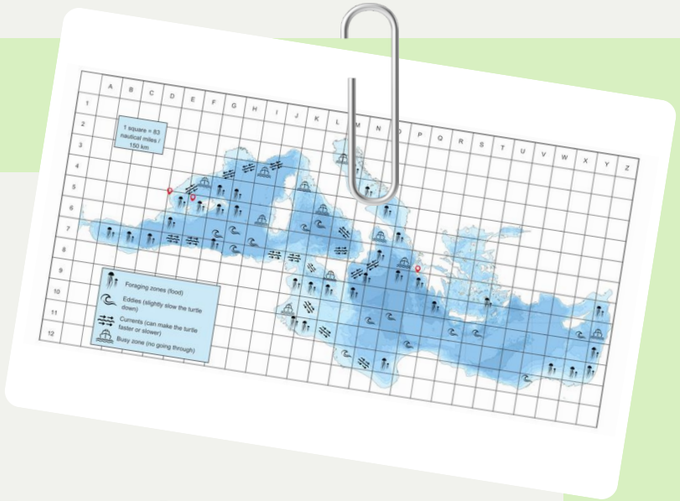
And remember, the GPS sends a signal only when Luna comes up to the surface for air. That's why the map shows only some points, not the whole path.




If we connect these signals, we can guess the path Luna has taken. But it’s not easy, the sea is wide and full of choices. Let’s unfold your map and solve this together!

Activity 3

Mission sheet: A long journey



Team roles

Navigator

Decides the direction based on the map.

Recorder

Notes down the coordinates and reasons.

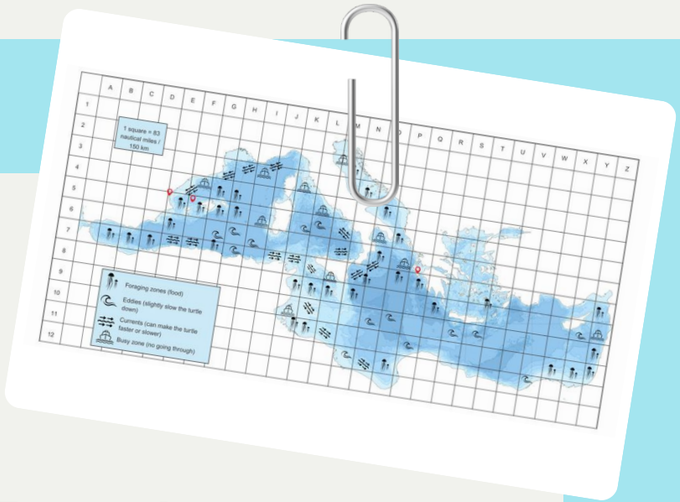
Presenter

Shares the team’s results with the class.

Download

Activity 3

Mission sheet: A long journey



Team roles

Navigator

Decides the direction based on the map.

Recorder

Notes down the coordinates and reasons.

Presenter

Shares the team’s results with the class.

Download


Fantastic work, Navigators! You have found Luna’s signals and mapped its possible route across the Mediterranean. Let’s continue our adventure!

Chapter 4

A safe nest



After days of following Luna’s signals, Antonio and the children finally saw the island of Zakynthos appear on the horizon. It was one of the most important nesting places for sea turtles. Their hearts filled with pride and joy: Luna had reached its destination!



They anchored near the shore and could already see turtles swimming close to the island. But as the sun set, something else caught Miguel’s eye. Plastic bags were floating in the waves, drifting dangerously near the turtles



The next morning, Antonio took the children to the **Sea Turtle Protection Society Office** in Laganas. The head volunteer, Sofia, welcomed them and explained how they protect the turtles and their nests.




We can help, but we never touch the turtles. Instead, we protect the nests and keep the beach clean.We have a beach patrol at sunup tomorrow morning. Will you join us?
Yes!

Early the next morning, the children joined Sofia and the volunteers on the beach. The sun was just rising, and everything was calm. The children followed eagerly, hoping to see where the turtles had left their mark. The group walked quietly, using flashlights that shone with a soft red light. This way, they wouldn’t scare or confuse any turtles still nearby. Suddenly, someone pointed to the sand. There were turtle tracks!



