5-6 activity

Ocean Architects

Create a reef of your own and see how it survives a storm!

Wonder and Explore: Coral is made up of hundreds of tiny little animals that are stuck in one spot and have a mouth that is also their bottom - what special powers do they have to protect us from huge waves and storms?

Activity Outline:

Use Lego to create a coral reef - then send water flying to see if coral reefs can really protect us.

As you investigate the damage compare the shapes of corals to see what ones withstood the waves to have the greatest powers of protection.

Topics under investigation:

1. Can coral really protect us?

2. Do all corals have the same powers of protection?

What you need:

1. Lego (or some form of construction blocks);
2. a bucket,
3. water,
4. sand,
5. sandcastle moulds.

Curriculum links:

Science Understanding- Biological sciences

Year 5: Living things have structural features and adaptations that help them to survive in their environment.

Year 6: The growth and survival of living things are affected by physical conditions of their environment.

Year 5-6 Science as a Human Endeavour

Nature and development of science: Science involves testing predictions by gathering data and using evidence to develop explanations of events and phenomena and reflects historical and cultural contributions.

Use and influence of Science: Scientific knowledge is used to solve problems and inform personal and community decisions.

5-6
activity

Ocean Architects

Activity

Use construction blocks, such as lego, to construct a coral reef featuring plate, mound, encrusting and branching coral. To make your analysis easier later use the same colour bricks for each different shape (growth form) of coral. (eg blue bricks for plate, yellow for mound)

- Each Lego brick is alike a coral polyp, they are connected together to make a coral and these are connected together to make a reef.
- Mound corals take longer to grow - Did they take longer for you to build?

You will also need to design two identical cities - one will have a reef to protect it, one will not. Erosion is one of the main impacts of waves on coastal areas so ideally you will be able to build your cities out of sand using sandcastle moulds.

- Why do the cities need to be identical?
- What impact could any differences have on the results?

Set up your cities in a chosen location (remember it needs to handle sand and water, and be easy to collect Lego pieces from).

- In front of one city place your coral reef.

Get your storm waves ready: Prepare at least 3 buckets of water (with sand stirred up, not settled, inside them) for each city.

- Do you think the coral reef will be able to protect the city?
- What shape of coral do you think will best survive the storm?

STEM

In this activity students will follow directions, manipulate materials, experiment and think about solutions.

General Capabilities

Critical and creative thinking

Ocean Day fact:
Coral reefs reduce 97% of a wave's energy helping to protect our coastlines.

5-6 activity

Ocean Architects

Create a reef of your own and see how it survives a storm!

The storm hits! Go on your knees and splash the buckets of water, one at a time, towards the base of each city. Note the damage to each city after each 'wave'.

- Did both cities survive the storm? How about the reef?
- What corals stayed intact? What ones broke?
- What corals had the most amount of sand settle on them?
  - Collect all pieces of Lego that have broken off
- How could you work out what % of the reef was damaged.
- How could you work out what % of the different shapes of coral were damaged.
  - What coral had the greatest power of protection?

Discussion

Reefs can effectively protect shorelines because of their ability to cause waves to break offshore, thus limiting the energy impacting the coastline.

In 2015, Scientists studied the impact of a cyclone that struck Ningaloo Reef and caused extensive damage along the coast of Western Australia. They compared cyclone impacts on coastlines with and without reef and found that the beaches without reef had ten times more erosion.

How could decision makers and members of the community use this information?
(Example answers)

- Help find the safest places for cities and major infrastructure to be built.
- Help rescuers predict where the greatest damage will happen so they can create more effective emergency response plans.
- Help sailors know the best locations to go in a storm.
- Help emergency workers know where to tell people to go for safety.

WOW!

Coral reefs cover less than 1% of the ocean floor yet they are home to over 25% of our oceans' marine life.

5-6 activity

Ocean Architects

Extension Questions:

The growth characteristics needed for recovery are different to those needed for surviving a storm.
What coral do you think will recover the quickest? Why?

What do you think would happen if there were more waves?

