

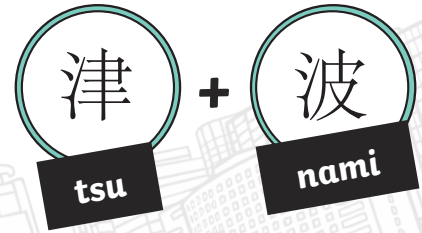
Tsunamis

Tsunamis are one of the most powerful and destructive natural forces on planet Earth.

Origin of the Name

The word tsunami is pronounced 'soo-nah-mee' and it originates from two Japanese words: 'tsu' meaning 'harbour' and 'nami' meaning 'wave'.

Therefore, tsunami translates as 'harbour wave' – a name given to this natural phenomenon due to the fact that they only seem to become visible when near the coast.



Key Distinctions

Often, tsunamis are mistakenly called 'tidal waves'; however, they are unrelated to the tides and are not linked to the gravitational forces of the Moon and the Sun. Although both types of waves have crests and troughs, there are distinct differences between tidal waves and the waves seen during a tsunami.



Tidal waves are shallow water waves which can be large in size but are always controlled by the gravitational forces of the Moon and the Sun. As the waves are shallow and the energy moving within them comes from the wind, they can only ever reach a limited size and speed.



A tsunami, however, is a series of much larger waves which are caused by the movement of a greater amount of energy through the water. This energy does not come from the wind; instead, it is caused by an underwater volcanic eruption, an underwater landslide or, most commonly, an earthquake on the ocean's floor. Very rarely, tsunamis can also be caused by a giant meteor hitting the ocean.

Formation of a Tsunami

As a huge amount of energy caused by the underwater event tries to travel to the ocean's surface, it pushes water up with it – causing the sea level to rise. However, gravity pulls this water back towards Earth, quickly spreading the energy out to the sides.

Water begins to race towards the land at speeds of up to 500 miles per hour – faster than an aeroplane. The waves can cross an entire ocean in less than one day without losing energy.

When the tsunami is far from the shore, it can be hard to detect; this is because the energy is moving through the entire depth of the water and the waves of the tsunami can be as small as one metre tall. However, as the tsunami gets closer to shore and the water of the ocean becomes shallower, there is less water for the huge amount of energy to move through. This causes the waves to slow down but, when they do so, the water becomes much taller.

If the trough of the tsunami reaches the shallow water of the shore first, it can make the ocean seem as if it is withdrawing back on itself much further than normal. It is this phenomenon, coupled with the unrivalled height of the waves created (around ten times of those seen during average storms), that are key features of a tsunami.



Destructive Power

Due to their rapid yet barely noticeable journey across the ocean, it is not always possible to spot a tsunami with enough time to act. With humanly constructed defences unable to stand up to the sheer power of the tsunami, immediate devastation of all structures occurs. Boulders are lifted, buildings are destroyed and vehicles are swept away as the water races up to one mile inland before retreating back away from the coast carrying all debris with it.

Additionally, contrary to popular belief, a tsunami is not just one wave (it is a series of waves commonly known as a 'wave train') and it is not always the first wave of a tsunami which is most destructive. As tsunami waves are very long, they can reach the shore as far as one hour apart, giving survivors a false sense of security.

Preventative Measures

As trying to stop a tsunami is futile, scientists focus instead on developing ways of detecting tsunamis earlier so that people can be safely evacuated. They use advanced systems to monitor underwater activity which may indicate an earthquake or eruption is imminent and they invest time and effort into ensuring that global communication systems are quick, effective and extensive.

Questions

1. Which of these statements are true? Tick **two**.
 - ☐ The origin of the word tsunami is Japanese.
 - ☐ The word tsunami translates as 'great wave'.
 - ☐ The word tsunami is pronounced 'too-nah-mee'.
 - ☐ The meaning of the word tsunami is 'harbour wave'.
2. Number the sub-headings below to show the order in which they appear in the text.
 - ☐ Formation of a Tsunami
 - ☐ Key Distinctions
 - ☐ Preventative Measures
 - ☐ Origins of the Name
 - ☐ Destructive Power
3. Find and copy one word from the section **Origin of the Name** which means the same as 'occurrence'.

4. **...coupled with the unrivalled height of the waves created...**
Why did the author choose to use the word 'unrivalled' in this sentence?

5. Look at the section called **Destructive Power**.
Find and copy a phrase which shows that the fact given would surprise a lot of people.

6. Briefly explain how tsunamis got their name.

7. Summarise the key differences between tsunamis and tidal waves.

8. What events can generate enough energy to cause a tsunami?

9. Why are tsunamis hard to detect when far from the shore?

10. Tsunamis are the most dangerous natural force on Earth.
Do you agree with this statement? Fully explain your answer using evidence from the text.

Answers

1. Which of these statements are true? Tick **two**.

- ☒ **The origin of the word tsunami is Japanese.**
- ☐ The word tsunami translates as 'great wave'.
- ☐ The word tsunami is pronounced 'too-nah-mee'.
- ☒ **The meaning of the word tsunami is 'harbour wave'.**

2. Number the sub-headings below to show the order in which they appear in the text.

- Formation of a Tsunami
- Key Distinctions
- Preventative Measures
- Origins of the Name
- Destructive Power

3. Find and copy one word from the section **Origin of the Name** which means the same as 'occurrence'.

phenomenon

4. **...coupled with the unrivalled height of the waves created...**

Why did the author choose to use the word 'unrivalled' in this sentence?

Pupils' own responses, such as: The author used the word unrivalled to show that nothing else even comes close.

5. Look at the section called **Destructive Power**.

Find and copy a phrase which shows that the fact given would surprise a lot of people.

contrary to popular belief

6. Briefly explain how tsunamis got their name.

Pupils' own responses, such as: Tsunamis got their name, which means harbour wave, because they only became apparent when near the shore or harbour.

7. Summarise the key differences between tsunamis and tidal waves.

Pupils' own responses, such as: Tidal waves are controlled by gravitational forces and the energy within them is from the wind whereas tsunamis are not controlled by gravitational forces and the energy within them does not come from wind.

8. What events can generate enough energy to cause a tsunami?

Pupils' own responses, such as: The events that can generate enough energy to cause a tsunami are an underwater volcanic eruption, an underwater landslide, an earthquake on the ocean's floor or, very rarely, a giant meteor hitting the ocean.

9. Why are tsunamis hard to detect when far from the shore?

Pupils' own responses, such as: Tsunamis can be hard to detect when they are far from the shore because the energy is moving through the entire depth of the water and the waves of the tsunami can be as small as one metre tall. This would make them look like normal waves.

10. Tsunamis are the most dangerous natural force on Earth.

Do you agree with this statement? Fully explain your answer using evidence from the text.

Pupils' own responses, such as: I do not agree that tsunamis are the most dangerous natural force on Earth – I think that earthquakes are. This is because there would be far less tsunamis if there were less earthquakes. Earthquakes can also be destructive inland, not just for up to one mile around the shoreline.