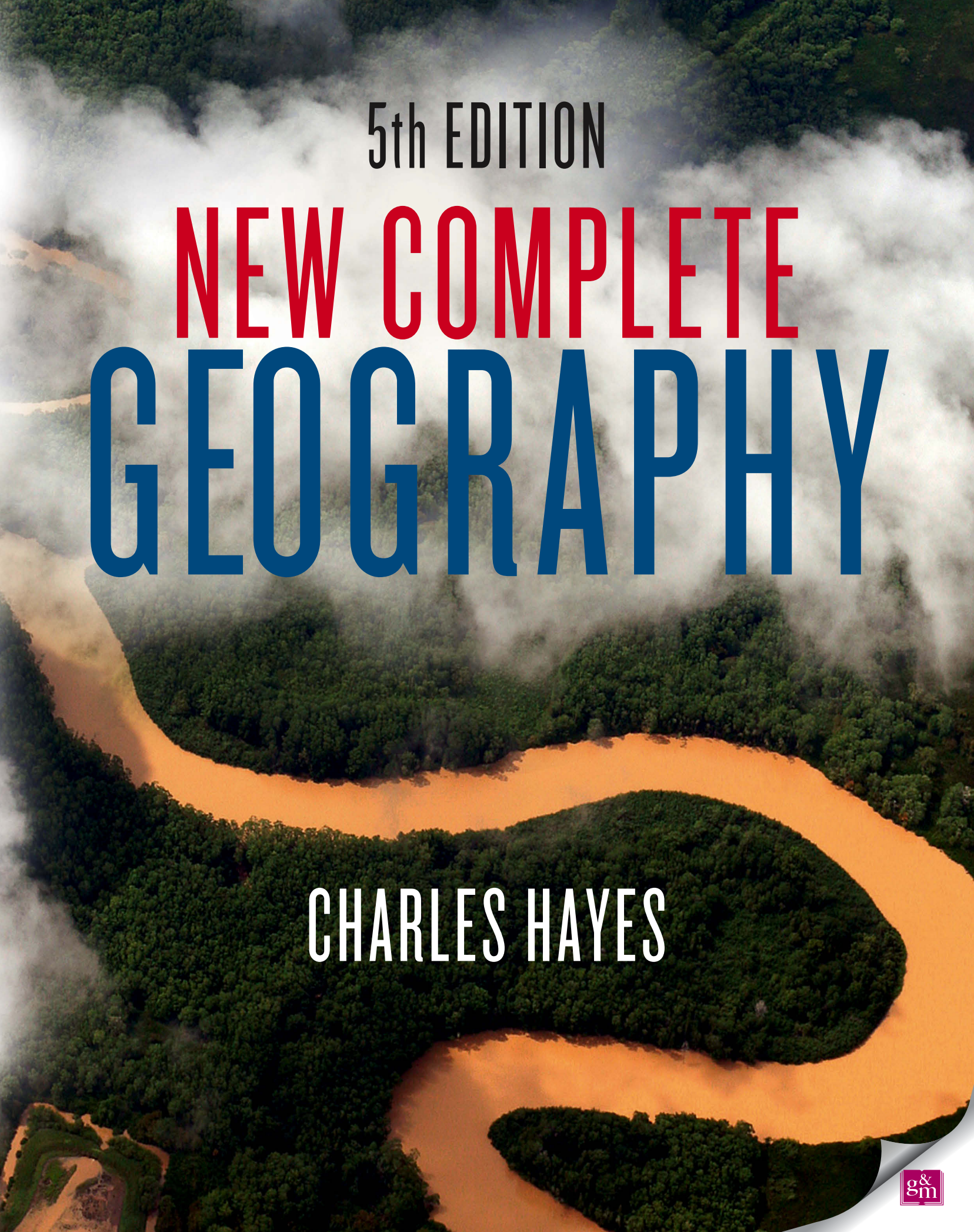
5th EDITION
NEW COMPLETE
GEOGRAPHY
CHARLES HAYES

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5th EDITION

NEW COMPLETE GEOGRAPHY

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Syllabus Section C: Economic Activities

Unit 1: Primary Economic Activities

Unit 2: Secondary Economic Activities

Unit 3: Tertiary Economic Activities

Unit 4: Economic Inequality

Introduction

Welcome to the new edition of ***New Complete Geography*** – the market-leading textbook that spearheads a student-centred and active-learning approach to Geography. Revised and updated, it reflects the changing focus on assessment and ensures that learning is both targeted and satisfying.

