

Leaving Certificate

Geography

Mass Movement

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

Learning Support	Vocabulary, key terms working with text and writing text	Pages 3-8, 10-13
Language Support	Vocabulary, key terms, grammar, working with text and writing text	Pages 3-13
Subject class	Key vocabulary	Pages 3-8
Learning focus	Using Geography textbooks and accessing curriculum content and learning activities.	
Levels for Language Support students	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.	
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.	
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Using this unit

Learning support, language support and mainstream subject class

The sections *Focus on vocabulary*, *Focus on reading* and *Focus on writing* are suitable for **Learning Support**.

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

Focus on vocabulary, *Focus on reading* and *Focus on writing* are suitable for use in **Learning Support**, **Language Support** and **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 section *Mass Movement* 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

amount
angle of slope
debris
deforestation
earth
earthflow
erosion
flood
forest
geology
geologist
gradient
gravity
human activity
lahar
land
landslide
latitudes
loose stones
mass
mass movement
mass wasting
material
moisture
movement
mud
mudflow
rain
rainfall

region
regolith
results
rock
snow
snowfall
slope
slump
slumping
soil
soil creep
solifluction
speed
tremors
type
vegetation
volcano
water content

Verbs

to assist
to creep
to cut
to fall
to include
to meander
to move
to result in
to slide
to tilt

Adjectives

continuous
curved
downhill
downward
falling (adjective)
fast
high
impermeable
large-scale
loose
low
permeable
rapid
slow
small-scale
steep
tectonic
torrential
vertical
weathered

Adverbs

catastrophically
rapidly
slowly
suddenly

NAME: _____ DATE: _____
Leaving Certificate GEOGRAPHY: Mass movement

Vocabulary file for the topic
Mass Movement

Word	Meaning	Page(s) in my textbook	Note
gradient			
material			
vegetation			
soil creep			
terraces			
regolith			
permafrost layer			
solifluction			
slumps			
curved planes			
landslide			

NAME: _____ DATE: _____
Leaving Certificate GEOGRAPHY: Mass movement

Word	Meaning	Page(s) in my textbook	Note
debris pile			
sloping ground			
permeable / impermeable			
grazing			
mudflows			
torrential rain			
human activity			
inhabitants			
coastal cliffs			
unstable sediments			



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:

How does movement of the land change the landscape?

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



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

Language Level: B1
 Individual / pair

Focus on vocabulary

1. Missing words

The following sentences are taken from your textbooks. 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) Mass movement describes _____ movement of material.
- b) Soil _____ is the slowest type of mass movement.
- c) The moving material, which includes soil, loose stones and rock is called _____.
- d) A bog _____ is a type of earthflow.
- e) A slump occurs when blocks of rock or loose debris slide down along _____ planes in response to gravity.
- f) The peat in bogs contains 95 per cent _____.
- g) A mudflow caused by a volcanic eruption is called a _____.

regolith burst water downhill creep lahar curved

2. Matching

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
a rock slide	the collection of material (regolith) at the base of a slope following a landslide
a debris pile	being weak because the material is not joined up, solid
impermeable rock	animals feeding on grass
sheep grazing	a sudden movement of rock down a non-vertical slope
unconsolidated	rock that will not soak up water

What is the opposite of impermeable? _____

What is the opposite of unconsolidated? _____

Note the prefixes!

3. Completing sentences

Choose the best word or phrase to complete the sentences below. Put a), b) or c) in the space. Check your textbook if you are not sure.

