

Leaving Certificate

Geography

Earthquakes and Volcanoes

Please see *Teachers' Notes* for explanations, additional activities, and tips and suggestions.

Levels	Students' English-language skills should be developed to Level B1 during funded Language Support. Mainstream subject learning will require the development of skills at Level B2 if students are to cope with public examinations.	
Language focus	Key vocabulary, word identification, sentence structure, extracting information from text, writing text, grammar.	
Learning focus	Using Geography textbooks and accessing curriculum content and learning activities.	
Acknowledgement	The <i>English Language Support Programme</i> gratefully acknowledges the permission of Gill and Macmillan to reproduce excerpts from <i>Dynamic Human Geography</i> by Patrick O'Dwyer, Barry Brunt and Charles Hayes.	
Contents of this Unit		Page
	Keywords	3
	Vocabulary file	4,5
	Activating students' knowledge	6
	Focus on vocabulary	7,8,9
	Focus on grammar <i>(sentence order, verbs with prepositions, completing text, nouns and adjectives)</i>	10,11
	Focus on reading	12,13,14
	Focus on writing <i>(writing paragraphs)</i>	15
	Answer Key	16,17,18,19

Using this unit

Language support and mainstream subject class

The sections *Activating students' knowledge*, *Focus on vocabulary*, and *Focus on grammar* have been designed, in particular, for Language Support classes.

Focus on reading and *Focus on writing* are suitable for use in either Language Support or subject classes.

Answer Key

Answers are provided at the end of the unit for all activities except those based on free writing.

Textbooks

This unit focuses on the sections *Earthquakes and Volcanoes* of the Leaving Certificate Geography curriculum. Students will need to use their textbooks if they are to gain the most benefit from the activities.

Learning Record

The Learning Record is intended to help students monitor their progress. This can be downloaded or printed from the website in the section *Advising Students and Record of Learning for the Leaving Certificate*. A copy of the Learning Record should be distributed to each student for each Unit studied.

Students should:

1. Write the subject and topic on the record.
2. Tick off/date the different statements as they complete activities.
3. Keep the record in their files along with the work produced for this unit.
4. Use this material to support mainstream subject learning.

Symbols

Symbols are used throughout the unit to encourage students to develop their own learning and support materials.



prompts students to file the sheet when they have completed the activity. This is used for activities which can be used as a reference in the future e.g. for subject classroom, revision, homework etc.



prompts students to add vocabulary, definitions, or examples of vocabulary in use to their own personal glossary for the topic. A personal glossary makes study and revision more efficient.

Keywords

Nouns

ash
basalt
billion
boundary/boundaries
cause
cloud
cone
continental crust
continental drift
core
crust
damage
deposits
depth
distribution
earth
earthquake
earth's crust
effects
epicentre
fault
faulting
focus
folding
gases
geysers
glacier
hot spots
landslide
lava
liquefaction
liquid rock
lithosphere
location
magma
magnitude
mantle rock
minerals
mineral deposits
mobility
molten rock
motion
movement
ocean floor
ocean trench
planet
plate
plate tectonics
process
pyroclastic clouds

rifting
rock
rock layer
sea floor
seismograph
seismology
separation
significant relevant
points (SRPs)
structure
subduction
surface
tectonic cycle
tension
theory
tremors
tsunamis
type
vent
volcanic ash
volcano/volcanoes
waves

Verbs

to adjust
to bulge
to change
to collide
to compress
to confine
to crack
to create
to destroy
to erupt
to expand
to explode
to fold
to forecast
to form
to get stuck
to jam
to measure
to melt
to metamorphose
to move
to occur
to overheat
to predict
to release
to rift
to rise
to separate

to sink
to slide
to subduct
to transfer
to transform
to underlie

Adjectives

active
affected
close
convergent
divergent
cool
curved
deep
dormant
fast
geothermal
hot
huge
minor
molten
rigid
seismic
shallow
slow
strong
volcanic
cone-shaped

Proper Nouns

(names of places or people)
The Pacific Ocean
California
Great Rift Valley
Mercalli scale
Mt. Etna
Mt. Vesuvius
Pacific Ring of Fire
Richter scale
San Andreas Fault

Phrases

flow sideways
moving apart
opposite directions
same direction
over millions of years

NAME: _____ DATE: _____
Leaving Certificate GEOGRAPHY: Earthquakes and Volcanoes

Vocabulary file for the topics
Earthquakes and Volcanoes

Word	Meaning	Page(s) in my textbook	Note
rifting			
faults			
plates			
crust			
to undulate			
magnitude			
prediction			
seismic gaps			
stress			
liquefaction			



NAME: _____ DATE: _____
Leaving Certificate GEOGRAPHY: Earthquakes and Volcanoes

Word	Meaning	Page(s) in my textbook	Note
landslides			
tsunami			
epicentre			
vent			
fissure			
lava			
pyroclasts			
gas bubbles			
viscous lava			
basalt plateaus			
seismograph			



Introduction

Activating students' existing knowledge

Use a spidergram to activate students' ideas and knowledge on the key points in this chapter. See **Teachers' Notes** for suggestions.

