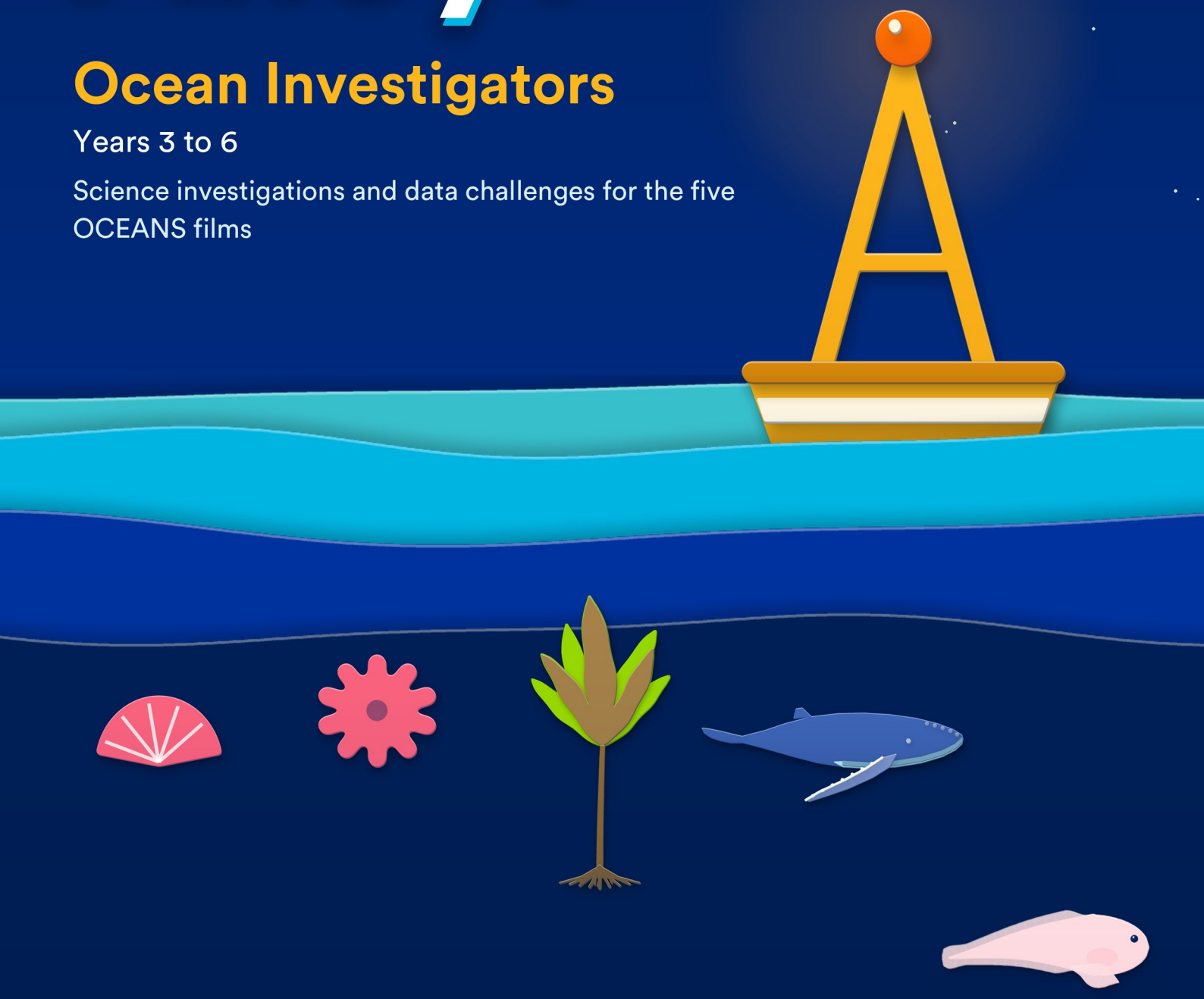
Buoy Ahoy!

