Science Week

Stage 3-4 Activity Booklet

Deep Blue: Innovation for the Future of our Oceans

Name: _____

If you complete this booklet you can ask for 5 hours in your Passport!
If you would like help ask your family for ideas to complete this booklet.

DID YOU KNOW

Whales are some of the biggest animals on Earth, and the **Blue Whale is the largest animal to have ever existed!**

Sometimes it is hard to imagine how big an animal is until you stand next to it. Even when we see large animals like **whales** in **photos** or **through binoculars**, they may not seem as big as they actually are!

Measure your height using a ruler (you may need someone to help).
Write your height here: _____

Draw yourself in the red box above the orca. Remember the Orca is 6m, so you should be less than 1/3 of its size.

Look at all the whales on the grid.

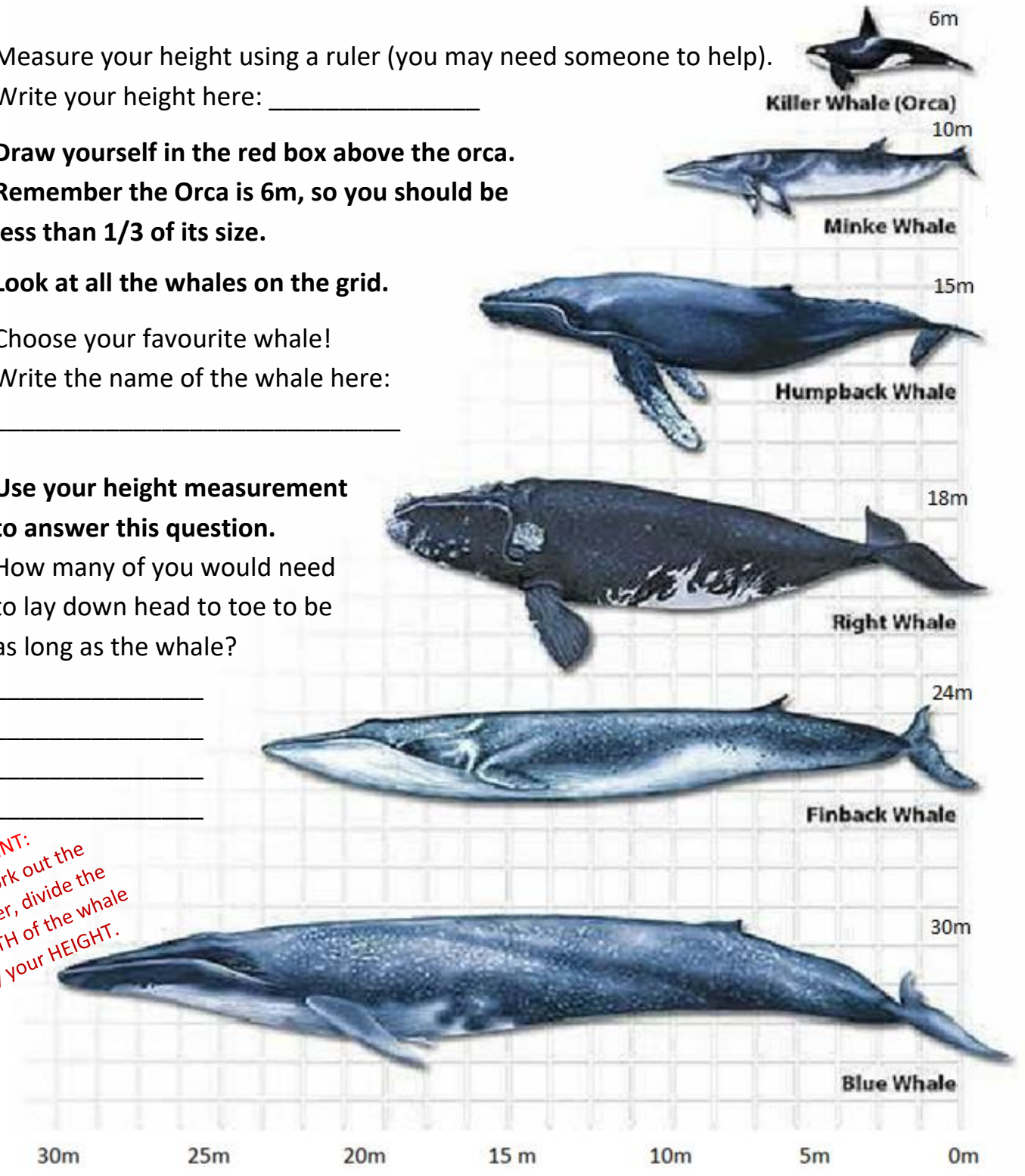
Choose your favourite whale!
Write the name of the whale here:

_____

Use your height measurement to answer this question.
How many of you would need to lay down head to toe to be as long as the whale?

_____
_____
_____
_____

HINT:
To work out the answer, divide the LENGTH of the whale by your HEIGHT.



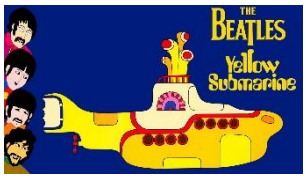
Oceans play an important part in controlling the **climate and weather**, as well as providing us with food, energy, fuels, minerals, routes for communication and transport and, of course, a large area for **recreation**!