- 1) Sudden, large scale, mass movements can be _____.
a) interesting b) catastrophic c) noisy
- 2) Soil particles can be bound together by _____.
a) roots b) water c) rocks
- 3) The rib or stepped pattern on a slope is called _____.
a) wrinkles b) terracettes c) lines
- 4) Slumps usually occur on hills with thick soil, river banks and coastal _____.
a) harbours b) beaches c) cliffs
- 5) _____ activity on a bog can cause a bog burst.
a) human b) insect c) chemical

4. Vocabulary in use

Write a short sentence using each of the following words/phrases. Check your text book for information.

saturated _____

gravity _____

landslide scar _____

gradient _____

farming practices _____



5. Identifying vocabulary

Circle the words or terms in the box that relate to mass movement. Look through your textbook if you are not sure.

investment	landslides	council	vegetation	
erosion	coalfield	creep	mudflow	
communication	solifluction	population	regolith	
soggy	region	gravity	glacier	debris
downpours	snowflakes	deforestation		

Language Level: B1
Individual / pair

Focus on grammar

6. Verbs

Use the verbs in the brackets to complete this text. When the verb is in the passive form, this is indicated in the brackets.

Remember, when you are writing about something in the past, you must use a past tense.

Rock slides _____ (to occur) due to gravity on slopes where bedding planes of rock layers that _____ (to lie) parallel to the surface _____ (to undercut - *passive*) or _____ (to become) too heavy.

The rock mass _____ (to move) downslope when the weight of the surface layers _____ (to be) too great for the slope to support.

Landslides _____ (to occur) on a variety of scales. Most _____ (to be) small, involving blocks up to a few metres across. Some, however, _____ (to be) large enough to be catastrophic. Earthquakes in mountain regions _____ (to cause) landslides. Many such slides _____ (to occur) in Kashmir in Pakistan in 2005 when an earthquake _____ (to shake) this region. They _____ (to restrict) access for getting emergency relief to the wounded and isolated communities in the mountainous region in the Himalayas.

7. The Passive Form

In the following sentences, put the verb in sentences a), c), e), g) into the Present Passive form and the verb in sentences b), d), f) and h) into the Past Passive form. Be careful, all these verbs are **not regular**.

- Some mass movements _____ by the results of weathering. (to cause)
- The Vaiont Dam _____ in the 1960s. (to build)
- In high latitudes or in high mountains, regolith _____ solid. (to freeze)
- The Glenariff Valley _____ by the erosive action of a glacier. (to create)
- A landslide which consists only of regolith _____ a debris slide. (to call)
- Slumping in southern California _____ by earthquakes. (to cause)
- When soils are saturated with water the particles expand and _____ by water molecules. (to separate)
- When a lahar descended the slope of Nevado del Ruiz in 1985, approximately 20,000 residents _____ in the mud. (to bury)

Language Level: B1 / B2 Individual / pair
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Focus on reading

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

Landslides

Slides happen when bedrock, or regolith, breaks away from a slope and shoots downhill on a glide horizon (slope angle) roughly parallel to the slope surface. Slides may move at speeds up to 300km an hour. They are particularly fast when a cushion of air gets trapped beneath the moving mass. In this case, there is hardly any contact between the moving mass and the ground surface, so the mass moves something like a hovercraft. Sometimes rock and debris slides move so fast they have sufficient energy to climb the opposite side of the valley.

Rock slides occur due to gravity on slopes where bedding planes of rock layers that lie parallel to the surface are undercut or become too heavy. The rock mass moves downslope when the weight of the surface layers is too great for the slope to support.

Landslides occur on a variety of scales. Most are small, involving blocks up to a few metres across. Some, however, are large enough to be catastrophic. Earthquakes in mountain regions cause landslides.

	True	False
Landslides travel parallel to the slope surface.		
Landslides usually move slowly.		
Landslides move very fast when there is air trapped beneath them.		
Rockslides occur when the rock layer becomes too heavy for the surface of a slope.		
Landslides are always small.		
Landslides can cause earthquakes.		

9. Reading for the key points

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 (from the same topic) to decide on the key information in that paragraph.
3. Answer the questions beside each box after you have read the text.

You should **try** to read quickly, without stopping to check every word.

Keep your answers to this exercise as you will need them later for a writing task.