Ocean Investigators

Years 3 to 6

Science investigations and data challenges for the five OCEANS films



Made by Scitech Digital Content

an OCEANS series

Teacher Notes

Each film has two pages. The investigation is a hands-on fair test that uses everyday classroom things. The data and thinking page uses the real numbers from the film. Watch the film first; the games make a good warm-up or reward.

Curriculum links

Western Australian Curriculum: Science (mandated content for implementation in 2026), Science Understanding.

Year 3 Earth and space sciences (Coast): "Soils, rocks and minerals are important Earth resources, and are used by humans and other living things in different and interconnected ways"

Year 3 Chemical sciences (Polar): "The observable properties of solids and liquids; how adding or removing heat leads to a change of state"

Year 4 Earth and space sciences (Coast): "Weathering, erosion, transportation and deposition cause slow or rapid change to Earth's surface"

Year 4 Biological sciences (Kelp Forest, Polar): "Producers, consumers and decomposers have roles within an ecosystem and interact in ways that can be represented by food chains"

Year 5 Biological sciences (Kelp Forest, Deep Ocean): "Living things have structural and behavioural adaptations that enable their survival in their environment"

Year 5 Physical sciences (Polar, Deep Ocean): "Light energy travels from a source in a straight path and can be absorbed, reflected, refracted, form shadows and be sensed"

Year 6 Biological sciences (Coral Reef, Kelp Forest): "The growth and survival of living things are affected by the changing conditions in their environment and the influence of human activities"

Year 6 Earth and space sciences (Coral Reef): "The effect of sudden geological events on Earth's surface, such as tsunamis, earthquakes and volcanic eruptions, and extreme weather, such as cyclones, extreme heat and floods"

Answers

Coast: One pool is about 150,000 ÷ 60 = 2,500 cubic metres. Survey answers depend on the sample.

Coral Reef: 6/10 = 60%. (The survey behind the film found more than 60% of corals had died at eight sites in Ningaloo's northern lagoon.) The algae share food made with sunlight and give the coral much of its colour; without them the coral turns white (bleaching) and can't get enough food. Spawning nights depend on next year's full moon dates. The tiles let scientists find the same young corals again and check how they grow. The 3,000 is not how many survived: the rest were released onto the reef.

Kelp Forest: Seaweed is the producer; abalone and anything that eats abalone are consumers. Octopus, rock lobsters, some fish and people eat abalone. More than 70 days (ten weeks is 70 days). Perth to Sydney by road is about 3,850 to 4,050 km depending on the route, so there and back is about 7,700 to 8,100 km, close to 8,000 km.

Polar: 9/10 = 90%. Food chain: algae → krill → humpback whale. Double 7.7 million is 15.4 million square kilometres. (The sea ice reaches more than double Australia's area at its winter peak.) North to south: Camden Sound (Kimberley), Broome, Shark Bay, Perth, Southern Ocean. (Australia's area, about 7.69 million square kilometres, is from Geoscience Australia, not the film.)

Deep Ocean: 8,336 m = 8.336 km. 9,000 − 8,849 = 151 m. 3/4 = 75%, so about 15 of 20. (Everest's height is not from the film.)

Safety

Never look at the Sun. Mop up spills straight away in the Beach in a Tray test. No torches in eyes during Into the Dark. One straw per child; don't share straws. Sweep up spilled rice or paper dots at the end so nobody slips, and put the rice back in a container.