Possible key terms for the spidergram:

Volcanoes around the world

Earthquakes

- Invite students to provide key words in their own languages.
- Encourage dictionary use.
- Encourage students to organise their vocabulary into relevant categories (e.g. meaning, nouns, keywords, verbs etc.).



Students should record vocabulary and terms from the spidergram in their personal dictionaries.

Level: B1 Individual / pair

Focus on vocabulary

1. Missing words (Earthquakes)

The following sentences are taken from your textbooks. They describe what happens during an earthquake. The key words are missing. First, check that you understand the meanings of the key words in the box below, then read the sentences and fill in the gaps.

- a) _____ over a hot spot splits a continent into new plates.
- b) The majority of earthquakes occur along _____ boundaries.
- c) The Richter Scale indicates the _____ of an earthquake.
- d) A _____ is used for planning building regulations, evacuation and emergency procedures.
- e) _____ occurs when very thick silt or sand is saturated with water.
- f) When the earth is shaken, the movement of ground on steep slopes causes _____.
- g) A _____ is formed by a sudden change in the sea floor.

liquefaction magnitude landslides plate rifting forecast tsunami
--

2. Matching (Earthquakes)

Match each term in Column A with a definition in Column B. Draw a line between them. Look at your text book if you need help.



Column A	Column B
epicentre	Locations in the ocean ridges where new crust is being created or old crust is being recycled
foreshocks	Parts of the earth's crust that are moving
seismic gaps	The point on the earth's surface directly above an earthquake
tectonic plates	Small earthquakes that occur before a great earthquake.
subduction zones	Places along fault lines that have been quiet for a long time.

3. Completing sentences (Volcanoes)

Choose the best word or phrase to complete the sentences below. Put a), b) or c) in the space.

- 1) Volcanic activity occurs where plates separate and collide and also at ____ .
a) batholiths b) hot spots c) lava
- 2) When magma reaches the surface it is called ____ .
a) lava b) gas c) fissures
- 3) _____ are particles of rock that are blasted from a volcano.
a) stones b) pyroclasts c) ash
- 4) _____ makes lava thick.
a) rock b) gas c) silica
- 5) You can find _____ at sites of past volcanic activity, for example in Iceland.
a) hot spots b) hydrothermal areas c) subduction zones

4. Opposites

Complete the grid by writing the opposites of the adjectives in Column 1. Use your keyword list, dictionary or textbook for help if necessary.

Column 1	Opposite
active	
cool	
shallow	
convergent	
fast	
strong	



5. Identifying vocabulary

Circle the words, terms or proper nouns in the box that relate to **volcanic activity**. The other terms in this box are all related to different topics in Geography. Look through your textbook if you are not sure.

lakes	geothermal energy	blow hole
	magma	tidal current
coastal erosion		Mt. Etna
		transport
cinders	Ireland	population
migration		
molten rock	fissures	geysers
climate	urban-industrial	push and pull
Hawaii	basalt plateaus	hot springs
		peripheral regions

What do these words mean in this topic?

geysers _____

cinders _____



6. Vocabulary in use (Earthquakes)

Write a short sentence using each of the following words/phrases. Check your text book or dictionary if you need help.

rifting _____

focus _____

body waves _____

landslides _____

sea floor _____



Level: B1
Individual / pair

Focus on grammar

7. Sentence order

Put the words in the correct order to form sentences. These sentences are all in the form of SRPs (significant relevant points). These are the type of statements that you use when writing answers.

Don't forget to use capitals for proper names and remember your punctuation!

a) occurs where activity volcanic separate and plates collide

b) is a silicon material silica formed from oxygen and

c) steep acid forms lava cones

d) the indicates richter magnitude earthquake of scale the an

e) by surface released waves are close an earthquake surface and travel to the

f) can lasers the fault across movement of rocks a measure line

8. Verbs followed by prepositions

You will find verbs that are followed by prepositions in your textbook. These sentences are taken from a textbook. Put prepositions from the box below into the spaces. Then make a list of the verbs with their prepositions below.