The oceans and their wildlife have provided us **with myths and legends and subjects for stories, painting, music and poetry**.

Your challenge is **to design an exhibition piece for an underwater museum** inspired by a myth, song, painting or story. You can use the back of this page or create your piece on another piece of paper or cardboard!

Some suggestions are:

Yellow Submarine – The Beatles



The Little Mermaid – Hans Christian Andersen

Loch Ness Monster

The Kraken

Bermuda triangle

Atlantis

Jaws

Surfin' USA – The Beach Boys

Moby Dick – Herman Melville

The Great Wave of Kanagawa

Poseidon

Water Density Eggsperiment

Density is a measurement that compares the **amount of matter** an object has to its **volume**. An object with a lot of matter in a certain amount of volume has **high density**. An object with a little matter in the same amount of volume has a **low density**.

Think about the types of water you see around you each day. Fresh water, chlorinated water and salt water are all around Australia.



Your challenge is to see if salt affects the density of water?

What you will need:

- Salt
- Warm water
- 2 glasses or buckets of water
- 2 eggs

Method:

1. Fill one glass of water – about 2/3 full.

2. Drop an egg into the glass and observe what happens

3. Fill the other glass with water to the original level. Now add 3 tablespoons of salt and stir well.

What do you think will happen when you drop the other egg into this glass?

4. Drop the second egg into the saltwater and note down below what happened.

Next time you go swimming compare how much easier it is to float on your back at the beach then it is at the pool.

Take some photos or write your observations on the back of this page!

Observations or evidence

Animals that live in **very cold climates** need to keep warm by having **thick fur**, **insulating feathers**, or lots of **blubber**. Animals that live in the Arctic and Antarctic circles have around 30% of their bodies made up of stored fat to keep them from freezing. They can grow **VERY** big which helps to keep them warm.

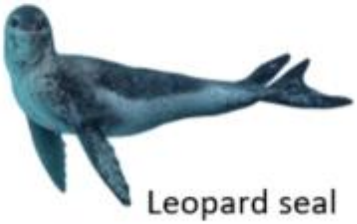
Look at the scale below. Pick a cold climate animal from the images below. *How many of you would need to sit on one side to balance the scale if this animal was on the other side?* Weigh yourself on a set of scales and use this measurement to help with the calculation below! Turn over and create a profile for this animal.

Which animal did you choose?	How much does it weigh in kg?	Your weight in kg	Divide the animal's weight by your weight to get the answer
_____	_____	_____	_____
_____			÷ _____
			= _____

DID YOU KNOW
The word **'Arctic'** comes from the Greek word **'arktos'** which means **bear.** Polar bears only live in the **Northern Hemisphere**, you won't find them in **Antarctica!**

Elephant seal
weight: 4000 kg

Polar bear
weight: 450



Leopard seal
weight: 350 kg

Walrus weight:
1000g

Orca weight:
5400 kg

Narwhal weight:
940 kg

Blue whale weight:
150,000 kg

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PHOTO OR DRAWING

Common name: _____

_____

Scientific name: _____

_____

Type of animal: mammal reptile

invertebrate fish

Description: _____

_____

_____

Length: _____

Weight: _____

Habitat: _____

_____

Diet: _____

_____

Life span / age: _____

Interesting facts: _____

_____

_____

_____

_____

_____

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Why do polar bears look white?

What colour is a polar bear? They look like they have white fur, which blends in with the snow and ice sheets they live on. Polar bears actually **have transparent** (see-through) fur, **so why does it look white?**

Polar bears have **hollow hairs**. When light from the sun travels through each strand of hair, it **gets bent around** and appears to be white. Their fur is double layered to keep them warm in the Arctic.

The **National Maritime Museum** has a great experiment to test this!

https://www.sea.museum/discover/apps-and-games/kids-craft/arts-and-crafts-blogs/polar-science-experiment-why-do-polar-bears-look-white

What You'll Need:

- A cup
- Water
- A sheet of paper with 2 arrows pointing the same direction

To Do The Experiment:

Place the sheet of paper with arrows upright
Place the glass in front of it.
Pour water to cover the first arrow

DID YOU KNOW

Polar bears have black skin and transparent fur? Their fur has no pigment but appears white due to bent light in the strand.

What has changed?

_____

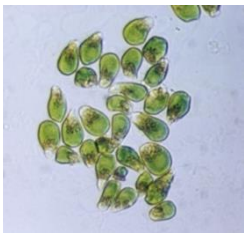
_____

_____

How does this happen?

Adding the water to the cup causes the light to bend and created visual illusions, like a flipped arrow and white polar bear hair!

Take photos, a video or drawing of your experiment as evidence to your CU coordinator!



DID YOU KNOW

About 70% of the oxygen in our atmosphere is produced by marine plants like plankton!

We know that a lot of the oxygen in Earth's atmosphere comes from **trees**. But are there other sources? **Yes! Plants in the ocean also photosynthesise and produce oxygen.** These plants in the ocean produce more oxygen than plants on land, and we breathe this in. There are **different types of plants in the ocean**, and they can be tiny phytoplankton or huge kelp!