Sources

Coast: WA Department of Transport, Coastal Erosion Hotspots (2019); Baird Maritime, Port Beach sand nourishment project (1 July 2022).
Coral Reef: ABC News, Ningaloo coral mortality survey by Curtin University (19 Nov 2025); Marine Technology News, Millions of coral larvae released at Nyinggulu (9 June 2026, WAMSI trial); Bureau of Meteorology, Severe Tropical Cyclone Narelle (2026); DPIRD Marine Waters, Eggs in the sea (coral spawning).
Kelp Forest: Wernberg et al., Nature Climate Change (2013); Wernberg et al., Science (2016) and UWA news; Bennett et al., Marine and Freshwater Research (2016), the Great Southern Reef; Vranken et al., Scientific Reports 15: 5019 (2025), kelp recovering at Port Gregory.
Polar: NSIDC, Antarctic sea ice maximum 2026 (third lowest on record); NSIDC, sea ice albedo; Australian Antarctic Division, extent of Antarctic sea ice.
Deep Ocean: University of Western Australia and Guinness World Records, deepest fish (2023); MBARI, bioluminescence in deep-sea animals.
Curriculum: School Curriculum and Standards Authority, Western Australian Curriculum: Science, scope and sequence for implementation in 2026.

Beach in a Tray

Coast | Film: Buoy Ahoy! Coast | Game: What's in the Sand?



Our question

How do waves move sand, and can adding sand help protect a beach?

You need: A shallow tray or tub, sand, water, a jug, a ruler, a few small stones (optional)

What to do

1. Pile sand at one end of the tray to make a sloping beach. Pour water into the other end until it is about 2 cm deep.
2. Measure how far the dry beach reaches from the end wall. This is the beach width.
3. Make 20 gentle waves by dipping a ruler up and down at the water end. Measure the beach width again.
4. Rebuild the plain beach, then make 20 strong storm waves. Measure again. Look for where the sand ended up.
5. Rebuild the beach with extra sand (like the dredge did), then with a row of stones. Each time, make the same 20 storm waves, measure and compare.

Fair test: Change one thing at a time. First compare gentle and storm waves on a plain beach. Then change the protection (none, extra sand or stones) and use the same storm waves each time. Keep the tray, the sand, the water depth and the number of waves the same.

Safety: Mop up spills straight away.

Our results

Beach and waves	Width before (cm)	Width after 20 waves (cm)	Change (cm)
Plain, gentle waves			
Plain, storm waves			
Extra sand, storm waves			
Stones, storm waves			

Think about it

- Which waves moved more sand? Where did it go?
- How is your tray like Port Beach in a winter storm?
- Which protection worked best? Would it work on a real beach?

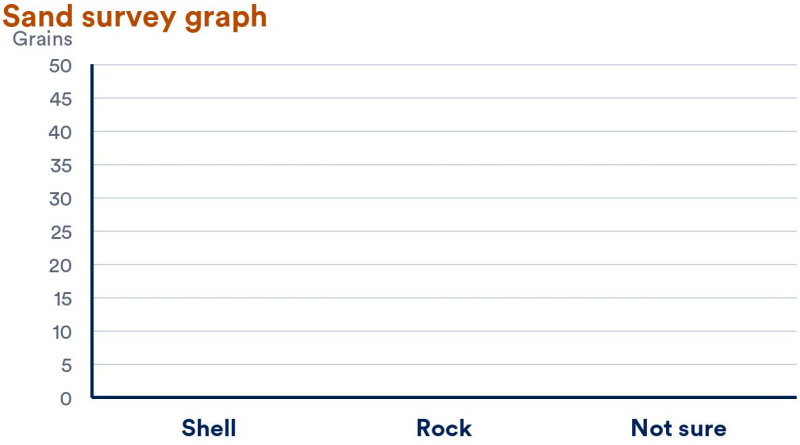
Curriculum link: Year 4: weathering, erosion, transportation and deposition.

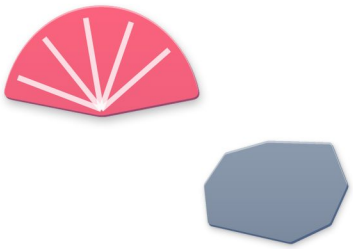
Port Beach by the Numbers

From the film

- In 2019, a report named Port Beach one of the two WA beaches most at risk.
- The State Government gave $3.25 million to help.
- The plan was to bring up to 150,000 cubic metres of sand. That is enough to fill about 60 Olympic swimming pools.

