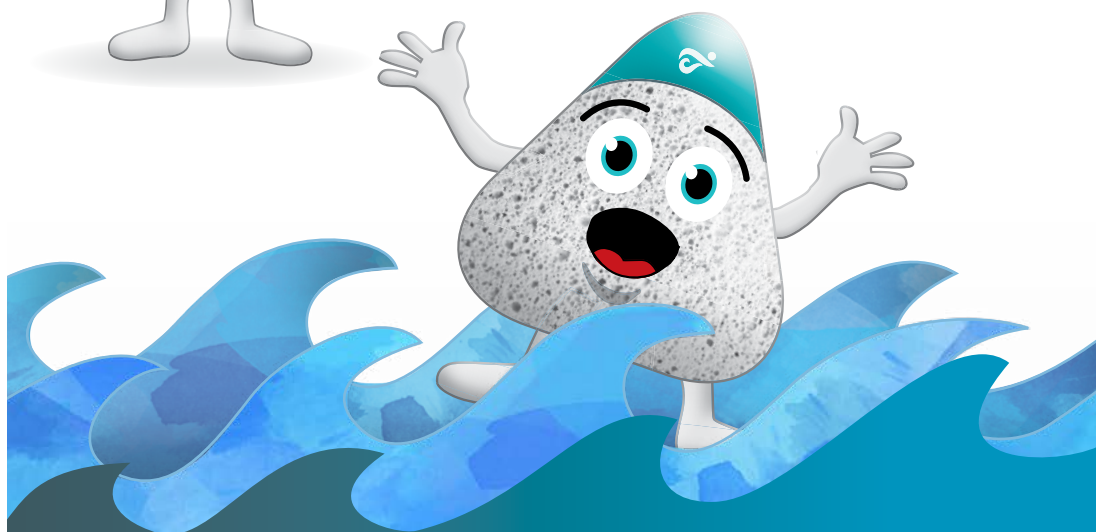
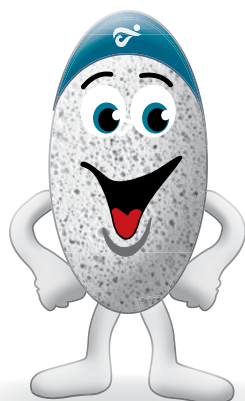


BEACH
WATER SKILLS FOR LIFE

WAVES

MODULE

3



5-6 LESSONS

LEVEL 3/4



SUPPORTED BY



He Kaupare. He Manaak
He Whakaora.
prevention. care. recovery



WAVES

DESCRIPTION

We all know that waves come in many shapes and sizes, can be amazing to watch and can create loads of fun for us all. But what causes a wave to evolve and change? In this module students look at how swells are caused and the different conditions that cause them, as well as the different types of waves and why some are more dangerous than others.

ACHIEVEMENT OBJECTIVES

Level 3

Science

Nature of Science

Participating and contributing:

- Use their growing science knowledge when considering issues of concern to them.
- Explore various aspects of an issue and make decisions about possible actions.

Physical World

Physical inquiry and physics concepts: Explore, describe, and represent patterns and trends for everyday examples of physical phenomena, such as movement, forces, electricity and magnetism, light, sound, waves, and heat. For example, identify and describe the effect of forces (contact and non-contact) on the motion of objects; identify and describe everyday examples of sources of energy, forms of energy, and energy transformations.

English

Processes & Strategies: Integrate sources of information, processes, and strategies with developing confidence to identify, form, and express ideas.

- Integrates sources of information and prior knowledge with developing confidence to make sense of increasingly varied and complex texts
- Selects and uses a range of processing and comprehension strategies with growing understanding and confidence
- Thinks critically about texts with developing confidence

Structures: Show a developing understanding of text structures.

- Understands that the order and organisation of words, sentences, paragraphs, and images contribute to and affect text meaning

Health & Physical Education

Personal Health and Physical Development

Safety and Risk Management: Students will identify risk and their causes and describe safe practice to manage these.