It is important to learn the preposition at the same time as you learn the verb.

- a) Long range forecasts are based _____ the idea that earthquakes are repetitive.
- b) Small changes warn us that strain is building _____ .
- c) Landslides cut _____ communities.
- d) When a sheet of magma cuts _____ bedding planes, it hardens to form a dyke.
- e) Steeply sloping cones are formed _____ viscous lava.

up from off on across



9. Verbs

Use the verbs in brackets to complete this text.

Be careful about the following:

- The verbs will be used in **active** and **passive** forms.
- Some verbs will be in the **present** and some in the **past** tense.
- Check whether the verb refers to a **singular** or **plural** noun.

The positive effects of volcanic action

Tourism _____ (to be) a major industry based directly on volcanic structures such as craters, volcanic cones or geysers. Every year Mt Vesuvius _____ (to attract) hundreds of thousands of tourists, who _____ (to pay) a fee _____ (to climb) this dormant volcano. Nearby sites such as Pompeii, which _____ (to devastate) when Vesuvius _____ (to erupt) in AD 79, also _____ (to attract) many visitors.

In Iceland natural steam _____ (to use) to generate electricity. The geothermal energy produced is used to heat houses, grow tomatoes and provide pools for swimming all the year round, even though the temperatures outside may be well below freezing. The volcanic landscape in Iceland _____ (to be) a major tourist attraction.

Volcanoes can also _____ (to create) new land in the sea. Many islands which _____ (to create) in this way, as for example the islands that form Japan, _____ (to be) among the most densely populated regions on earth.

10. Nouns to adjectives

Below are five nouns commonly used in the topics earthquakes and volcanoes. Change the nouns to adjectives, then put each adjective into a phrase or sentence. Doing this exercise will help you to remember these words and how to use them. You can use your textbook to help you.

(Noun: a word that refers to a person, place or quality. For example book, beauty. Adjective: a word that describes a noun. For example big, boring).

Noun	Adjective	Sample sentence
volcano		
depth		
mobility		
pyroclast		
structure		

Level: B1 / B2 Individual / pair

Focus on reading

11. Read the text and indicate with a tick (✓) whether the statements below are True or False.

Hot spots

Some volcanic activity occurs away from plate boundaries. It is localised and confined to specific spots on the earth's crust, such as Hawaii or the Canary Islands. These places are called hot spots. Some hot spots are located at plate boundaries, e.g. in Iceland.

Most evidence indicates that hot spots remain stationary. Only about twenty of the 120 hot spots that are believed to exist are near plate boundaries.

Hot spots are usually hot areas found deep within the earth's mantle. Some geologists believe that narrow columns of hot magma, called plumes, rise through the mantle to the surface in the way smoke rises through a chimney. These plumes can split continents or create volcanoes, as in Hawaii.

A hot spot under Iceland is thought to be responsible for the regular volcanic activity on the island, which is sited on the Mid Atlantic Ridge. Another hot spot is believed to exist beneath the Canary Islands.

	True	False
Volcanic activity only occurs at plate boundaries.		
Hot spots are found in specific places on the earth's crust.		
Hot spots are moving all the time.		
There are only 20 hot spots in the earth's crust.		
Hot spots are near the earth's surface.		
Plumes are columns of hot magma.		
Plumes can create volcanoes.		
Iceland is situated on the Mid Atlantic Ridge.		



12. Reading for the main idea

It is not always necessary to read through every sentence and paragraph of text. Nor do you have to understand every single word. However, It is important to read with a purpose.

1. In this exercise you must read each paragraph (taken from your textbook) to decide on the main idea of that paragraph.
2. Then write **a phrase** on the blank line which **summarises** the topic of the paragraph.

You should **try** to read quickly, without stopping to check every word. However, sometimes it is necessary to read with more focus when the topic is not immediately clear.

a) Topic: _____

As magma rises, gases dissolved in the magma expand and bubble off, as water does when it is boiled. The resulting froth creates tremendous outward pressure that forces the magma upward. As the magma meets groundwater near the surface, the volcano becomes like a pressure cooker. The volcanic mountain bulges. Finally the expanding gases push through cracks in the volcano. When they reach the surface, the pressures are suddenly released. The bubbles expand dramatically and the volcano erupts in an explosion of ash and molten rock.

b) Topic: _____

There is often an increase in the frequency of minor earthquake tremors (mild shaking of the ground) before a volcanic eruption. Having decided that a volcano may erupt in the foreseeable future, geologists set up a number of seismographs around the sides of the summit of the volcano. These help to track the location, strength and frequency of earthquakes.