<p>Paragraph 1 A bog burst is a type of earthflow. Earthflows occur on sloping ground in regions of heavy rainfall where rock is deeply weathered. These deep soils become mobile when saturated with water and may suddenly slip downslope in response to gravity. This action leaves a curved-shaped scar where the slip begins and a bulge at the base of the slope.</p>	<p>a) What is the topic? b) What direction do the soils slip? c) What shape is the scar left on the landscape?</p>
<p>Paragraph 2 The peat in bogs contains 95% water and 5% solids, so even in its normal state it may become unstable on steep slopes. This risk increases after periods of heavy rain. Some bog bursts may move slowly. Others that are completely saturated with water may move quickly. A slope of 4 degrees is sufficient for a burst to take place, but it may occur on a slope of as little as 2 degrees.</p>	<p>d) How much solid material is there in peat? e) What makes the peat more unstable? f) What gradient will allow a burst to take place?</p>
<p>Paragraph 3 Whether the bedrock is permeable or impermeable will also affect the likelihood of flow. Impermeable bedrock will not soak up water, and the bog surface becomes saturated easily and quickly. The quality and amount of vegetation on the bog surface also has an important bearing on the eventual outcome. Roots from heathers, plants such as rhododendrons and trees such as birch or pines help to prevent downslope movement of bog material.</p>	<p>g) What happens if the bedrock is impermeable? h) Why is vegetation important?</p>
<p>Paragraph 4 Periods of very heavy rain followed by unseasonably long spells of hot, dry weather create the most risk of bog burst. During hot, dry spells, the intricate root system of the upper layer of bog, which under normal conditions acts as an anchor for the bog, starts to shrink and die back. With nothing left to anchor the bog, the peat mass may flow downslope.</p>	<p>i) What type of weather creates the greatest risk of a bog burst? j) What happens to root systems in these weather conditions?</p>

10. 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 is a lahar?
2. What covers the top of many volcanic cones?
3. Where do the most dangerous lahars occur?
4. What is ejected from these volcanoes?
5. What does the hot ash do?
6. What flows through the valleys?

Lahars

Lahars are mudflows caused by volcanic eruptions. Many volcanic cones are so high that they are permanently capped with snow. The most dangerous lahars occur on volcanic cones in fold mountain regions that have been dormant for a long time. Over the years, great depths of snow and ice accumulate on the slopes of these cones. Their slopes are also composed of loose ash and pyroclastic layers.

When eruptions occur in these volcanoes, vast quantities of hot ash are ejected from the crater because the magma is viscous (thick). Viscous lava traps expanding gases. The hot ash lands on the surrounding ice fields and instantly melts the ice and snow. The vast quantities of water released rush downslope, gathering ash and pyroclasts as they go. This creates liquid mud that moves through the valleys at the base of the mountain, carrying along rocks, trees, houses and everything else it can root up on its journey.

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Leaving Certificate GEOGRAPHY: Mass movement

Language Level: B1 / B2
Individual / pair

Focus on writing

11. Writing text from notes

Use the notes that you made when you were answering the questions in Exercise 9 to write a short piece of text on **bog bursts**.

Write 4 short paragraphs each of which contains the key information that you have already identified.

Check your notes to make sure that they are accurate by using your text book.

Note

This is an example of how you can make your own notes with the important information from a particular topic.

Notes are very useful for managing your learning and for revision for tests and exams.

Answer Key

Focus on vocabulary

1. Missing words

- a) Mass movement describes **downhill** movement of material.
- b) Soil **creep** is the slowest type of mass movement.
- c) The moving material, which includes soil, loose stones and rock is called **regolith**.
- d) A bog **burst** is a type of earthflow.
- e) A slump occurs when blocks of rock or loose debris slide down along **curved** planes in response to gravity.
- f) The peat in bogs contains 95 per cent **water**.
- g) A mudflow caused by a volcanic eruption is called a **lahar**.