- An introduction page to each unit now outlines the **Unit Focus** and the **Key Skills** that the textbook covers within the unit.
- New **Pre-unit Work pages** include *keyword boxes* to improve Geographical literacy and understanding. *Class discussion topics* are also frequently included to ignite student interest in the new topic.
- Each chapter now begins with a **Learning Focus** box that informs teachers and students what they can expect to cover within the chapter.
- Completely **updated text and statistics**, along with **new case studies** on topical issues such as wind farms and electricity pylons, reflect the latest changes in Irish and international Geography. Upcoming changes to OS map symbols are also flagged.
- New **Recap Maps** are included at the end of each chapter. These summarise the key points of each chapter in an attractive visual format that facilitates easy understanding and retention.
- New **Post-unit Work pages** are included at the end of each unit. They include *cloze tests* that re-emphasise chapter summaries in a manner that requires active student inputs.
- This book retains all the features that make it uniquely popular. These include the use of **double-page spread design** to facilitate visual learning. They also include in-chapter activities and the clever use of **caption-questions and other stimuli** that turn hundreds of photographs, diagrams and other illustrations into active-learning tools.
- The **eBook** allows easy access to numerous new and relevant animations, video clips and other exciting aids.
- Our unique **eTest** facility is an online chapter-by-chapter multiple choice assessment tool that allows students to measure their personal progress and achievements.

New Complete Geography Teachers' Handbook

The **New Complete Geography Teachers' Handbook** is now available *free of charge* to teachers. This valuable book contains:

- 23 **continuous assessment tests** that track the textbook and may be photocopied to measure student progress throughout their Junior Cycle course. Each test is accompanied by a marking scheme. An assessment results sheet is also provided.
- **Sample lesson plans**
- **Exam and study tips** that may be photocopied for students or parents
- A **Web-Resource bank** that contains hundreds of useful online weblinks.

New Complete Geography has already helped countless students in Ireland to understand, engage with and enjoy Geography. This completely updated edition will continue to help students reach their maximum potential through active, enjoyable and effective learning. We hope you enjoy it!