c) Topic: _____

Many mineral deposits form from mineral-rich fluids that escape from magma. These fluids are very hot and under tremendous pressure as they escape through cracks or faults in the crust. Some fluids cool along these cracks, or faults, and form mineral veins. Others are 'sweated' into rocks where they form mineral ores, such as copper ore or zinc ore.

d) Topic: _____

Small changes can warn us if strain is building up and close to snapping. These include an increased uplift of land. If there is a noticeable change in movement of the surface level, it is a sign of increased stress on rocks.

e) Topic: _____

The sudden movement of the sea surface creates waves that radiate out from the epicentre across the ocean surface and may cause damage and loss of life even thousands of kilometres from where they originate. Similar waves may be created by coastal landslides or by volcanic eruptions at sea.

13. Reading for specific information

Read the following extract from your textbook. Don't read slowly though every word and sentence.

Read the questions first

Read the text in order to find the answers.

Underline the key sentences when you have found the answers.

Tip: It's a good idea to time yourself so that you learn how to find important information quickly.

Questions:

1. What was the magnitude of the Kashmir earthquake?
2. Where was the epicentre located?
3. Where was the focus of the earthquake?
4. What were schoolchildren doing at the time?
5. Why did people not have time to escape?
6. What happened to the villages in the area?

The 2005 Earthquake in Kashmir

The Kashmir earthquake in October 2005 measured 7.6 on the Richter Scale, the same strength as the 1906 earthquake in San Francisco. Over 79,000 people died and more than 3.3 million people were left homeless, only weeks before the start of the winter snows.

The epicentre was located in the Pakistan-administered region of Kashmir, a territory disputed with India that is by far the most earthquake-prone region in the mountains. Kashmir lies in the area where the Eurasian and Asian tectonic plates are colliding. Out of this collision, the Himalayas began uplifting 50 million years ago, and continue to rise by about 3 mm per year. The focus of the earthquake was located at a depth of 26 km below the surface. About 50 million people are at risk from Himalayan quakes.

The earthquake caused widespread destruction in northern Pakistan, as well as damage in Afghanistan and the Kashmir valley in northern India. As the earthquake struck on a Saturday and this is a normal school day in the region, most students were at school at the time. Many were buried under collapsed school buildings. Many other people were trapped in their homes and, because it was also the month of Ramadan when most people were taking a nap after their pre-dawn meal, they did not have time to escape during the quake. Reports confirmed that entire towns and villages were completely wiped out in northern Pakistan, with other surrounding areas suffering severe damage.

Level: B1 / B2
Individual / pair

Focus on writing

14. Writing a paragraph

Remember!

- A paragraph is a unit of information unified by a central controlling idea.
- Paragraphs should focus on one piece of information.
- The main idea in a paragraph is often expressed in one particular sentence (called the topic sentence). This sentence is usually at the beginning of a paragraph, but can come at the end or even in the middle.
- It is important to organise the information logically in a paragraph.

a) Write a paragraph on the topic *Volcanic Activity*.

Include a sentence about each of the following points. Use your **textbook** if you need to check the information.

- Where volcanoes occur
- How volcanoes explode
- What is ejected from volcanoes?
- What are Hot Spots and where are these found?

b) Write a paragraph on the topic *Earthquakes*.

Include a sentence about each of the following points. Use your **textbook** if you need to check the information.

- What are the causes of earthquakes?
- Where do earthquakes occur?
- What types of earthquake waves are there?
- How are earthquakes measured?
- How do seismologists study earthquakes? – name some of the methods used

Answer Key

Focus on vocabulary

1. Missing words (Earthquakes)

- a) **Rifting** over a hot spot splits a continent into new plates.
- b) The majority of earthquakes occur along **plate** boundaries.
- c) The Richter Scale indicates the **magnitude** of an earthquake.
- d) A **forecast** is used for planning building regulations, evacuation and emergency procedures.
- e) **Liquefaction** occurs when very thick silt or sand is saturated with water.
- f) When the earth is shaken, the movement of ground on steep slopes causes **landslides**.
- g) A **tsunami** is formed by a sudden change in the sea floor.