One type of **phytoplankton** that produces tons of oxygen is called ***Prochlorococcus***. Millions of *Prochlorococcus* can fit in a single drop of

National Geographic have an activity which calculates **the number of breaths you take each day**, and **how many come from Prochlorococcus**! **Do the activity below,** and find more info with this link:

https://www.nationalgeographic.org/activity/save-the-plankton-breathe-freely/

Steps	Examples
Step 1 Measure the number of breaths you breathe in thirty seconds. Record your number below. Answer: _____ breaths in thirty seconds	10 breaths in thirty seconds
Step 2 Calculate the number of breaths you breathe in one minute. Answer: _____ (Answer from Step 1) × 2 = _____ breaths in one minute	10 × 2 = 20 breaths in one minute
Step 3 Calculate the number of breaths you take in one hour. Answer: _____ (Answer from Step 2) × 60 minutes = _____ breaths in one hour	20 × 60 = 1,200 breaths in one hour
Step 4 Calculate the number of breaths you take in one day. Answer: _____ (Answer from Step 3) × 24 hours = _____ breaths in one day	1,200 × 24 = 28,800 breaths in one day
Step 5 Calculate the number of your breaths that come from Prochlorococcus. Answer: _____ (Answer from Step 4) ÷ 5 = _____ breaths per day that come from *Prochloroccus*	28,800 ÷ 5 = 5,760 daily breaths come from Prochlorococcus

Cetaceans in culture and mythology

Whales and dolphins are part of a group of animals called Cetaceans. You say this word like 'seh-tay-shun'. The word **CETUS comes from Latin, meaning large sea creature**, and **ACEA means "of the nature of**". When you combine those two, the word means **"creature belonging to family of whales or dolphins".**

Whales, orcas and other dolphins are an important part of culture for many Indigenous peoples around the world. Orcas and whales are seen in belief systems, symbolism, art and storytelling from Polynesian peoples, Inuit peoples in Canada, Alaska and Northern Europe, Native American peoples in North America, Maori peoples in New Zealand and Aboriginal peoples in Australia.

Look up some stories, myths, beliefs and Dreaming stories about whales, orcas and dolphins from First Nations cultures around the world. You may like to find out more about these examples:

The Whale's Awakening, why the whale swims up and down the East Coast

The Kohola (whale) in Hawai'i

Old Tom and the Whalers of Eden, NSW.

Whales as kaitiaki (guides) in Maori traditions

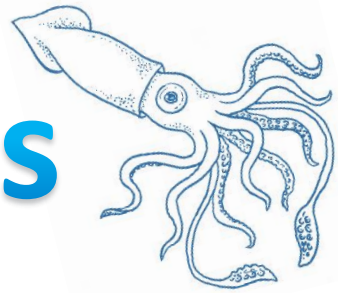
Natsilane, the Native American Tlingit Legend

Cooperative fishing between Aboriginal people and dolphins

Kwakiutl belief of hunters turning into Orcas

The Maori legend of Paikea, the Whalerider

Ocean Giants



Plants and animals of all shapes and sizes live in Earth's oceans. There are single celled organisms like **phytoplankton** and huge creatures like **sunfish.**

Use this website to look at the different types of ocean giants, from clams to crabs, and seals to squid!

https://www.businessinsider.com.au/comparison-of-the-biggest-animals-in-ocean-2015-1

Choose an animal from each of the four rows to research. Fill in the information below!

TOP ROW

Animal: _____

Length (m): _____

Bigger or smaller than you:_____

Where does it live: _____

What does it eat: _____

_____

SECOND ROW

Animal: _____

Length (m): _____

Bigger or smaller than you:_____

Where does it live: _____

What does it eat: _____

_____

THIRD ROW

Animal: _____

Length (m): _____

Bigger or smaller than you:_____

Where does it live: _____

What does it eat: _____

_____

FOURTH ROW

Animal: _____

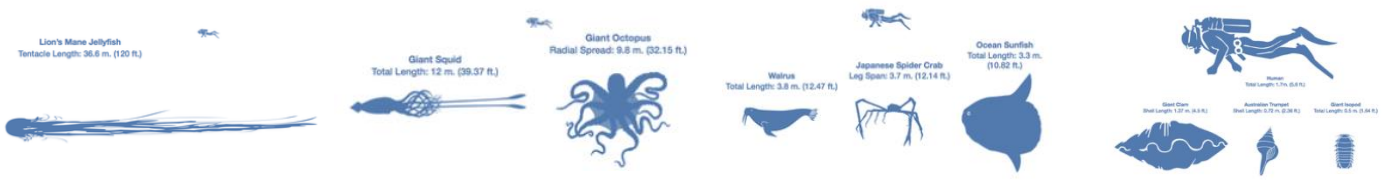
Length (m): _____

Bigger or smaller than you:_____

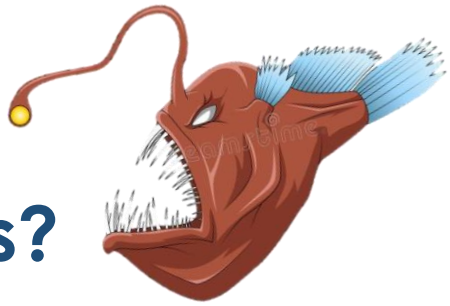
Where does it live: _____

What does it eat: _____

_____



What lives in the depths of our oceans?



Oceans hold up to **97% of the Earth's water**, that's around **1.35 BILLION TRILLION litres**! There **are five oceans across the plant**, and over **100 different seas**!