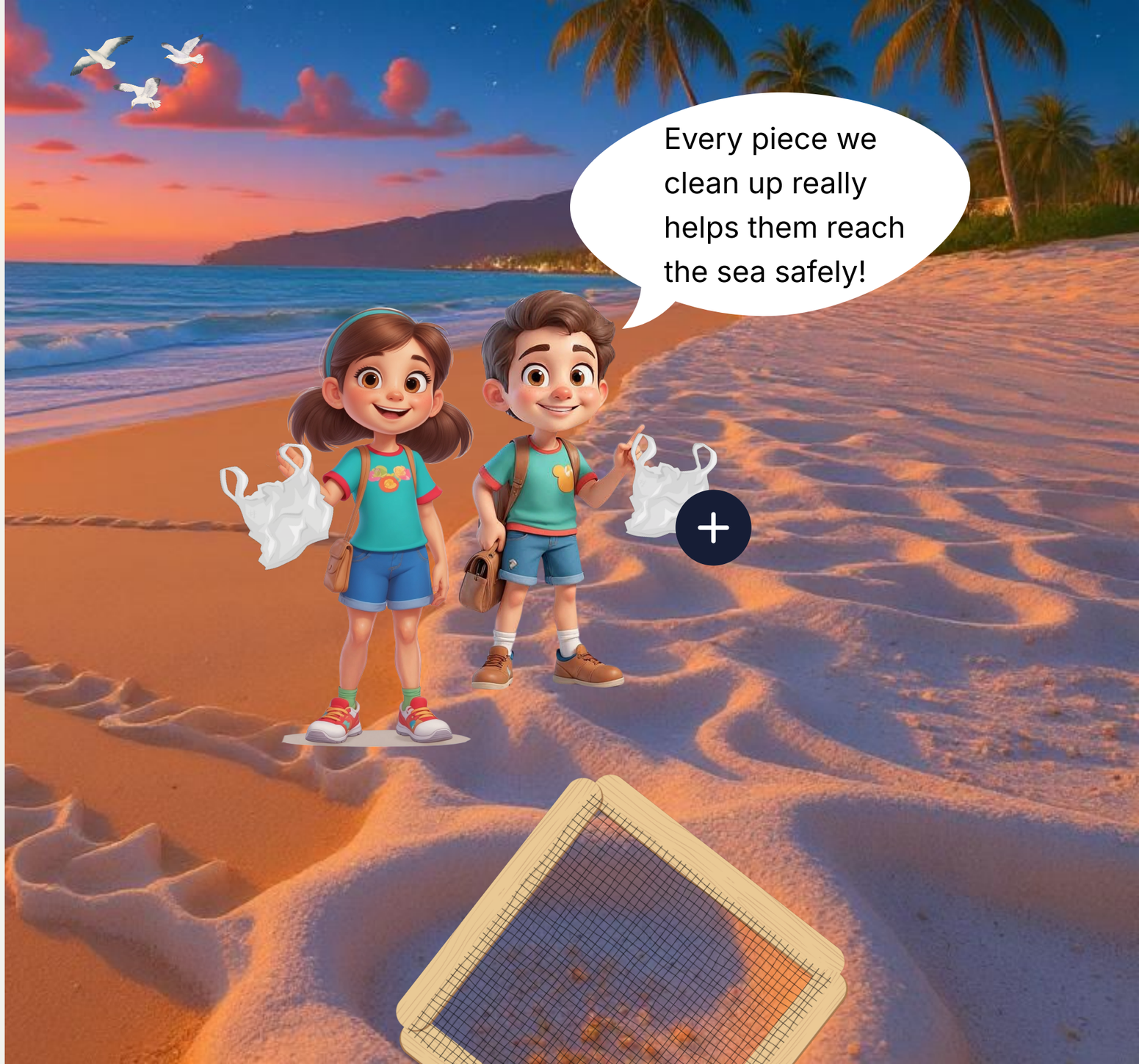
The team delicately placed a wooden frame and a mesh over the nest to protect it.



