14 Natural Disasters

Before We Start, Let's Check

What you already know

Look at the pictures given below. Write the name of the disaster each of them shows. Choose words from the box given below.

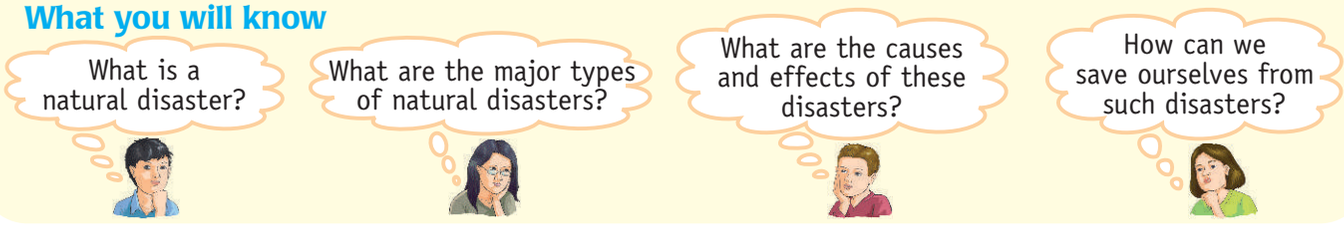
earthquake *flood* *tsunami* *volcanic eruption* *drought*





_____ _____ _____ _____ _____

What you will know



DISASTER

A disaster is an event resulting in great loss and misfortune. When there is a great harm to animal and human life, a widespread damage to buildings and properties and a significant loss to the environment, we call it a disaster.

Disasters can be of two types: man-made disasters and natural disasters.

Man-made disasters

Man-made disasters are disasters that result from human intent, negligence or error.

Terrorist activities, epidemics, fire accidents, road accidents, nuclear disasters, etc are some examples of man-made disasters.

Man-made disasters can be both intentional or unintentional. But they result in huge loss of life and property.

plane crash – a man-made disaster

Natural disasters

Natural disasters are disasters caused by environmental factors.

Earthquakes, floods, droughts, cyclones, volcanic eruptions, etc. are some examples of natural disasters.

Natural disasters can occur at any time or place without a warning. So, they bring with them a lot of destruction and suffering.

In this chapter, we shall learn about some major natural disasters.

landslide – a natural disaster

EARTHQUAKE

destruction by an earthquake

An earthquake is a sudden rapid shaking of the earth's surface.

Earthquakes come in many forms. They can be felt as mild shocks under the feet, or they may be so massive that they can destruct a whole city within seconds.

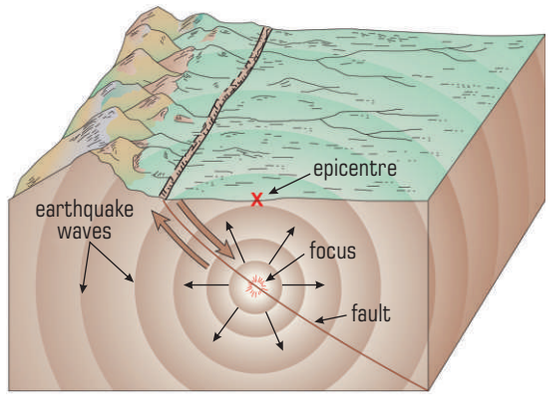
What causes an earthquake?

We have studied that the earth is made up of three layers — crust, mantle and core. Earthquakes develop in the crust of the earth. There are many huge pieces of rocks called, **tectonic plates**, inside the earth.

These plates keep moving around slowly. Sometimes, they slide past each other. Sometimes, they bump each other. These plates have rough edges, called **faults**, because of cracks or breaks.

Sometimes, the edges get stuck but the plates keep moving. Pressure slowly starts to build up where the edges are stuck.

Finally, when the plates have moved far enough, the edges get separated and all the stored energy is released. This energy is radiated in all directions in the form of waves like ripples in a pond.



the process of an earthquake

When the waves reach the earth's surface, they shake the ground. It makes houses, buildings and bridges also shake.

The point under the ground where an earthquake originates is called the **focus**.

The point on the surface of the earth, which is directly above the focus is called the **epicentre**.

Effects of earthquakes

Earthquakes are the deadliest of all natural disasters. Most deaths are caused by collapsing buildings or fires.

Sometimes, the shaking of the ground causes large cracks in roads, grounds, etc.