Sand survey graph





Your turn

1. If 150,000 cubic metres of sand fills about 60 pools, about how much sand fills one pool?

2. Sand survey: count 50 grains from a sand sample. How many are shell and how many are rock? Write each as a fraction and a percentage.

3. Draw a bar graph of your sand survey on the grid.

4. The City of Fremantle, Fremantle Ports and the Department of Transport worked together. Why might a port and a council both want this to work?

5. Winter storms carry sand away and summer waves often push some back. Predict what Port Beach might look like in July and in January.

Will the Coral Babies Hold On?

Coral Reef | Film: Buoy Ahoy! Coral Reef | Game: Reef Thermometer

Our question

Does the surface of a tile change how many coral babies stay put in a storm?

You need: Three 'tiles': a smooth plastic lid, a piece of paper and a piece of rough fabric or sandpaper. Hole-punch paper dots or rice (coral babies), a drinking straw, a ruler

What to do

1. Put 20 coral babies on each tile.
2. Hold the straw 10 cm from the tile, level with the surface.
3. Give three strong puffs. This is the cyclone.
4. Count how many coral babies are still on the tile.
5. Repeat three times for each tile and work out the average.

Fair test: Keep these the same: the number of babies, the distance, the number of puffs and the person puffing.

Safety: One straw per child. Sweep up spilled rice or paper dots so nobody slips.

Our results

Tile surface	Trial 1	Trial 2	Trial 3	Average
Smooth lid				
Paper				
Rough fabric				

Think about it

- Which surface held on best? Why do you think that is?
- In March 2026, Cyclone Narelle hit Ningaloo. Afterwards lots of the real tiles were still there. What could make a tile good at holding on?
- What else, besides storms, can make it hard for young corals to survive?

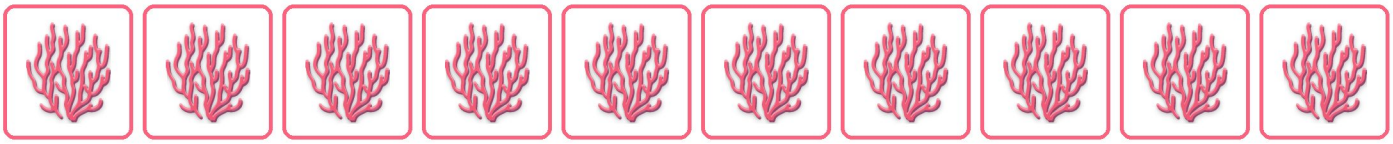
Curriculum link: Year 6: growth and survival affected by changing conditions. Year 6: extreme weather such as cyclones and extreme heat.

Reef in Hot Water

From the film

- Each coral is made of lots of tiny animals called polyps. Algae living inside them use sunlight to make food and share it.
- In 2025 the sea along WA's coast got far too hot for a long time. In one part of Ningaloo, about six out of every ten corals scientists checked had died.
- Coral spawning happens over a few nights in March or April, about a week or so after the full moon, after dark.
- The film says scientists raised hundreds of thousands of coral babies. The real number at Exmouth was about 800,000. Just over 3,000 settled on small tiles, including Polly, and the rest were released straight onto the reef.

Shade the bar: six out of every ten corals



Your turn

1. Write 'six out of every ten' as a fraction and as a percentage. Shade the coral bar to show it.

2. What does a coral get from its algae? What happens to the coral when the algae leave?

3. Use a moon calendar for next March. Which nights might Ningaloo's corals spawn?

4. About 800,000 coral babies were raised. Just over 3,000 settled on tiles, and the rest were released straight onto the reef. Why do you think scientists put some coral babies on tiles they can find again?

5. The film says the ocean needs to stop getting hotter for reefs to stay healthy. List two ways people are working on that.

Ocean Investigators | Years 3 to 6

Stand Up Straight

Kelp Forest | Film: Buoy Ahoy! Kelp Forest | Game: Reach for the Sun



Our question

Which stipe shape holds Goldie's blades up best?