Then, the team covered a nearby streetlamp with a red cover. Sofia explained how, when the hatchlings are born, they look for the brightest natural light, usually the moon over the sea, which guides them to the water.



After the turtle patrol was done, Miguel and Isabel walked along the beach, picking up plastic. They had learned that small pieces of trash, like plastic bits or bottle caps, could be swallowed by turtles and make them sick. Bigger items, like nets or bags, could block their way and cost them a lot of energy. Even though the baby turtles wouldn’t hatch for weeks, the children were already helping to keep them safe.



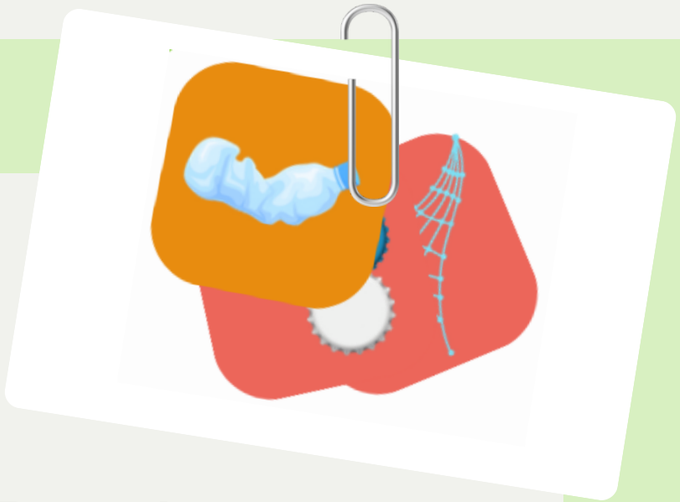
As the children were picking up the last plastic bag, Sofia called them over. She handed them a special Mission Pack, marked with the Turtle Guardians emblem. Inside were three tasks, just like the ones real volunteer teams do.




The hatchlings are counting on us.
Let’s work together.
We’ll need your help!

Activity 4

Mission sheet: Operation Beach Patrol



Team roles

Navigator

Opens the envelopes and shows the cards.

Recorder

Fills in the table with totals.

Counter

Checks numbers and compares hotspots.

Presenter

Explains the team's reasoning.

Download

Activity 4

Mission sheet: Operation Beach Patrol



Team roles

Navigator

Opens the envelopes and shows the cards.

Recorder

Fills in the table with totals.

Counter

Checks numbers and compares hotspots.

Presenter

Explains the team's reasoning.

Download

Activity 5

Mission sheet: Operation Safe Nest



Team roles

Navigator

Opens the envelopes and shows the cards.

Recorder

Fills in the table with risks and safety scores

Calculator

Adds up scores and compares nests

Presenter

Explains the team's reasoning.

Download

Activity 5

Mission sheet: Operation Safe Nest



Team roles

Navigator

Opens the envelopes and shows the cards.

Recorder

Fills in the table with risks and safety scores

Calculator

Adds up scores and compares nests

Presenter

Explains the team's reasoning.

Download


Great job, Turtle Guardians! You cleaned the beach, assessed the nests, and made the beach a safer place for the hatchlings!
Thank you for your help, team!

Antonio, Miguel, and Isabel stayed in Zakynthos for several weeks, offering their help as volunteers. They participated in beach cleanups, informed visitors about the importance of protecting the turtles, and helped prepare for the big moment: the baby turtles were about to hatch!

That night, they all went to the beach. The moon cast a soft silver path across the water, like a light guiding the turtles home. Suddenly, the sand began to move. Tiny heads poked through the surface.



One by one, the hatchlings emerged, scrambling toward the waves, leaving delicate trails in the sand. The family watched in awe until they saw one special baby turtle. A tiny, glowing moon-shape on its shell shimmered in the light, just like Luna’s.



As the little turtle slipped into the sea, the family stayed still, their eyes on the horizon. Miguel and Isabel looked out at the ocean, proud and inspired.

They knew this was only the beginning.





ENIGMATHICO

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