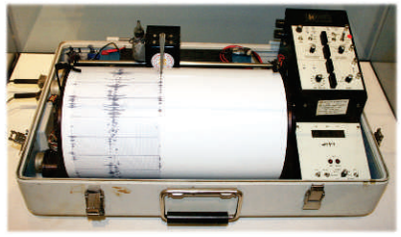
Earthquake may also trigger **landslides** or **avalanches**.

cracks in a road due to an earthquake

Measurement of earthquakes

Earthquakes are recorded by an instrument called the **seismometer**. It produces a pattern of earthquake waves on a paper called **seismograph**.

Scientists known as **seismologists** study the seismograph and try to find out the intensity or magnitude of an earthquake.



a seismometer

The intensity of an earthquake is measured on the **Richter scale**. It starts with magnitude 1 and goes upwards. The larger the number on the Richter scale, the greater is the intensity of the earthquake. Each one-point increase on the scale indicates ten times the amount of shaking.

Here are some examples of what may happen in the earthquakes of different intensities.

- Range from 1 to 2 – a very weak earthquake, most often not felt
- Range from 2 to 4 – a minor earthquake with rare damage
- Range from 4 to 6 – a moderate earthquake with major damage
- Range from 6 to 8 – a strong earthquake, very destructive in a widespread area
- Range from 8 to 10 – a great earthquake, devastating in areas of several thousands of kilometre
- More than 10 – has never been recorded

It is very unfortunate that even today scientists cannot predict earthquakes. The best they can do is to point out where earthquakes are likely to occur.

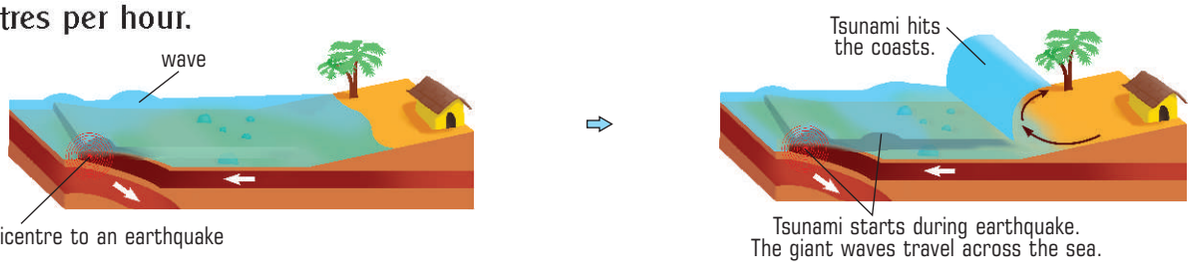
TSUNAMI

tsunami

'Tsunami' is a Japanese word. 'Tsu' means *harbour* and 'nami' means *waves*. Tsunamis are large and powerful ocean waves. They cause destruction and devastation when they reach the seashore.

What causes a tsunami?

Tsunamis are mostly caused by an earthquake under the sea. Due to the earthquake, water first moves at the epicentre. Then large waves spread out in all directions. These waves may travel in the open sea as fast as 800 kilometres per hour.



As the big waves approach shallow waters along the coast, they grow up to as high as 15 metres. Then they smash into the shore with great force and cause great destruction.

FLOODS

flood

A flood is an event where a piece of land that is usually dry gets submerged under water. Flooding may be only a few inches of water or it may cover an entire building. A flood can happen in a few minutes, hours, days or over weeks.

What causes floods?

There are many factors that cause floods.

- Heavy rain is the most common cause of floods. Whenever, there is more rain than the capacity the drainage system can hold, there can be floods.

- Rivers or streams can overflow their banks and cause floods. When the flow rate exceeds the capacity of the river channel, the surrounding area is submerged by water.
- In coastal areas, flooding is caused by high tidal waves or tsunamis.
- Sometimes, too much water is held up in a dam causing the dam to break and overflow the area. As it occurs very quickly and often without a warning, such floods are called **flash floods**.

Effects of floods

- Many people and animals die in floods. Many more get injured or become homeless.
- During floods, roads, bridges, farms, houses and automobiles are destroyed.
- Water supply, electricity and communication networks are disrupted.
- When floodwater recedes, affected areas are covered with silt and mud. The water and land can be contaminated leading to an outbreak of diseases such as cholera, malaria and dengue.

Floods leave many people homeless.