Charles Hayes

Dedication

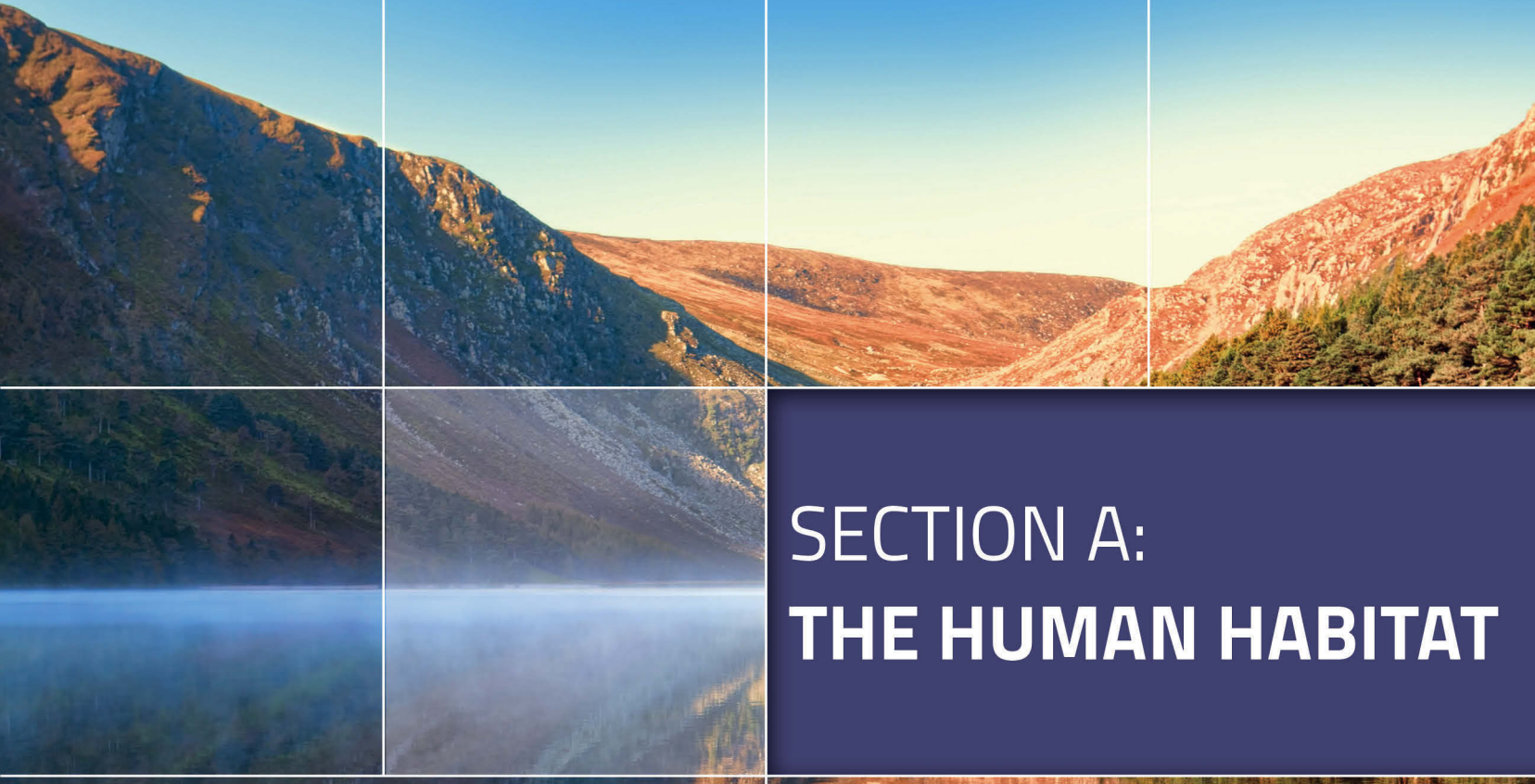
For the

Association of Geography Teachers of Ireland

and

Cork Geography Teachers' Association

which contribute so much to the teaching and learning of Geography.



SECTION A:
THE HUMAN HABITAT

Unit 1: The Earth's Surface: Shaping the Crust

Unit Focus

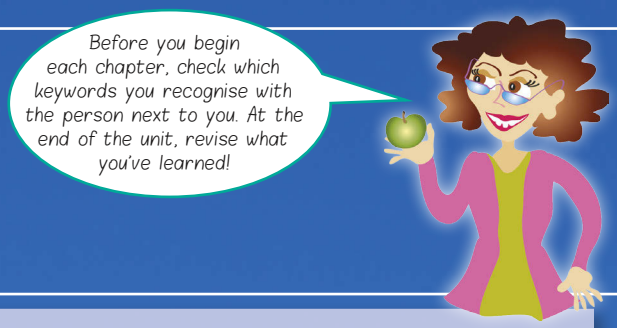
In Unit 1 students will learn and appreciate:

- The causes, locational patterns and effects of folding, earthquakes and volcanoes
- The origins, characteristics and uses of common rocks
- The forces of weathering and mass movement
- The work of rivers, ice and sea

Key Skills

- **Literacy**
  Reading and writing. Interpreting texts, photographs, maps, diagrams and written answers.
- **Managing Myself**
  Using **KWL** (what I already **K**now, what I **W**ant to know, and what I **L**earned) with pre-unit keywords, discussion questions and post-unit cloze tests.
- **Staying well**
  Using pair work, teamwork, oral discussion and debate to be social and confident.
- **Communicating**
  Expressing oneself through discussion, debate, written exercises, sketches and considered responses to stimuli.
- **Being creative**
  Exploring options and alternatives. Imagining. Debating, using written, map and photographic data.
- **Working with others**
  Pair work and group work. Sharing information and working together to reach achievable goals.
- **Managing Information and thinking**
  Researching, selecting and evaluating information. Using digital technology to access information and eTests to evaluate learning. Reflecting on and evaluating learning through shared responses, Recap Map summaries and answering questions.