Healthy Communities and Environment

Rights, responsibilities, and law: Students will research and describe current health and safety guidelines and practices in their school and take action to enhance their effectiveness (ie sun smart policies, water safety rules, how to recognise a rip or hypothermia).



Nature of Science

Participating and contributing

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Physical inquiry and physics concepts: Explore, describe, and represent patterns and trends for everyday examples of physical phenomena, such as movement, forces, electricity and magnetism, light, sound, waves, and heat. For example, identify and describe the effect of forces (contact and non-contact) on the motion of objects; identify and describe everyday examples of sources of energy, forms of energy, and energy transformations

English

Processes & Strategies: Integrate sources of information, processes, and strategies confidently to identify, form, and express ideas.

- Integrates sources of information and prior knowledge confidently to make sense of increasingly varied and complex texts
- Selects and uses appropriate processing and comprehension strategies with increasing understanding and confidence
- Thinks critically about texts with increasing understanding and confidence

Structure: Show an increasing understanding of text structures.

- Understands that the order and organisation of words, sentences, paragraphs, and images contribute to and affect meaning in a range of texts

Health and Physical Education

Personal Health and Physical Development

Safety and Risk Management: Students will access and use information to make and action safe choices in a range of contexts

Movement Concepts and Motor Skills

Science and Technology: Students will experience and demonstrate how science, technology, and the environment influence the selection and use of equipment in a variety of settings (i.e. tides, waves, wetsuits, life jackets).

Healthy Communities and Environment

Rights, responsibilities, and law: Students will specify individual responsibility and take collective action for the care and safety of other people in their school and in the wider community.

LEARNING INTENTIONS

- Students will gain an understanding how waves are formed
- Students will gain an understanding on the factor that determine the size of the wave
- Students will learn about the different type of wave bottoms eg. beach break (sand bottom), reef break, Point break, rivermouth wave, artificial wave
- Students will learn about sets, lulls and wave period, swell direction and how this affects the waves that arrive at their local beach

SUCCESS CRITERIA

- Students will understand how to read sets of waves and where waves are breaking
- Students will demonstrate their understanding of what dangers are associated with the different wave types especially surging waves and rock fishing
- Students can name 4 different wave breaks (point, beach, reef etc. and give examples)
- Students will be able to identify what a good swell period and direction is for their local beach

KEY COMPETENCIES

Participating and Contributing:

- Contribute ideas to class discussions
- Participate in independent and group activities
- Be able to give local examples

Managing Self:

- Complete individual and group tasks in a timely manner and to a high standard

Thinking:

- Apply new information to real life contexts

Using language, text and symbols:

- Read articles to gain understanding about how waves form and different types of waves
- Draw on a range of information sources to plan a water activity impacted by waves
- Interpret diagrams and graphics to gain understanding

Relating to others:

- Communicate ideas effectively
- Actively listen to others to help my understanding
- Respect the ideas and opinions of my peers

RESOURCES

Internet, digital devices, poster paper/ drawing equipment, youtube clips, articles, metservice surf forecasts

ASSESSMENT ACTIVITIES

- Class discussions
- Complete quizzes based on articles that have been read about the science behind waves
- Plan a beach activity that is impacted by waves (i.e. swimming, surfing, rock fishing) identifying what someone would do before going to the beach, before getting into the water and how to manage an activity safely in the water.

LESSON

1
to
2

How are waves formed?