What if the waves were closer together?

What if there were less 'waves' but the buckets were larger?

Class learning:

Corals:

- Coral reefs are made up of corals.
- Corals look like colourful rocks but look up close and you'll see that they are a group of tiny animals, called polyps that live together in a colony.
- As all the coral colonies grow so does the reef.
- Coral polyps are in the same group of animals as jellyfish and anemones.
- They share the same features of a cup shaped body, rim of tentacles and a mouth that is also their bottom! They have no brain, eyes or other specialised organs such as hearts, lungs, or kidneys.
- In a coral all polyps are joined together by an outer layer of skin through which nutrients are shared and messages are sent.

Coral growth:

- There are hundreds of different species of coral.
- Different species of animals (such as birds or fish) usually grow in different shapes but all the different types of coral grow in a one of 7 general shapes.
- The same species of coral will even grow in a different shapes
- The way the colony grows is a response to their environment, such as the amount of; waves, stirred up sand and sunlight.
- Each main shape of coral has a set of special advantages and disadvantages. Examples of these for 4 key shapes are:

Ocean Architects

5-6 activity

Shape:	Encrusting	Branching	Plate	Mound
Growth pattern:	Flat and wide. It stretches along surface of the reef.	Up, narrow and forked. (alike a tree branch)	Up and then spreading out flat like a plate or growing out from the reef like a shelf from a wall	Round boulder
Energy Focus	Defence: These corals have an extensive border and constantly need to attack and defend in order to maintain their position and keep growing.	Repair: Regrowing quickly after a branch breaks	Growth: corals grow upwards as quickly as they can so that then they can spread out and have more polyps for catching food.	Inner skeleton. Compared to other coral shapes mound corals have to
Good at:	Spreading out quickly	Growing again quickly. Not being covered with sand.	Avoiding competition around its edges & Sunbaking As the coral grows the plate spreads out and shades the area underneath. This stops algae and corals from being able to grow there and provides lots of space for fish to hide. The flat design enables all the polyps to get lots of sunshine.	Strength & resilience. They are the major contributor to the long term solid structure of the reef. Can live to be tens of thousands of years old.
Needs to be careful about:	Being covered with sand. Growing into an area not suitable for corals. Having to fight too many battles along its borders.	Being knocked over.	Being knocked over. The narrow base makes them fragile and in danger of being knocked over easily. Being buried it is easy for sand to collect on their flat surface. Sunburn – Near the surface there may be too much light.	Being overgrown when little. Growing so slowly.

5-6 activity

Ocean Architects

Create a reef of your own and see how it survives a storm!

Strange but true!

Corals eat sugar all day then balance their diet by eating 'meat and veg' at night!

- Corals need food for energy.
- Coral polyps get their food in 2 main ways
    1. Coral polyps have special algae in their tissues (called zooxanthellae) that use sunlight to make sugars which they give to the coral. This process is called photosynthesis and is one of the important roles of plants.
    2. Coral polyps have a rim of tentacles around their mouth (which amazingly is also their bottom!!!) these tentacles are used to grab plankton from the water.
- To get lots of food corals need access to sunlight and water currents carrying plankton
- Corals need to be careful though as if the currents are too strong the coral will break.
- Growing flat is great for sunbaking but corals have to be careful as they might get buried under sand as sand can easily land on top of you if you are flat.
- Corals use energy for; catching food, reproduction, growing and defending themselves.
- They only have a set amount of energy so if they need lots of it for defence then they won't have as much for growing or reproduction.
- To grow corals need to build their skeleton.
- A coral skeleton is limestone (or calcium carbonate to be precise).
  This means that corals can do something amazing - they can turn water (or the tiny amounts of minerals found in it) into rock! This does take time though so corals grow slowly.
- Different shapes of coral have different amount of skeleton within their bodies.
  A mound coral has a lot while a branching coral has a little.
- Corals have different growth rates based upon their skeletal investment (how much energy is put into building a skeleton for support).
- Mound corals can grow 2cm a year while branching corals can grow up to 10cm per year.