VOLCANIC ERUPTION

A **volcano** is an opening in the earth's surface from which molten rocks, ash and gases escape out.

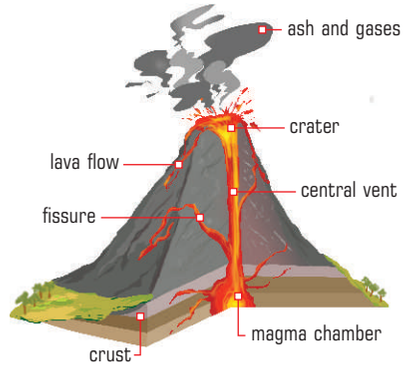
All volcanoes do not lead to disasters, only some massive volcanic eruptions do.

a volcanic eruption

What causes a volcanic eruption?

We have read that inside the earth there are hot molten rocks called **magma**. It is located deep within the mantle of the earth. Some of this magma often comes up and collects in cracks in the earth's solid crust. Some large chambers also fill with magma. When extreme pressure builds in such chambers, the magma gushes out through the spaces in the crust to the surface. It is called a volcanic eruption.

Sometimes, the magma comes out of a vertical tunnel, called **vent**, with great force. The small hollow opening on the mouth of the volcano through which magma erupts is called the **crater**. Such volcanoes erupt with a huge explosion. They can send ash high into the air over 30 kilometres above the earth's surface.



the process of a volcanic eruption

Magma may also come out quietly and gently through long cracks on the surface called **fissures**.

When magma comes out on the surface of the earth, it is called **lava**. Lava spreads on the surface and on cooling, forms igneous rocks.

Types of volcanoes

On the basis of the occurance of eruption, volcanoes can be divided into three types — active, dormant and extinct volcanoes.

1. Active volcano

A volcano is considered active if it is erupting or it has erupted within known history.

2. Dormant volcano

A dormant volcano is one that has not erupted for the past 10,000 years but could erupt again.

3. Extinct volcano

An extinct volcano is one that is not expected to erupt again as it has been cut off from its supply of magma.

DROUGHT

Drought occurs when there has not been enough rainfall over a long period of time.

When a place faces drought, it is dry and hot. Due to lack of rain, the ground has no moisture. Cracks appear in the soil.

Rivers, lakes, streams and other sources of water dry up.

drought

What causes drought?

Drought has many causes.

- Drought can occur when there is less than normal rainfall or snowfall.
- At some places, most of the water comes from rivers or streams. There drought may occur if these sources of water dry up. Hydroelectric dams and irrigation systems affect the flow from their sources upstream.
- Deforestation leads to less rainfall. Without a proper tree cover, surface water is more exposed to the sun and evaporates. In the absence of trees, the ability of the ground to hold water also reduces. All these factors speed up the onset of drought.

Effects of drought

Drought affects us in many different ways.

- Drought creates a shortage of clean water for drinking, sanitation and personal hygiene. It can lead to a number of diseases and cause an **epidemic**.
- Drought leads to shortage of food crops as well as grass and grains used to feed animals. This creates another disaster called **famine**.
- As water bodies dry up, water animals in them die. It affects food chains and the ecosystem.
- People and animals migrate to other areas in search of better living conditions.

Words to Remember

disaster	–	an event resulting in great loss and misfortune
earthquake	–	a sudden rapid shaking of the earth's surface
tectonic plates	–	massive, irregularly shaped slabs of rocks that glide over the mantle
fault	–	an area of stress in the earth where tectonic plates slide past each other, causing a crack in the earth's crust
focus	–	the point of origin of an earthquake
epicentre	–	the point on the earth's surface that is directly above the focus of an earthquake
avalanche	–	a large mass of snow sliding down a mountain
seismologist	–	a scientist who specialised in the study of earthquakes
tsunami	–	large powerful ocean waves often caused by an undersea earthquake
flood	–	the overflowing of water onto land that is normally dry
flash flood	–	a flood that occurs very quickly and often without a warning
volcano	–	an opening in the earth's crust through which lava, ash and hot gases escape out
magma	–	hot molten rock material under the earth's crust
crater	–	a large hollow forming the mouth of a volcano
fissures	–	long cracks on the surface of the earth through which magma flows out gently
lava	–	magma that reaches the earth's surface through a volcano
drought	–	an abnormally long period of time during which there is very little or no rain
epidemic	–	an outbreak of a contagious disease that spreads rapidly and widely
famine	–	a situation in which there is not enough food for a great number of people