The ocean is divided into **5 different layers**, from top to bottom! These layers are called **ocean zones**. These zones are based on how far sunlight can travel from the ocean's surface. The zones are called; **Sunlight**, **Twilight**, **Midnight**, **Abyss** & **Trench**.

Watch 'How Deep Is The Ocean' to find out more about our oceans:
https://thekidshouldseethis.com/post/how-deep-does-the-ocean-go

Which zone gets the **most light** and which get the **least light**?

Most: _____

Least: _____

Can you find **two different species** that live in **each of the ocean layers**?

Sunlight: _____

_____

Twilight: _____

_____

Midnight: _____

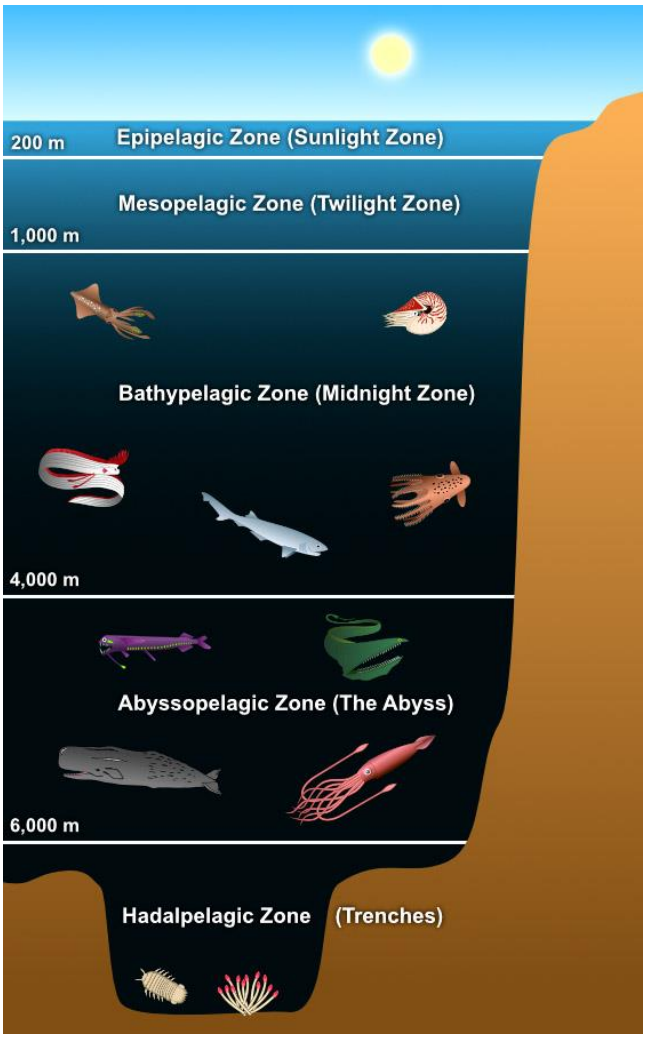
_____

Abyss: _____

_____

Trench: _____

_____



Make the ocean layers!

DID YOU KNOW

As the ocean gets deeper, it gets colder and has more pressure. The change in temperature and pressure means that fish and plants have had to adjust to living in those conditions. The bottom of the ocean is nearly freezing!

For this activity you will need:

-Empty toilet paper roll
-Colouring pencils
-Blue textas or paints (5 different shades)
-Scissors
-A4 piece of paper
-Glue

1. Using the blue colouring textas, colour the toilet paper in 5 different sections like the photo below.
2. Label each zone in the correct order (from top to bottom) next to a different shade of blue – **Sunlight, Twilight, Midnight, Abyss and Trench**
3. On the white paper draw the ocean species you listed from above.
4. Once you have finished cut and paste them into each of their zones.
5. Don't forget to take a photo or bring it in to your CU coordinator!

You may like to use this Ocean Zones poster by Rie Koishi to help you draw the animals! Follow the link or google "A2 Ocean Zones Poster"

https://i.etsystatic.com/20535210/r/il/03c13f/1931376232/il_1588xN.1931376232_o8e7.jpg

The Arctic Ocean

The Arctic Ocean is located in the **Northern Hemisphere** and is closest to Russia, Norway, Iceland, Greenland, Canada, and the United States (Alaska). And yes, it's also home to the **North Pole**! The Arctic Ocean is the smallest of the world's five oceans, the shallowest and the coldest. It is covered in ice all winter long!

Can you circle which 5 animals you think would call the Arctic Ocean home?

Polar bears

Seals

Arctic foxes

Dolphins

Crocodiles

Turtles

Walruses

Whales

Fill in the blank with the words below!

Drifting Sea Ice **Midnight Sun** **- 40 degrees Celsius** **Polar Night** **50%**

- The Arctic Ocean is almost entirely covered in ……during the winter
- In summer …… per cent of the Arctic Ocean remains frozen
- Temperatures in the Arctic can reach as low as……..
- In the Arctic, there are periods of at least 24 hours when the sun doesn't go down. This is called ……..
- In the winter, there are also periods of at least 24 hours during when the sun doesn't rise. This is called ……..

DID YOU KNOW

The North Pole has 163 days of total darkness (polar night) and 187 days of midnight sun each year. Midnight sun means that the sun doesn't set AT ALL for 24 hours!

If the arctic is so cold how do animals stay warm? Let's find out.