2. Matching (Earthquakes)

Column A	Column B
epicentre	The point on the earth's surface directly above an earthquake
foreshocks	Small earthquakes that occur before a great earthquake.
seismic gaps	Places along fault lines that have been quiet for a long time.
tectonic plates	Parts of the earth's crust that are moving
subduction zones	Locations in the ocean ridges where new crust is being created or old crust is being recycled

3. Completing sentences (Volcanoes)

- 1. b)
- 2. a)
- 3. b)
- 4. c)
- 5. b)

4. Opposites

Column 1	Opposite
active	dormant
cool	hot
shallow	deep
convergent	divergent
fast	slow
strong	weak

5. Identifying vocabulary

lakes	geothermal energy	blow hole
	magma	tidal current
coastal erosion		Mt. Etna
		transport
migration	cinders	Ireland
		population
molten rock	fissures	geysers
climate	urban-industrial	push and pull
Hawaii	basalt plateaus	hot springs
		peripheral regions

geysers = jets of hot water and steam that shoot into the air

cinders = pyroclasts that are the size of peas

Focus on grammar

7. Sentence order

- Volcanic activity occurs where plates separate and collide.
- Silica is a material formed from silicon and oxygen.
- Acid lava forms steep cones.
- The Richter Scale indicates the magnitude of an earthquake.
- Surface waves are released by an earthquake and travel close to the surface.
- Lasers can measure the movement of rocks across a fault line.

8. Verbs followed by prepositions

- Long range forecasts are based on the idea that earthquakes are repetitive.
- Small changes warn us that strain is building up.
- Landslides cut off communities.
- When a sheet of magma cuts across bedding planes, it hardens to form a dyke.
- Steeply sloping cones are formed from viscous lava.

9. Verbs

The positive effects of volcanic action

Tourism is a major industry based directly on volcanic structures such as craters, volcanic cones or geysers. Every year Mt Vesuvius attracts hundreds of thousands of tourists, who pay a fee to climb this dormant volcano. Nearby sites such as Pompeii, which was devastated when Vesuvius erupted in AD 79, also attract many visitors.

In Iceland natural steam is used to generate electricity. The geothermal energy produced is used to heat houses, grow tomatoes and provide pools for swimming all the year round, even though the temperatures outside may be well below freezing. The volcanic landscape in Iceland is a major tourist attraction.

Volcanoes can also **create** new land in the sea. Many islands which **were created** in this way, as for example the islands that form Japan, **are** among the most densely populated regions on earth.

10. Nouns to adjectives

Noun	Adjective
volcano	volcanic
depth	deep
mobility	mobile
pyroclast	pyroclastic
structure	structural

Focus on reading

11. Hot spots

	True	False
Volcanic activity only occurs at plate boundaries.		√
Hot spots are found in specific places on the earth's crust.	√	
Hot spots are moving all the time.		√
There are only 20 hot spots in the earth's crust.		√
Hot spots are near the earth's surface.		√
Plumes are columns of hot magma.	√	
Plumes can create volcanoes.	√	
Iceland is situated on the Mid Atlantic Ridge.	√	

12. Reading for the main idea

Suggested answers:

- How a volcano erupts / the process of eruption
- How geologists predict volcanic eruptions
- Volcanoes leave mineral deposits in veins / fluids from magma form mineral ores
- Predicting an earthquake / movement in the earth's surface suggests increased stress
- Volcanoes, earthquakes and landslides cause tsunamis / tsunamis can travel thousands of kilometres

13. Reading for specific information

The 2005 Earthquake in Kashmir

The Kashmir earthquake in October 2005 measured ¹7.6 on the Richter Scale, the same strength as the 1906 earthquake in San Francisco. Over 79,000 people died and more than 3.3 million people were left homeless, only weeks before the start of the winter snows.

The epicentre was located ²in the Pakistan-administered region of Kashmir, a territory disputed with India that is by far the most earthquake-prone region in the mountains. Kashmir lies in the area where the Eurasian and Asian tectonic plates are colliding. Out of this collision, the Himalayas began uplifting 50 million years ago, and continue to rise by about 3

NAME: _____ **DATE:** _____
Leaving Certificate GEOGRAPHY: Earthquakes and Volcanoes

mm per year. The focus of the earthquake was located at ³a depth of 26 km below the surface. About 50 million people are at risk from Himalayan quakes.

The earthquake caused widespread destruction in northern Pakistan, as well as damage in Afghanistan and the Kashmir valley in northern India. As the earthquake struck on a Saturday and this is a normal school day in the region, ⁴most students were at school at the time. Many were buried under collapsed school buildings. Many other people were trapped in their homes and, because it was also the month of Ramadan when ⁵most people were taking a nap after their pre-dawn meal, they did not have time to escape during the quake. Reports confirmed that ⁶entire towns and villages were completely wiped out in northern Pakistan, with other surrounding areas suffering severe damage.