

A space radar image of Teide Volcano, showing its complex, layered structure. The volcano is depicted in a vibrant, multi-colored palette of greens, yellows, and purples, highlighting its intricate topography and various geological features. The central peak is prominent, surrounded by a series of concentric ridges and valleys. The overall appearance is that of a highly textured, multi-tiered volcanic structure.

Google Arts & Culture

Learn Anywhere: Extreme Planet

In association with



Space Radar Image of Teide Volcano, 1999, NASA/JPL

How to use this lesson plan

This plan takes you on an exciting journey with plenty of links through to amazing online content, so no need to print. This lesson plan is suitable for anyone but we recommend it for ages 7 to 11. It's a lot of fun to go on this journey with parents, teachers or your friends, but it is designed so you can explore independently at your own pace. There are different types of questions to answer: can you discover, explore and invent? We think so.

Check in with your parents or teacher if you need to, but you'll need a tablet, computer or smartphone. You can do this *Learn Anywhere* Lesson on almost any device as long as you can get online and use a web browser.

There are 3 Chapters:

Chapter 1 - Earthquakes 45 minutes

Chapter 2 - Volcanoes 60 minutes

Chapter 3 - Tsunamis 45 minutes

You'll see some helpful signs on the way:



Useful information to guide you through the lesson



Things you'll need to watch, read, learn and make things with during the lesson.



Digital activity time. Take quizzes and explore.



Estimated time to do a section of this lesson



Explore online content. Discover videos, stories, or go and look at and zoom around pictures.



Activity time. This is where you get to design, make or write something of your own.



Headphones to listen to videos and audio



3D Model for you to spin around and explore.



Things you'll need

Things that will help you during this *Learn Anywhere* lesson.



Scrap Paper



Scissors



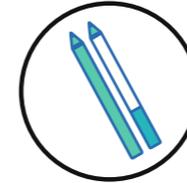
Brush and Paint



Notepad



Tablet or Computer



Pens and Pencils

Welcome to *Learn Anywhere: Extreme Planet*

In this *Learn Anywhere* lesson, you are going to learn all about how the planet we live on, the Earth, experiences extreme events, such as erupting volcanoes, earthquakes and huge floods, known as tsunamis. You'll explore real-life events, understand their impact on people around the world and how we learn to adapt to our extreme planet. Get ready to investigate...

What will you do?

1. Go on an adventure to discover Earth's extreme events.
2. Hunt for facts and stories about these extreme events.
3. Write a story of your own about earthquakes.
4. Create your own volcano.
5. Paint a tsunami.



D. Howard Hitchcock, Untitled (Halemaumau Overflowing onto the floor of Kilauea Caldera with Snow on Mauna Loa in Background), 1894, National Park Service

What will you learn?

1. Discover three different types of extreme events.
2. Discover what links these extreme events.
3. Discover the impact they have on people around the world.
4. Practice writing.
5. Practice art and design.
6. Practice modelling.
7. Discover persistence through understanding how people adapt to extreme events.

After studying this lesson, you will be able to:

1. Describe and identify earthquakes, volcanoes and tsunamis.
2. Understand the impact of these extreme events on people around the world.
3. Write a story about being in an earthquake.
4. Create your own volcano.
5. Paint a tsunami.

Vocabulary: 3D, Alaska, ash, Chinatown, coastline, crater, crust, disaster, drone, earthquake, eruption, fault, fire, gas, Hawaii, Italy, Japan, Krakatoa, laser, lava, magnitude, Minoan, Myanmar, plates, Pompeii, prediction, radar, Roman, San Andreas, San Francisco, Santorini, space, temple, Thailand, Thera, tsunami, United States, Vesuvius, volcano.

There's one more thing to know before you go on your lesson. Google Arts & Culture pictures are big. So big that you can zoom in. Explore. Sometimes right down to a drop of water.

So you just need to click on a link, then on the Magnifying Glass symbol and zoom in with the Zoom Slider. Drag the white box around and you can explore the picture. You'll find out for yourself. Here's an example of a Google Arts & Culture picture and the zoom slider.

The diagram illustrates the process of zooming in on a Google Arts & Culture image. It consists of three main parts:

- 1. Click on the magnifying glass:** A screenshot of the Google Arts & Culture interface shows a painting of a landscape with a tree and a field. A magnifying glass icon is highlighted in the bottom right corner of the image area.
- 2. Use the slider to zoom in:** A zoom slider interface is shown, featuring a white box that can be dragged across the image to select a specific area for zooming. Below the slider are minus and plus signs and a hand icon with arrows indicating the zooming action.
- 3. Explore art works in detail:** A detailed view of the painting is shown, revealing intricate details of the scene, including people working in a field and a building in the background.