What you need:

- large bowl filled with ice water
- sticky tape
- butter – 5 tablespoons
- spoon
- zip- lock bag

1. Place your bowl with cold water and ice next to you.
2. Using the spoon, add 5 tablespoons of butter into the zip-lock bag.
3. Next place one hand into that bag and massage the butter so that it is spread evenly over your hand. **Don't take your hand out of the bag!** This is your **blubber glove**.
4. Make sure the bag stays secure by taping the zip-lock bag around your wrist.
5. Stick your bare hand into the icy water first, to get an idea of how cold the water is. Then stick your covered hand with the new blubber glove into the water bowl of water.

Did your two hands feel the cold water differently? What was different?

_____

_____

_____

_____

You'll notice that the 'butter glove' doesn't feel as cold. This is because butter is similar to polar species blubber that keeps them warm!

Ecotourism lets people enjoy the natural environment in a safe and sustainable way. Coral reefs are one fantastic environment you can visit to snorkel, dive, swim and walk through beautiful ecosystems!

These animals can all be found on coral reefs around Australia. Use books or the internet to fill in their *scientific* or common name. On the back page create a profile for one of these animals OR pick your own animal to research.

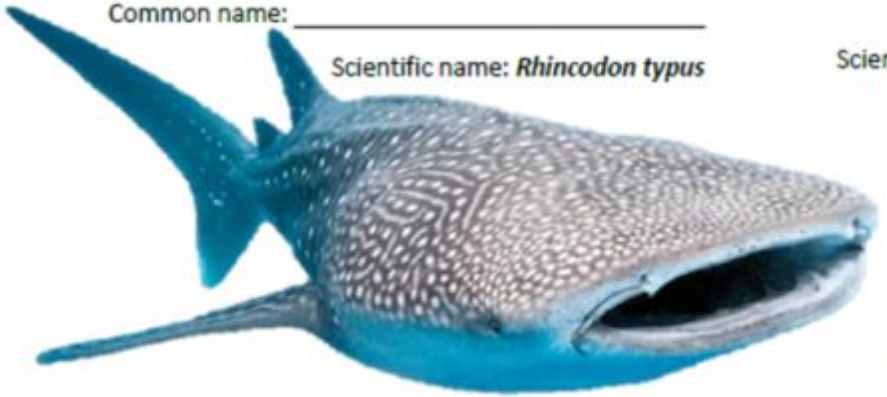
DID YOU KNOW

The whale shark is the **largest fish** in the ocean. This shark is a filter feeder and doesn't have teeth.

Sea snakes are a type of **marine reptile.** There are 55 species of sea snakes. All species of sea snakes very are venomous and should **never** be touched.

Common name: _____

Scientific name: ***Rhincodon typus***



Common name: **Green sea turtle**

Scientific name: _____

Common name: _____

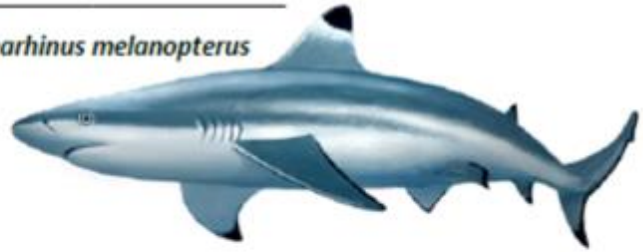
Scientific name: ***Thaumoctopus mimicus***

Common name: **Yellow-bellied sea snake**

Scientific name: _____

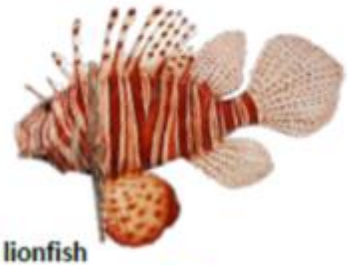
Common name: _____

Scientific name: ***Carcharhinus melanopterus***



Common name: _____

Scientific name: ***Chlorurus strongylocephalus***

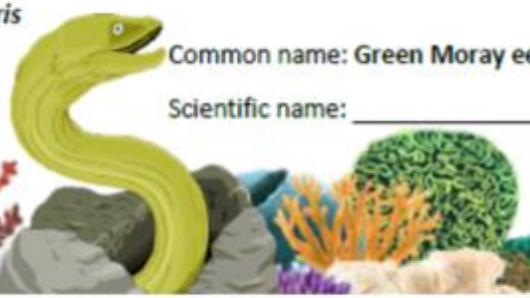


Common name: _____

Scientific name: ***Amphiprion ocellaris***

Common name: **Green Moray eel**

Scientific name: _____



Common name: **Common lionfish**

Scientific name: _____

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PHOTO OR DRAWING

Common name: _____

_____

Scientific name: _____

_____

Type of animal: mammal reptile

invertebrate fish

Description: _____

_____

_____

Length: _____

Weight: _____

Habitat: _____

_____

Diet: _____

_____

Life span / age: _____

Interesting facts: _____

_____

_____

_____

_____

_____

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The Great Barrier Reef is **the largest reef system in the world**! It takes up and area of 344,400 km squared (that's **70 million football fields!!!**).

Each year 2 million people visit The Great Barrier Reef and the surrounding islands. Have you ever been to **The Great Barrier Reef**? Would you like to go there one day? Maybe you will like to swim with turtles or sharks, or look at the shells washed up on the islands.

DID YOU KNOW

The Great Barrier Reef is the largest living structure on Earth! It stretches 2300 km down the eastern coast of Australia.