PRE-UNIT WORK
Unit 1: The Earth's Surface: Shaping the Crust



Ch. 1: The Restless Earth

	Words of wonder	Now we know
1. Crust		
2. Mantle		
3. Core		
4. Plates		
5. Plate boundaries		
6. Continental drift		
7. Fold mountains		
8. Earthquakes		
9. Compression		
10. Volcanoes		
11. Magma		

For Discussion:

(a) Some countries, such as Chile in South America, experience severe earthquakes. Others, such as Ireland, do not. Why?

(b) IMAGINE that a severe earthquake happened during this class. How should you react?

Ch. 2: Rocks

1. Igneous		
2. Sedimentary		
3. Metamorphic		
4. Strata		
5. Compression		
6. Permeable		
7. Natural resource		
8. Quarry		
9. Shaft mine		

For Discussion:

(a) IMAGINE that you could walk back in time and that every one-metre stride you took brought you back 2,000 years. (One stride brings you back to the time of the Roman Empire, two to Ancient Egypt, four to the late Stone Age, and so on.) Limestone, Ireland's principal rock, was formed approximately 350,000,000 years ago. How far back would you need to walk to reach the time when limestone was being formed?

Ch. 3: The Forces of Weathering

1. Denudation		
2. Weathering		
3. Erosion		
4. Mechanical weathering		
5. Freeze-thaw action		
6. Calcium carbonate		
7. Precipitation		
8. Chemical weathering		
9. Carbonation		
10. Karst		
11. National park		

For Discussion:

Mountains in Munster may once have been as high as the present-day Alps. Why are they now much smaller than the Alps?

Ch. 4: Mass Movement

1. Regolith		
2. Gravity		
3. Soil creep		
4. Bogburst		
5. Mudflow		
6. Landslide		

For Discussion:

Have you ever seen footage of an avalanche? What is it? What happens? How is an avalanche different from a landslide?

SECTION A: **THE HUMAN HABITAT**

Ch. 5: The Work of Rivers

			
1.	Hydraulic action		
2.	Tributary		
3.	Waterfall		
4.	Transportation		
5.	Suspension		
6.	Deposition		
7.	Meander		
8.	Alluvium		
9.	Levee		
10.	Ox-bow lake		
11.	River load		
12.	Hydroelectric power (HEP)		

For Discussion:

'Rivers can be friends and enemies of people.' Do you agree with this statement? Explain.

Ch. 6: The Work of Moving Ice

			
1.	Glacier		
2.	Plucking		
3.	Abrasion		
4.	Cirque/corrie		
5.	U-shaped valley/glaciated valley		
6.	Ribbon lake		
7.	Moraines: lateral/medial/frontal		
8.	Esker		

For Discussion:

(a) People did not live in Ireland during the Ice Age. If they did, they could have walked hundreds of kilometres out beyond parts of our present coastline. Why?

(b) The last ice age had a big impact on the landscape of modern Ireland. Can you think of any evidence of this?

Ch. 7: The Work of the Sea

			
1.	Waves		
2.	Hydraulic action		
3.	Compressed air		
4.	Abrasion		
5.	Attrition		
6.	Sea cliff		
7.	Sea stack		
8.	Caves		
9.	Longshore drift		

For Discussion:

(a) Where does the sand on beaches come from?

(b) Why are beach pebbles usually smooth to touch?