Points to Recall

- Disasters are incidents that occur suddenly and cause great loss of life and damage to property.
- Disasters can be man-made or natural.
- Accidents, terrorist activities, epidemics, etc. are some man-made disasters.
- Earthquakes occur due to the gliding of tectonic plates against each other.
- Seismologists find out the intensity of earthquakes with the help of the seismometer.
- Tsunamis are large powerful ocean waves caused by undersea earthquakes.
- Tsunamis cause great destruction on islands and in coastal areas.
- Heavy rain, overflowing of rivers and high tidal waves are major causes of floods.
- Floods cause loss of human and animal life as well as the destruction of property.
- A volcano erupts when underground magma escapes out from the earth's crust due to excessive pressure.
- Volcanoes can be of three types: active, dormant and extinct volcanoes.
- A prolonged period of little or no rain leads to drought.
- An acute food shortage due to drought creates famine.

Exercises

A. Tick (✓) the correct option.

1. Which of the following is a man-made disaster?

(a) cyclone ☐ (b) flood ☐ (c) terrorism ☐ (d) tsunami ☐

2. Which of the following may be caused by an earthquake?

(a) avalanche ☐ (b) landslide ☐ (c) both (a) and (b) ☐ (d) none of these ☐

3. Which of the following lies on the surface of the earth?
   (a) focus (b) epicentre (c) tectonic plate (d) all of these
4. Which of the following may be the reason of floods?
   (a) heavy rain (b) overflowing river (c) tsunami (d) all of these
5. Drought may result in
   (a) tidal waves (b) famine (c) a volcanic eruption (d) all of these

B. Choose the appropriate word and fill in each blank.

1. A _____ shows a pattern of earthquake waves on paper. (*seismometer* / *seismograph*)
2. 'Tsunami' is a _____ word. (*Japanese* / *Chinese*)
3. The hollow opening through which magma erupts is called the _____. (*vent* / *crater*)
4. An _____ volcano is not expected to erupt again. (*extinct* / *active*)
5. _____ speeds up the onset of drought. (*Afforestation* / *Deforestation*)

C. Answer in one or two words only.

1. What are the cracks and breaks in tectonic plates called? _____
2. Name the point where an earthquake originates. _____
3. What are scientists who study earthquakes called? _____
4. What man-made structure may cause flash floods? _____
5. Do all volcanoes lead to disaster? _____

D. Answer in one sentence only.

1. What is a disaster?
2. What do you understand by flash floods?
3. Differentiate between magma and lava.
4. Differentiate between dormant and extinct volcanoes.
5. How does drought affect food chains?

E. Answer in a few sentences.

1. Differentiate between natural and man-made disasters with examples.
2. Explain the cause of an earthquake.
3. What is the Richter scale? Explain its use.
4. How does a tsunami occur? Explain.
5. Write any three consequences of floods.

Creative Skills

BRAINSTORM

1. How may plastic bags, wrappers and packets lead to floods?
   [*Clue: Blocking of the drainage system*]
2. Why are scientists not able to predict earthquakes?

Tell Your Teacher

Read the following activities. Tell your teacher what right or wrong thing each child does.

- Sunny is playing football with his friends in a field. Suddenly, he feels the ground under his feet shaking. All children start running here and there. Gaurav, one of Sunny's friends, runs and stands under a tree. Sunny stops him from doing so and advises all the children to lie face down in the open.
- Shruti and her family live in a coastal town. Yesterday, they heard a warning of a cyclone hitting the coast soon that may result into a flood. So today they are evacuating the town. Before leaving the house, Shruti makes sure that the main power supply is switched off. Then, she insists that all members of the family should go in one vehicle only.

FIND OUT

What is the Ring of Fire? Where is it located?

_____

_____

What was Pangea? Who gave this idea?

_____

_____

Project

1. Write a brief report on any one of the following natural calamities.
   - Mumbai floods of 2005
   - The Indian Ocean tsunami of 2004
2. Take a sheet of chart paper. Using colour pens, write ten safety measures that should be followed during an earthquake.