Follow Sir David Attenborough through an exploration of The Great Barrier Reef aboard the Alucia research and media vessel!

https://attenboroughsreef.com/

You can do Virtual Reality dives, get to know the crew aboard the Alucia and learn about the different issues facing the reef. Make sure you listen to the introduction to maximise your experience.

Write down 5 new things you've learned!

1. _____

2. _____

3. _____

4. _____

5. _____

Sea Turtles

There are seven species of sea turtles: Green Sea, Olive Ridley, Hawksbill, Flatback, Loggerhead, Kemp's Ridley and Leatherback. Sea turtles spend their whole lives in the ocean, **except for when they hatch on the beach or come back to lay their eggs.**

Turtles are fantastic swimmers, and can hold their breath for **five hours underwater**.
Sea turtles can live to **be 100 years old and some even grow to be 700kg**!
Sea turtles are different to other types and **can't** hide in their shells.

Turtles are known as the ocean's lawn mower because they eat seagrass. **Look up some other things that sea turtles eat and write or draw them below:**

_____

_____

DID YOU KNOW

Sea turtles are a species of marine reptile. Sea turtles have been around for 110 million years, that's since the dinosaurs!

PLASTIC IN THE SEA...

WHERE IT SHOULDN'T BE

Create an art work that you can display in your school that raises awareness of plastic pollution in our oceans!

The art work must encourage friends, families and students to USE LESS PLASTIC. You might challenge them to cut down on plastic use for ONE WHOLE DAY!

How can you use less plastic? Here are some ideas:

- Paper straws instead of plastic
- Reusable containers for your packed lunch
- Reusable drinks bottles
- If you like ice-cream, have it in a cone, not a plastic cup
- Party bags – homemade treats instead of plastic toys

Your art work could be:

- A poster that shows the dangers to marine life...
- Leaflets or flyers that students can take home and share with their families and friends...
- A video telling your friends where can get help if they find an animal in distress...

HINT:

Find out more about your **local wildlife rescue organisations** and put their contact details on your art work so others will know who to contact for help with a sick, injured or stuck animal!