You need: Three identical paper strips (about 4 cm by 20 cm), sticky tape, paper clips, Blu Tack, a ruler

What to do

1. Make three stipes from identical strips: one left flat, one folded in half along its length, one rolled into a tube and taped.
2. Stand each one upright in the same-sized lump of Blu Tack. That is the holdfast.
3. Hook paper clips onto the top one at a time. These are the blades.
4. Count how many clips each stipe holds before it bends over.
5. Repeat three times and work out the average.

Fair test: Keep these the same: the paper, the size of the strips, the Blu Tack and the clips.

Our results

Stipe shape	Trial 1	Trial 2	Trial 3	Average
Flat				
Folded				
Rolled tube				

Think about it

- Which shape was strongest? Why?
- Some kelp have little air balloons to help them float. Goldie doesn't. What holds her up instead?
- How does each part of Goldie (holdfast, stipe, blades) help her survive?

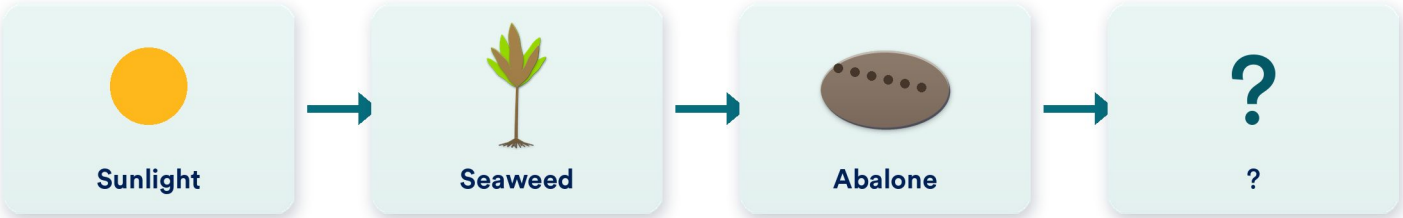
Curriculum link: Year 5: structural adaptations that enable survival. Year 4: producers and consumers in food chains.

Goldie's Forest

From the film

- Kelp forests stretch along more than 8,000 km of coast, about as far as driving from Perth to Sydney and back. Together they are called the Great Southern Reef.
- In early 2011, for more than ten weeks, the sea off WA stayed more than two degrees warmer than normal.
- Along about 100 km of coast, the kelp forests disappeared. Warm-water fish then nibbled young kelp, making it harder to grow back.
- Abalone, a kind of sea snail, munch on bits of seaweed that drift by.

Food chain



Your turn

1. Finish the food chain: Sunlight → seaweed → abalone → ? Research what eats abalone.

2. Which living thing in your food chain is the producer? Which are consumers?

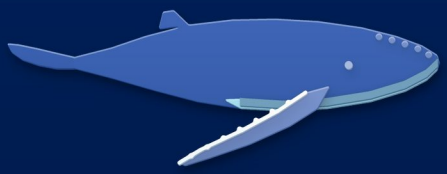
3. How many days is 'more than ten weeks'? Why might a long heatwave be worse than a short one?

4. Use a map or online tool to check how far it is to drive from Perth to Sydney. Does 'there and back' match 8,000 km?

5. People who spot a fish a long way from home can tell scientists. Design a fish-spotting record card. What should it ask?

Earth's Sun Hat

Polar | Film: Buoy Ahoy! Polar | Game: Keep it Cool



Our question

Does a white surface or a dark surface warm up more in sunlight?

You need: Two identical cups with the same amount of water, white paper, black or dark paper, sticky tape, a thermometer if you have one, a sunny spot, a timer

What to do

1. Wrap one cup in white paper and one in dark paper.
2. Measure the starting temperature of the water in each cup.
3. Put both cups side by side in the sun.
4. Measure each cup every 10 minutes for 30 minutes. No thermometer? Feel the water with a finger and rank them.
5. Graph your results.