Aftermath of Messina Earthquake Searching for Survivors, 1908, Italian American Museum of Los Angeles

Chapter 1



What's this chapter about?
Earthquakes



What will I do?
Explore how earthquakes happen
Learn about two earthquakes from
history



How long will this chapter take?
45 minutes



Eugene McCarthy, City Hall after the Earthquake, 1906, California State Archives

The ground is shaking, moving under your feet. Buildings seem to ripple and objects are flying around. It's an earthquake.

Earthquakes happen when two large pieces of the Earth's crust, its outer shell, suddenly slip. The Earth's crust is not made up of one smooth piece, it is made up of many pieces, it's the world's biggest jigsaw.

These pieces are called "plates". The edges of the plates gradually move against each other over millions of years, but when they slip, a shockwave is generated that shakes the surface of the Earth.

There are about 500,000 earthquakes a year. Most are undetectable by humans yet some can destroy cities.

They are measured by their "magnitude", or how severe they are. The scale runs from 1.0 - barely felt at all - to 9.0 - total destruction and permanent changes to the Earth's surface.

You have probably seen news about earthquakes in various countries. We're going to focus on one in San Francisco in the United States in 1906, and one in Myanmar in 2016.



The San Francisco earthquake of 1906 is one of the most famous in history. It struck at 5.12am on 18th April.

80% of the city was destroyed, some of it in the initial quake but most in the fires that started in the aftermath, which burned for days. 3,000 people died. It is still the greatest loss of life from natural disaster in California's history.

It was caused by movement on the famous San Andreas fault, part of the boundary between the Pacific Plate and the North American Plate on the Earth's surface.

The San Andreas fault continues to be very active. And it runs directly through the biggest cities of California, Los Angeles and San Francisco.

Scientists say that the San Andreas fault is ready to unleash another major earthquake. However, "ready" could mean tomorrow, or it could mean 10 years from now because it is very difficult to predict accurately.

What does this mean for the people who live in San Francisco now? Being ready for earthquakes is part of life, as it is in many parts of the world. Having enough food, fresh water, and medicine to survive, should the worst happen. And there are extra rules in place to make sure buildings can withstand earthquakes.



Click [here](#) to explore more about how Chinatown, an area of San Francisco, was rebuilt after the 1906 earthquake.



Now for a much more modern earthquake. In 2016, Myanmar suffered an earthquake which severely damaged some of its temples. Click [here](#) to discover how scientists are using technology to help repair them. There's a very cool 3D image of one of the temples - click [here](#) to move it around.



Questions for Chapter 1

Let's finish this chapter with some questions. When you **Discover**, you are comprehending and remembering. When you **Explore**, you are really able to understand it and think it through. When you **Invent**, you are able to comprehend, understand, remember, analyse and do something cool with your new knowledge.

Discover:

What percentage of San Francisco was destroyed in the 1906 earthquake?

Explore:

Why do you think people still live in areas, such as California, which are prone to earthquakes?

Invent:

What do you think it would be like to be in an earthquake? See if you can write a short story about it. Tell us how it feels to have something that has always been your friend, dependable earth under your feet, moving and rocking and roaring...





Chapter 2



What's this chapter about?
Volcanoes



What will I do?
Learn why volcanoes erupt
Explore two mega eruptions from history
Create your own volcano



How long will this chapter take?
60 minutes



Volcanoes. Spectacular, yet destructive eruptions. They get their names from the Roman god of fire, Vulcan and it can feel like the Earth is angry.

A volcano is a tear in the Earth's crust, which allows hot lava (molten rock), ash and gases to escape from below the surface.

Like earthquakes, volcanoes are often connected to the movement of the Earth's plates we learnt about in Chapter 1. The "Ring of Fire" is famous for volcanoes - a literal ring of volcanoes on the edges of the plates around the Pacific Ocean, from the United States to Japan to New Zealand to Chile.

Fun fact: most volcanoes are underwater.

Volcanoes are extremely dangerous - the hot lava can melt buildings, the ash can ruin aircraft engines, and the gases can poison plants and animals.