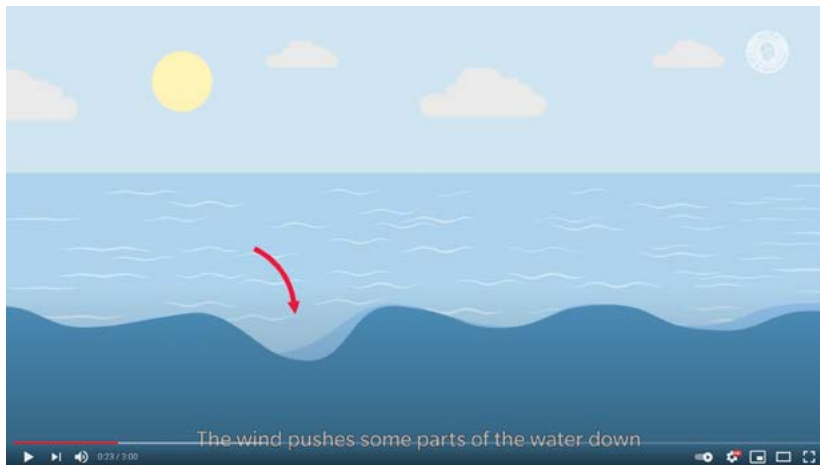
Class discussion: introduce the topic of water waves to the students.

Elicit students prior knowledge about waves by asking: What is a wave?

What causes waves to form? What do people do in waves?

What experiences have you had with waves?

Watch [The Formation of Waves video](#) with the class. **Read and discuss** the diagrams and graphics shown on the video to gain an understanding of how waves are formed. **Discuss** the importance of using weather forecasts to predict the type of waves we could expect to see.



Activity:

Ask the students to read the [Ocean Waves and Currents](#) & [Physics for Kids: Waves](#) articles and complete the quizzes to test their comprehension and understanding about waves. **Discuss** the new information and results as a class.

Earth Science for Kids

Ocean Waves and Currents

The water in the ocean is constantly moving. On the surface we see water moving in the form of waves. Below the surface the water moves in great currents.

Ocean Waves

One of the things many people love about the ocean is the waves. People love to play in the waves, surf the waves, and the sound of the waves crashing on the beach.

What causes ocean waves?

Ocean waves are caused by wind moving across the surface of the water. The **friction** between the air molecules and the water molecules causes **energy** to be transferred from the wind to the water. This causes waves to form.

What is a wave?

In science, a wave is defined as a transfer of energy. Ocean waves are called mechanical waves.



Physics for Kids

Waves


What is a wave?

When we think of the word "wave" we usually picture someone moving their hand back and forth to say hello or maybe we think of a **curling wall of water** moving in from the ocean to crash on the beach.

In physics, a wave is a disturbance that travels through space and matter transferring **energy** from one place to another. When studying waves it's important to remember that they transfer energy, not matter.

Waves in Everyday Life

There are lots of waves all around us in everyday life. Sound is a type of wave that moves through matter and then vibrates our eardrums so we can hear. Light is a special kind of wave that is made up of photons. You can drop a rock into a pond and see waves form in the water. We even use waves (microwaves) to cook our food really fast.



Types of Waves

Read [The four types of breaking waves article](#)

together as a class and discuss how each would impact a swimmer, surfer or someone fishing from the rocks. **Ask the students:** which wave would be the safest for swimmers? Which wave so you think surfers would prefer? Which wave/s do you think would be the most dangerous to people fishing off the rocks? **Discuss** the importance of observing waves and checking weather forecasts to make sure it is safe to enter the water for these activities. [Teacher Guide Language of Waves.](#)

Teacher Guide:
The Language of Waves

Drowning Prevention Auckland
education • research • advocacy

The "Up and Down" of Waves
Waves on a body of water are most commonly caused by wind. As wind passes over the water's surface, friction forces it to ripple. The strength (**speed**) of the wind, the distance the wind blows (**fetch**) and the length (**duration**) of the gust all determine how big the ripples will become. The height of a wave increases if the wind blows strongly for several hours, and waves of considerable height develop in open oceans if a strong wind blows for several days. The limiting factor in creating waves is the distance of ocean over which the wind blows is the fetch. When the wind dies down, the waves continue to travel away from their origin before dying. This is known as **swell**. There may be swell present even if the wind is calm and there appears to be no 'sea' waves.