Fair test: Keep these the same: the cups, the amount of water, the starting temperature and the sunny spot.

Safety: Never look at the Sun.

Our results

Time (minutes)	White cup (°C)	Dark cup (°C)
0		
10		
20		
30		

Think about it

- Which cup warmed up more? Why?
- How is the white cup like sea ice, and the dark cup like open ocean?
- Sea ice grows in winter and melts in summer. What does adding or removing heat do to water?

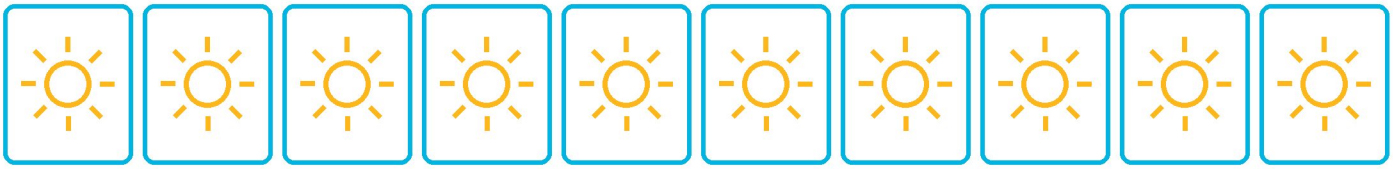
Curriculum link: Year 5: light can be absorbed and reflected. Year 3: adding or removing heat changes state (sea ice freezing and melting).

Sea Ice, Krill and Whales

From the film

- Bright white snowy ice bounces up to nine out of every ten parts of the sunlight that hits it back into space. Dark open ocean soaks up almost all of it.
- Every winter the sea ice around Antarctica grows until it covers an area more than twice the size of Australia.
- Algae grow on the bottom of the ice. Baby krill nibble the algae through the winter. Humpback whales eat krill.
- In 2026 scientists measured one of the smallest winter amounts of sea ice ever recorded.

Shade the bar: nine out of every ten parts of sunlight bounce back



Your turn

1. Write ‘nine out of every ten’ as a fraction and as a percentage. Shade the bar to show it.

2. Draw the food chain from the film: algae → ? → ?

3. What could happen to whales like Willa if there is less sea ice?

4. Australia covers about 7.7 million square kilometres. What is double that?

5. Willa swims from the Kimberley to the Southern Ocean. Put these places in order from north to south and mark them on a map: Perth, Camden Sound (in the Kimberley), Shark Bay, Broome.

Ocean Investigators | Years 3 to 6

Into the Dark

Deep Ocean | Film: Buoy Ahoy! Deep Ocean | Game: Glow Hunter



Our question

How does light change as it travels deeper through the ocean?

You need: A torch, a stack of tissue paper or baking paper sheets (each sheet is a layer of ocean), a white card, a dark room

What to do

1. Darken the room. Hold the torch a set distance from the white card.
2. Shine the torch through one sheet onto the card. Rate the spot: 3 bright, 2 dim, 1 faint, 0 can't see it.
3. Add sheets and rate the light at 1, 2, 4, 6, 8 and 10 sheets.
4. Stop when you can no longer see the light. Record how many sheets it took.
5. Extension: does the colour of the light change as you add sheets?

Fair test: Keep these the same: the torch, the distance to the card and the type of paper.

Safety: No shining torches in anyone's eyes.

Our results

Number of sheets	Brightness (0 to 3)	What we noticed
1		
2		
4		
6		
8		
10		

Think about it

- What happened to the light as you added layers?
- The film says it gets darker than the darkest night. Why might so many deep sea animals make their own light?
- Extension: the camera had no rope. It sank on its own and later dropped heavy weights to float back up. Which force pulls it down?