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Across

1 The zone in the ocean where light doesn't reach

3 Largest species of dolphin (also called a killer whale)

4 Largest animal on earth

6 Largest species of penguin

7 East Australian _____

11 The deepest part of the ocean is called Mariana _____

14 Great _____ Reef

Down

2 Yeti Crabs live on _____ vents

5 whales that filter feed are _____ whales

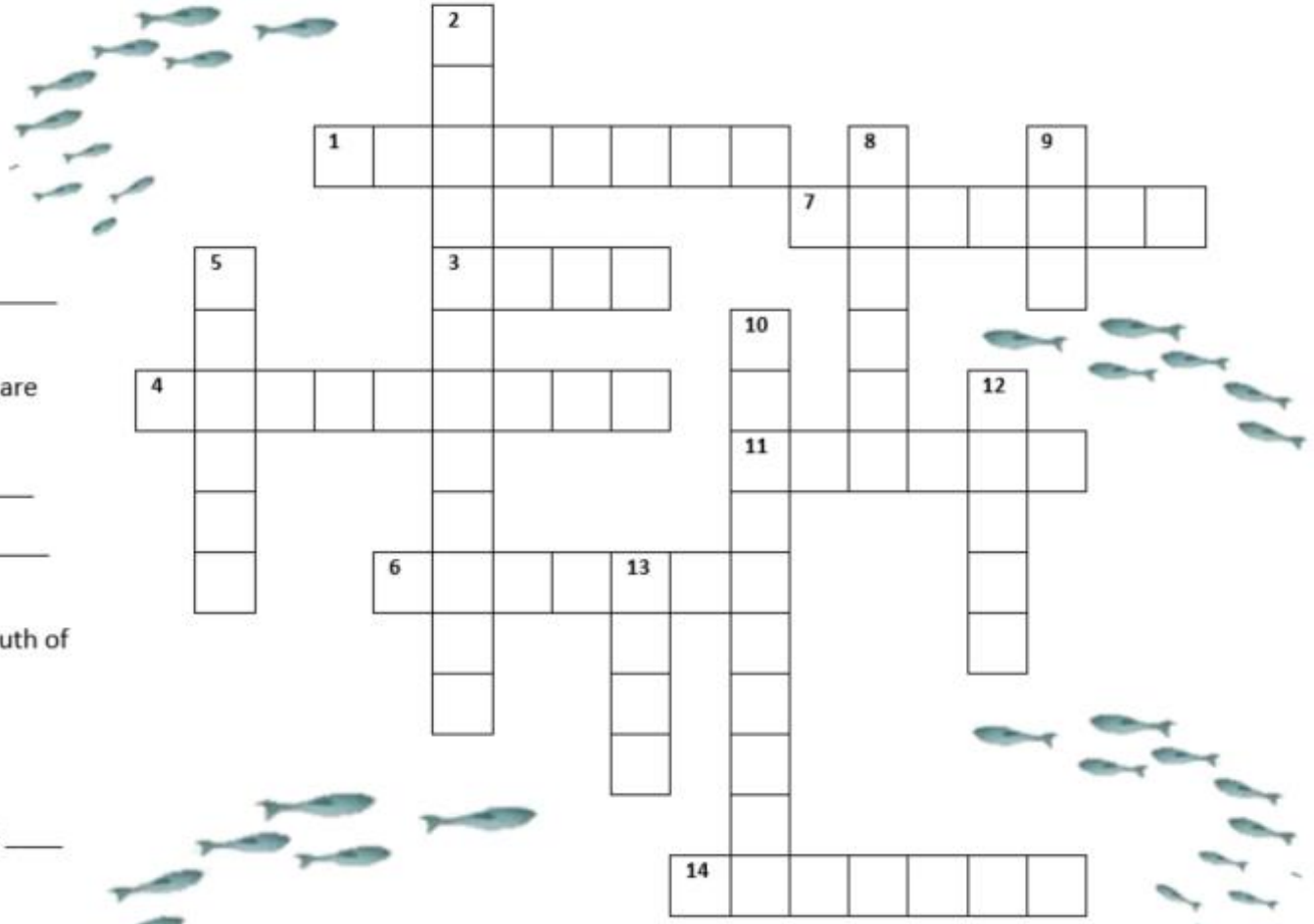
8 Green Sea _____

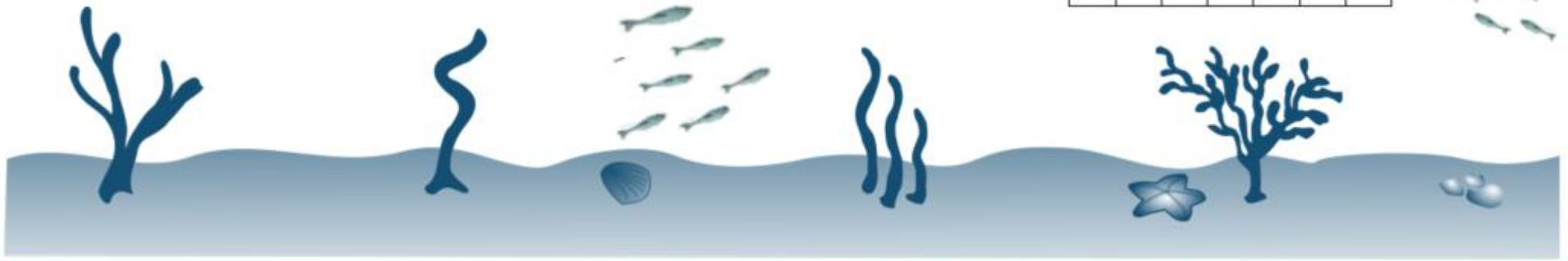
9 Stingrays live on the _____ floor

10 The cold landmass south of Australia

12 Pacific _____

13 Located off Western Australia is the Ningaloo ____





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Under the sea

Much of the ocean is undiscovered but with **new technology** we are able to dive deeper and spend longer in the deepest parts of the ocean.

Dr Sylvia Earle and **James Cameron** are two people who have created **submersibles** which take people down into the deep ocean to study different species and their surroundings.

Follow this website to learn more about the **Deep Sea Challenger**. It has reached the bottom of the Mariana Trench!
http://divemagazine.co.uk/kit/6723-10-facts-about-deepsea-challenger

Follow this website to learn more about being a deep sea **submersible pilot**!
https://www.nationalgeographic.org/article/deep-sea-submersible-pilot-erika-bergman/

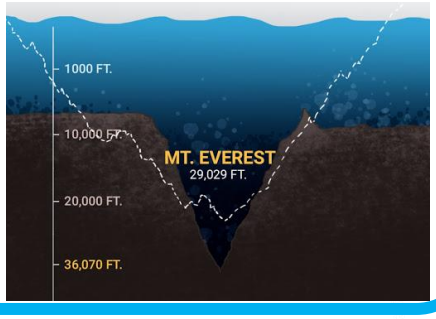
Pick one of these tasks to do:

1 **Design a new submersible** to dive down into the ocean. Give your invention a name and describe how it works.

2 **Write a song or poem** about what you might see around you if you were on the bottom of the ocean, or how it might feel to be there with new undiscovered species. You can add drawings or create some music too!

DID YOU KNOW

The deepest part of the ocean is the Mariana Trench. This trench is deeper than Mount Everest is tall. Mount Everest is 8848 metres high, and the Mariana Trench is 11034 metres deep! Watch this video to see how deep that really is! https://www.youtube.com/watch?v=Y2tm40uMhDI



Design your own submersible, or write your own song!

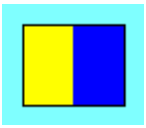
People use the oceans now more than ever in history. We have ships and boats for transporting people, transporting items, military use, and for leisure and fun!

Ocean vessels, lighthouses and ports use signal flags to communicate with each other. The International Code of Signals is used by most people. Each flag has a different meaning, and combing two flags will mean something different again.