2. Matching

Column A	Column B
a rock slide	a sudden movement of rock down a non-vertical slope
a debris pile	the collection of material (regolith) at the base of a slope following a landslide
impermeable rock	rock that will not soak up water
sheep grazing	animals feeding on grass
unconsolidated	being weak because the material is not joined up, solid

What is the opposite of impermeable?

permeable

What is the opposite of unconsolidated?

consolidated

3. Completing sentences

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

4. Vocabulary in use

Suggested main points for sentences:

saturated – impermeable bedrock / deep soils can become saturated / heavy rain / downpours / torrential rain

gravity – movement down hills / non-vertical slopes / steep slopes

landslide scar – evidence on slope after movement of rock / debris

gradient – the angle of slope / steeper the slope the faster/more likely

farming practices – the way farmers use the land / grazing / digging drains, ditches

5. Identifying vocabulary

investment	landslides	council	vegetation	
erosion	coalfield	creep	mudflow	
communication	solifluction	population	regolith	
soggy	region	gravity	glacier	debris
	downpours	snowflakes	deforestation	

Focus on grammar

6. Verbs

Rock slides **occur** due to gravity on slopes where bedding planes of rock layers that **lie** parallel to the surface **are undercut** or **become** too heavy. The rock mass **moves** downslope when the weight of the surface layers **is** too great for the slope to support. Landslides **occur** on a variety of scales. Most **are** small, involving blocks up to a few metres across. Some, however, **are** large enough to be catastrophic. Earthquakes in mountain regions **cause** landslides. Many such slides **occurred** in Kashmir in Pakistan in 2005 when an earthquake **shook** this region. They **restricted** access for getting emergency relief to the wounded and isolated communities in the mountainous region in the Himalayas.

7. The Passive Form

- Some mass movements **are caused** by the results of weathering.
- The Vaiont Dam **was built** in the 1960s.
- In high latitudes or in high mountains, regolith **is frozen** solid.
- The Glenariff Valley **was created** by the erosive action of a glacier.
- A landslide which consists only of regolith **is called** a debris slide.
- Slumping in southern California **was caused** by earthquakes.
- When soils are saturated with water the particles expand and **are separated** by water molecules.
- When a lahar descended the slope of Nevado del Ruiz in 1985, approximately 20,000 residents **were buried** in the mud.

Focus on reading

8. Landslides

	True	False
Landslides travel parallel to the slope surface.	√	
Landslides usually move slowly.		√
Landslides move very fast when there is air trapped beneath them.	√	
Rockslides occur when the rock layer becomes too heavy for the surface of a slope.	√	
Landslides are always small.		√
Landslides can cause earthquakes.		√

9. Reading for the key points

Paragraph 1

- a) bog bursts
- b) downslope
- c) curved-shaped

Paragraph 2

- d) 5%
- e) heavy rain
- f) 2 degrees

Paragraph 3

- g) the bog surface becomes saturated
- h) vegetation helps to prevent downslope movement

Paragraph 4

- i) heavy rain followed by long hot dry spells
- j) root systems shrink and die

10. Reading for specific information

Lahars

Lahars are ¹**mudflows caused by volcanic eruptions**. Many volcanic cones are so high that they are permanently capped with ²**snow**. The most dangerous lahars occur on volcanic cones in ³**fold mountain regions that have been dormant** for a long time. Over the years, great depths of snow and ice accumulate on the slopes of these cones. Their slopes are also composed of loose ash and pyroclastic layers. When eruptions occur in these volcanoes, ⁴**vast quantities of hot ash** are ejected from the crater because the magma is viscous (thick). Viscous lava traps expanding gases. The hot ash lands on the surrounding ice fields and ⁵**instantly melts the ice and snow**. The vast quantities of water released rush downslope, gathering ash and pyroclasts as they go. This creates ⁶**liquid mud** that moves through the valleys at the base of the mountain, carrying along rocks, trees, houses and everything else it can root up on its journey.