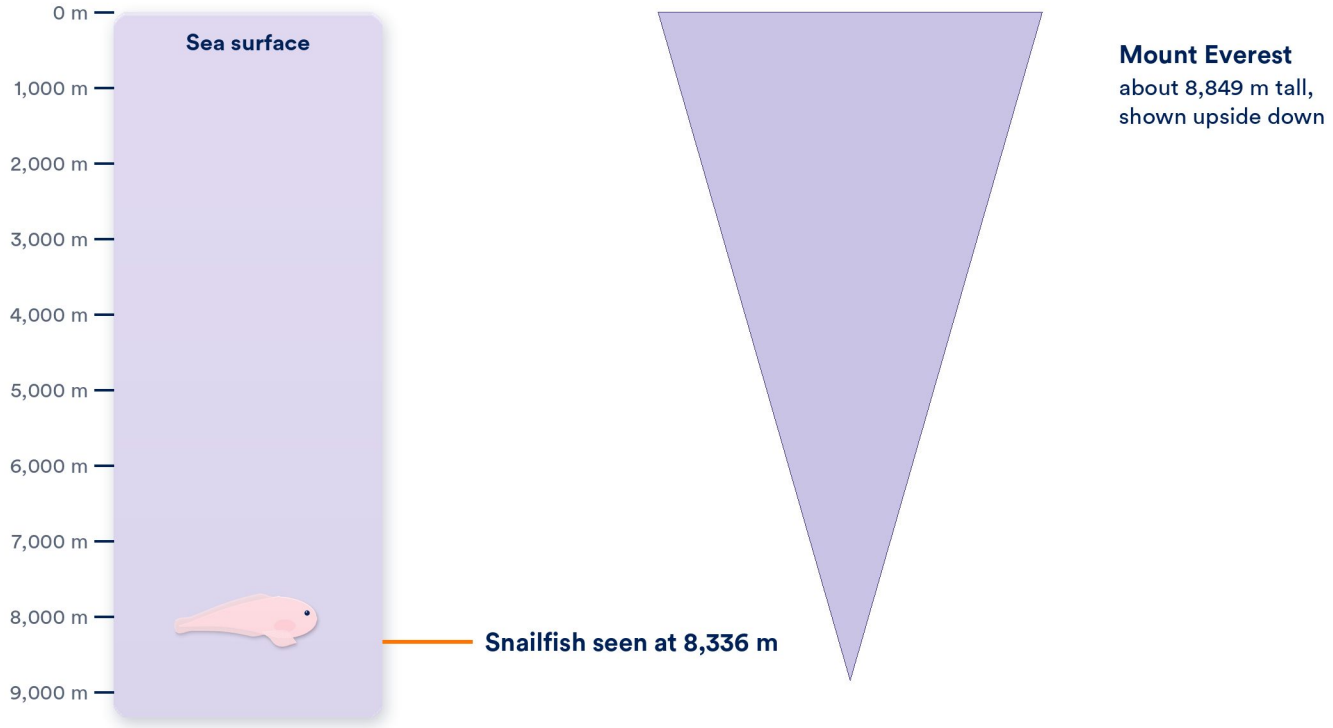
Curriculum link: Year 5: light can be absorbed. Year 5: adaptations for survival.

Deep Sea by the Numbers

From the film

- A baby snailfish was filmed 8,336 metres down in the Izu-Ogasawara Trench. That is the deepest any fish has ever been seen.
- In places the trench is more than nine kilometres deep, deeper than the tallest mountain on land is high.
- At the bottom, the water presses more than 800 times harder than the air presses on you at the beach.
- In one big study, about three out of every four deep sea animals counted could glow.

How deep? (on this page, 1 cm stands for 1,000 m)



Your turn

1. Write 8,336 metres in kilometres.

2. Mount Everest is about 8,849 metres tall. How much deeper is a 9,000 metre trench than Everest is tall?

3. Write ‘three out of every four’ as a fraction and a percentage. If scientists counted 20 animals, about how many could glow?

4. The snailfish is pale and soft, with no scales. Choose one feature and suggest how it might help in the deep sea.

5. Scientists from UWA in Perth worked with a university in Tokyo. Why do scientists from different countries team up?