The highest point of a wave is the **crest** and the lowest point is the **trough**. The difference between the two is known as the **wave height**. The **wavelength** is the distance from crest to crest.

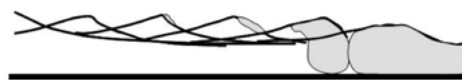
Waves **break** as they approach shallow water when the sea bed begins to affect the wave's shape and speed. Wave height increases and the crests become more peaked. As the steepness increases, the wave becomes unstable. The forward speed of the crest becomes faster than the speed of the wave and the wave breaks up the beach. This is called the **swash**. The water then drains down the beach under gravity and is called the **backwash**. A wave **period** (frequency) is time interval between the arrival of consecutive crests at a fixed point. Waves tend to come in groups.

Inshore Waves
Inshore waves can be described in three different ways according to their form. There are **dumping**, **surging** and **spilling** waves. Each of these waves has different looks and characteristics.

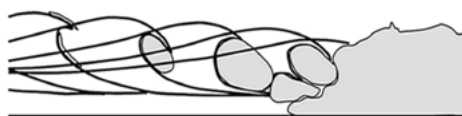
Dumping waves
Dumping or plunging waves break with a tremendous downwards force. They can throw a swimmer to the bottom and cause spinal injuries. Never try and body surf on a dumper wave! Keep out of their way or dive through them. Dumping waves usually occur when strong winds create waves with long wave periods. They can be found when there is a sudden rise in the sea floor eg on sand banks or steeply rising beaches. When these waves break, the water plunges forward and down into the trough. The steepness of the slope prevents the swash developing but the backwash is very powerful. It can carry materials down the beach and wash the sand out from beneath your feet. These waves can erode beaches. Dumping waves can help rips to form.



Spilling Waves



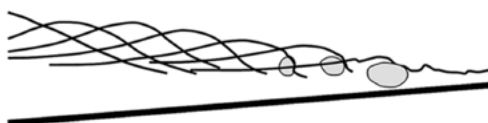
Plunging Waves



Surging Waves



Collapsing Waves



Activity:

In pairs or groups of 3, **ask** the students to read the [Why do waves come in sets? article](#).

Ask the students to create a small poster that highlights interesting facts about sets of waves.

Ask each group to present this to the class.

Why do waves come in sets?

OCTOBER 1, 2020 | SURFING



At the world's most crowded surf breaks, you'll always find surfers sitting further out than the rest of the pack. They are "waiting for the set." But do waves really come in sets? And what are set waves?

In surf lingo, a wave set is a series - or group - of waves that are generally larger and often more powerful than the average for a given period of time or day.

Reading waves

Watch the [4 Simple Ocean Observations to Improve Your Surfing video](#) to see how surfers read waves to both keep safe and have fun.



Activity:

In groups of 3 or 4, students **research** the meaning of the following four words and how they affect wave formations: swell, tides, wind & bathymetry. **Discuss** findings as a class. Students can start by using the information gained by the video above and research the internet to clarify further.

5

As a class, **read** the following tips about [How to stay safe while fishing/Rock fishing](#). **Show** the students the [metservice surf forecast website](#) and discuss conditions for the local beach.

Link not working

3

LEVEL 3/4



In pairs, **ask** the students to plan a beach activity that involves waves using the information studied in this module. Their plan must clearly identify what a water smart person would do before going to the beach, what they would do when they get to the beach and how to manage safe beach activities while in the water. The activities they may choose from include: surfing, rock fishing or swimming.

6

Going Further

Review student plans and decide as a class which are the most well planned. Use these plans on a trip to the beach to participate in the activities. Include wave observations as a real world experience for the students. Get them to time the waves and roughly measure the height and distance between sets of waves. See if the students can identify the types of waves they are seeing.