The eruption of Thera (modern day Santorini in the Mediterranean) was said to have destroyed the Minoan civilisation in Crete, about 1100 BCE and you can see the colossal crater it left behind in the picture.

We are going to have a look at two very famous eruptions: Vesuvius and Krakatoa. But first, explore some volcanic landscapes.



Click [here](#) to explore volcanic landscapes in Hawaii in spectacular 360 views. You can move around inside the pictures with your mouse.



On 26th August 1883, a violent eruption began in Indonesia at Krakatoa. The eruption devastated surrounding islands, causing over 36,000 deaths. Click [here](#) to explore how the explosion affected the whole world. The picture shows "Child of Krakatoa" erupting in 2018 so the volcano is still very active.





Going further back in time, we visit Pompeii, an ancient city in southern Italy which was perfectly preserved under metres of ash in the eruption of Mount Vesuvius in 79CE. The city offers a snapshot of life, frozen at the moment it was buried. Click [here](#) to take a tour of Pompeii.



Questions for Chapter 2

Time for some questions. Here's a reminder of how it works. When you **Discover**, you are comprehending and remembering. When you **Explore**, you are really able to understand it and think it through. When you **Invent**, you are able to comprehend, understand, remember, analyse and do something cool with your new knowledge.

Discover:

What year did Mount Vesuvius erupt, covering the city of Pompeii in ash?

Explore:

What do you think it is like to witness a volcanic eruption?

Invent:

You can create your own volcano, thanks to the Natural History Museum in London. Click [here](#) to find out how. Get your parents or teacher to help you.



Hébing & Schützenberger

Phot. A. Lacroix

La nuée ardente du 16 Décembre 1902 arrivant à la mer.

(Hauteur 4000^m)