Activity Time

Making a volcano model

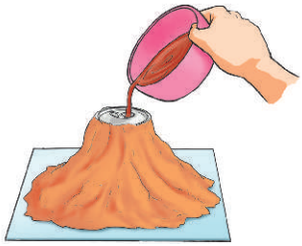
Steps

1. Take a cold drink can and put it on a sheet of wax paper.

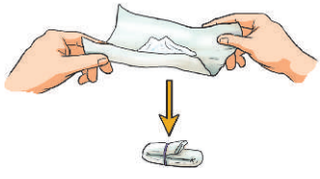
2. Mold some clay on the can to give it the shape of a volcano. Leave it for one hour.

3. Take some vinegar in a bowl and put red food colour in it.

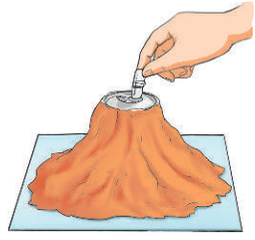
4. Mix a tablespoon of detergent with it.



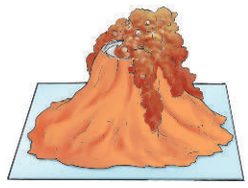
5. Pour the mixture into the volcano.



6. Take some baking soda on a tissue and close it with rubber bands.



7. Drop the baking soda roll in the volcano.



8. Step away and observe. Once the paper dissolves, the volcano will explode.

Revision Exercise 2

(Based on chapters 8 to 14)

A. Tick (✓) the correct option.

1. Which of the following is not a greenhouse gas?
   (a) oxygen ☐ (b) carbon dioxide ☐ (c) methane ☐ (d) ozone ☐
2. Which of the following is not an igneous rock?
   (a) pumice ☐ (b) marble ☐ (c) basalt ☐ (d) granite ☐
3. Which of the following is a non-renewable resource?
   (a) sunflower oil ☐ (b) soya bean oil ☐ (c) crude oil ☐ (d) all of these ☐
4. The moon takes about _____ days to orbit the earth.
   (a) 29.5 ☐ (b) 27.5 ☐ (c) 27.3 ☐ (d) 29.3 ☐
5. Which is the coldest layer of the atmosphere?
   (a) troposphere ☐ (b) mesosphere ☐ (c) stratosphere ☐ (d) thermosphere ☐
6. Which of the following is an opaque object?
   (a) coin ☐ (b) glass tumbler ☐ (c) butter paper ☐ (d) none of these ☐
7. During a lunar eclipse, the moon's colour changes into
   (a) grey ☐ (b) orange ☐ (c) black ☐ (d) purple ☐
8. Drought may result in
   (a) tidal waves ☐ (b) famine ☐ (c) a volcanic eruption ☐ (d) all of these ☐

B. Write 'T' for true statements and 'F' for false ones.

1. The ozone layer stops the heat of the sun from escaping into space. ☐
2. The crust is the thinnest layer of the earth. ☐
3. During a total lunar eclipse, the moon hides the sun completely. ☐
4. Coal is precious because it is a by-product of petroleum. ☐
5. Satellites orbit the earth in the exosphere. ☐

C. Fill in each blank choosing the correct word.

1. We can extract iron from _____ ore. (*pyrite* / *haematite*)
2. A _____ shows a pattern of earthquake waves on paper. (*seismometer* / *seismograph*)
3. The phases of the moon from a full moon to a new moon is called _____. (*waxing* / *waning*)
4. _____ is the most abundant gas in the atmosphere. (*Hydrogen* / *Nitrogen*)
5. _____ are a source of fresh water. (*Seas* / *Ice caps*)

D. Identify the following and write their names.

1. 

2. 

3. 

4. 

5. 

E. Answer in one or two words.

1. Name the closest star to the earth.
2. What do we call the impurities settled at the bottom of still water?
3. Name the two metals present in the core of the earth.
4. Name one gas responsible for acid rain.
5. Which rock is used to make blackboards?

F. Answer in one sentence.

1. How are we able to see the surface of the moon clearly through a telescope?
2. What is a fossil?
3. How do trees help in causing rain?
4. How much time does sunlight take to reach the earth?
5. Differentiate between magma and lava.

G. Answer in a few sentences.

1. How does the atmosphere help in maintaining the right amount of heat on the earth?
2. Explain the phenomenon of global warming caused by the greenhouse effect.
3. Explain the cause of an earthquake.

H. Think and answer.

1. How does deforestation create imbalance in nature?

   or

   Why do some pumice stones float on water?
2. Can we talk on the moon? If not, why?

   or

   Why does a scrap dealer *(kabadiwala)* buy old newspapers and other used items from houses?