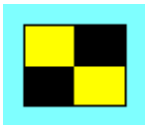
These are some examples of Signal Flags:

C – Charlie - affirmative / yes

N – November – negative / no

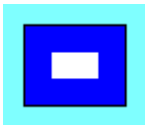


K - Kilo – I wish to communicate



L – Lima - you should stop

O - Oscar- man overboard



P – papa- the *Blue Peter* - all aboard

Y – Yankee - I am dragging my anchor

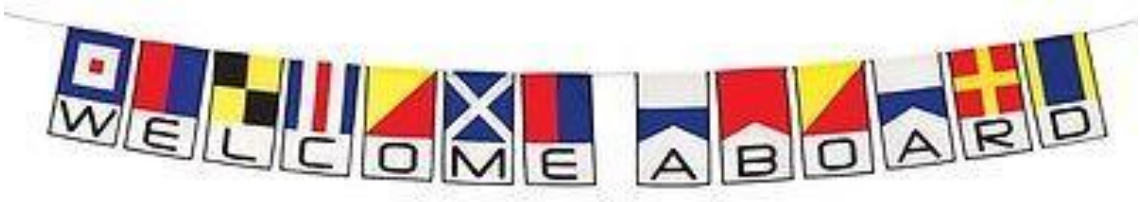
Z – Zulu – I require a tug

DID YOU KNOW

A ship with all of its signal flags hoisted is called "dressed overall". This is done as a celebration!

Use the template on the next page to create your own Signal Flags for your house, family, class or friend group! You can use the International Code of Signals to get some ideas.

You might like to create a flag that means **"dinner time", "I am taking the dog for a walk", "it's raining", "the footy is on", "my homework is finished", "it's my birthday"**



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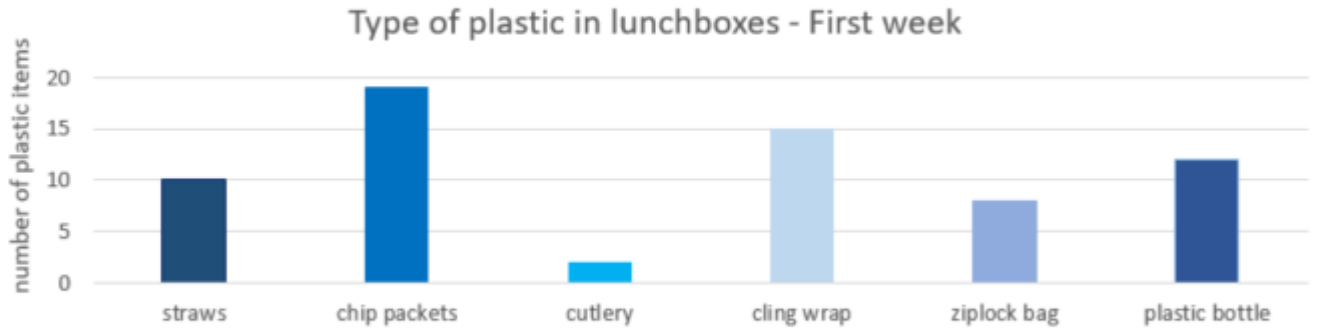
Reducing Plastic Waste in your Lunchbox

Ask your teacher if you can **survey students in your class** to find out **how many things in their lunch boxes are wrapped in plastic packaging.**
Create a chart to show the amount of plastic that is used. You might have categories such as clingwrap, plastic straws, chip packets, plastic cutlery.
Use the chart below to help create your own.

Then ask your class to find out **other ways** they could wrap their food i.e. wraps that can be reused; paper bags; paper straws.

One week later survey your class to find if there has been a reduction in the amount of plastic that is being used in their lunch boxes!

Has there been a increase or a decrease in the amount of plastic wrapping? Work out if the percentage of plastic used has decreased, increased or stayed the same!



DID YOU KNOW

80% of rubbish in the ocean comes from **land based sources**. Plastic bottles, chip packets and plastic bags enter the ocean from **people dropping rubbish at the beach** and **rubbish being blown off rubbish tips into drains** which lead to the ocean. The other **20%** comes from **lost or discarded fishing gear** such as nets, fishing lines and floats.

Draw or glue your charts on this page!

Make a marine animal and habitat card game!

Look at the habitats on this page. Find out **one** animal that lives in **each different** environment. That will be **12 different animals**!
On the next page, write or draw each animal that lives in the habitats, so you have a set of animal cards and a set of habitat cards!

Kelp forests

Anemone

Seafloor

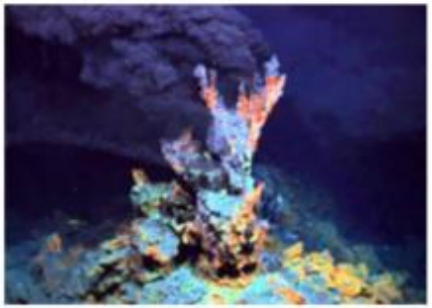
Coral reef

Open ocean

Lake / Estuary

Iceshelf - Northern Hemisphere

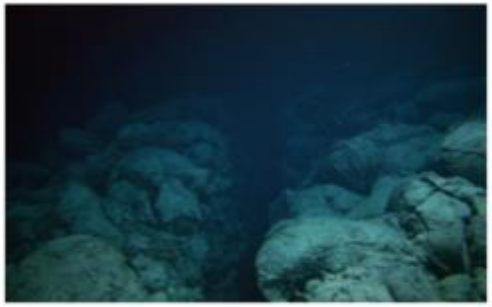
Hydrothermal vents



Iceshelf - Southern Hemisphere

Rock platform

Trench



Seagrass beds

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BACK OF CARDS

Cut out the cards and test your family and friends! **Show them all the cards** and see if they can **match the animal to the correct habitat**! **Remember to write down which animal goes with which habitat somewhere else so you can tell them the right answer. You could make it two animals per habitat for a challenge!**

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BACK OF CARDS