Musée de l'Édition



Chapter 3



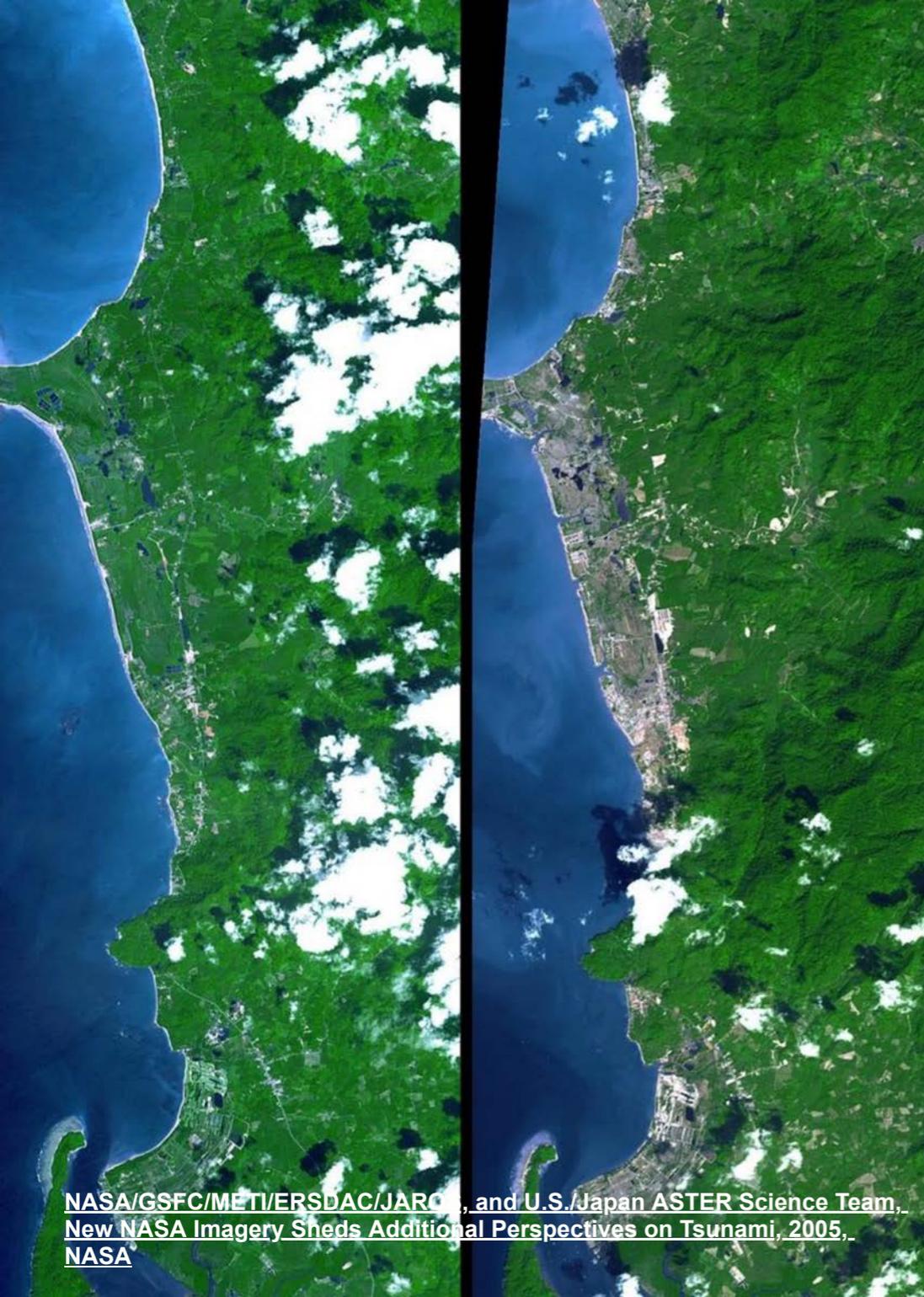
What's this chapter about?
Tsunamis



What will I do?
Explore some extra facts about tsunamis
Paint your own tsunami



How long will this chapter take?
45 minutes



[NASA/GSFC/METI/ERSDAC/JAROS, and U.S./Japan ASTER Science Team, New NASA Imagery Sheds Additional Perspectives on Tsunami, 2005, NASA](#)

Imagine a wall of water, 100 ft high, rushing towards you. That's what it's like to face a tsunami.

A tsunami (pronounced soo-nah-mee) is a series of huge waves, often triggered by an earthquake or underwater volcanic activity.

These walls of water can cause destruction when they crash ashore.

The picture is made up of two images taken from space by NASA. They are of the coast of Thailand, which was directly in the path of a tsunami in 2004.

The image on the left shows the coast in 2002. The one on the right shows it directly after the tsunami hit. The grey areas are where trees and plants have been stripped away by the waves.

This tsunami was caused by an undersea earthquake that was 9.0 on the magnitude scale, the highest possible reading. The tsunami killed an estimated 230,000 people in 14 countries and even triggered earthquakes in Alaska, over 9,000 kilometres away.

As we've seen, earthquakes, volcanoes and tsunamis are all linked and are part of the Earth's natural processes. We must learn to live with them. One community in Chile did just that after a devastating tsunami destroyed their town.



Click [here](#) to explore the days after the tsunami hit Constitución, in Chile.

Questions for Chapter 3

Time for some questions. Here's a reminder of how it works. When you **Discover**, you are comprehending and remembering. When you **Explore**, you are really able to understand it and think it through. When you **Invent**, you are able to comprehend, understand, remember, analyse and do something cool with your new knowledge.

Discover:

How high can a tsunami get?

Explore:

What makes tsunamis so devastating to coastal areas?

Invent:

The picture is a famous work of art from Japan. Called "The Great Wave" by Hokusai, it is thought it depicts a tsunami threatening the boats. How would you paint a tsunami?



Congratulations. You have proven yourself an inventive student of our home planet, the Earth.

Now it's time to continue your journey into science [here](#)

Answers to all the questions

Chapter 1

Discover: What percentage of San Francisco was destroyed in the 1906 earthquake?

Answer: 80%. Bonus marks if the cause of most of the destruction is mentioned.

Explore: Why do you think people still live in areas, such as California, which are prone to earthquakes?

Answers can vary but can refer to a sense of belonging in that location.

Invent: What do you think it would be like to be in an earthquake? See if you can write a short story about it. Tell us how it feels to have something that has always been your friend, dependable earth under your feet, moving and rocking and roaring...

Answers will vary but any form of description is acceptable of surroundings and feelings.

Chapter 2

Discover: What year did Mount Vesuvius erupt, covering the city of Pompeii in ash?

Answer: 79CE

Explore: What do you think it is like to witness a volcanic eruption?

Answers can vary but any form of description is acceptable.

Invent: You can create your own volcano.

Answers will vary.

Chapter 3

Discover: How high can a tsunami get?

Answer: 100 ft.

Explore: What makes tsunamis so devastating to coastal areas?

Answers can vary but should refer to the force of the water.

Invent: How would you paint a tsunami?

Answers will vary.