1 The Restless Earth

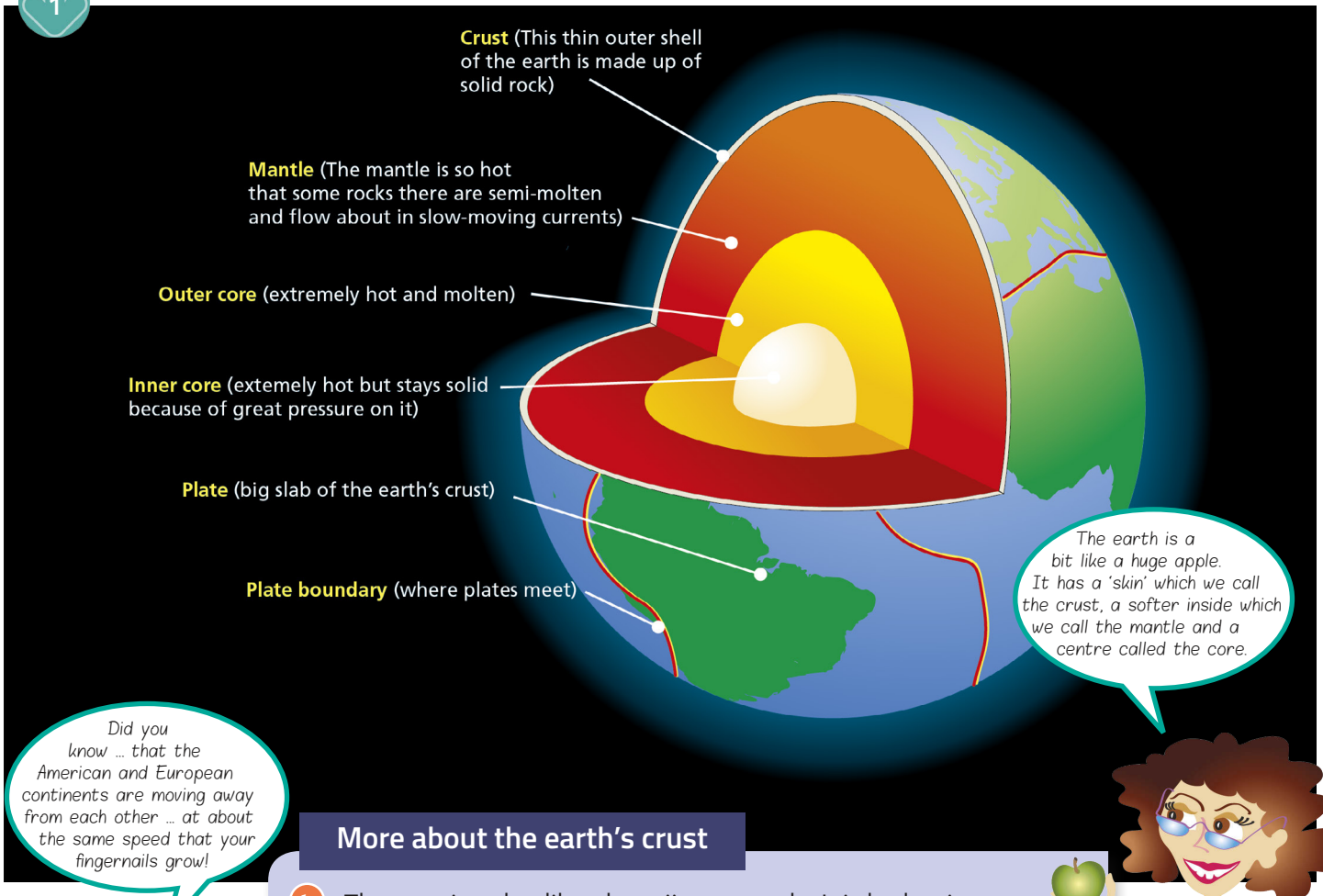
Learning Focus

- Moving crustal plates
- Folding and fold mountains
- Earthquakes and their effects
- Volcanic activity and its effects

Inside the Earth

The earth's layers

Figure 1 shows that the inside of the earth consists of several **different layers**.



More about the earth's crust

1. The crust is rather like a huge jigsaw puzzle. It is broken into pieces called plates. The places where plates meet are called **plate boundaries**.
2. These huge plates do the following:
   - They **float** on the heavier, semi-molten rock of the mantle.
   - They move around slowly, carrying our continents with them as 'passengers'. This movement is called **continental drift**.
   - They **collide** with and **separate** from each other. These movements cause **activities** such as **folding**, **earthquakes** and **volcanic activity** to happen at plate boundaries. The activities then give rise to **landscape features** or **landforms** such as **fold mountains** and **volcanic mountains**.

Our Moving Plates

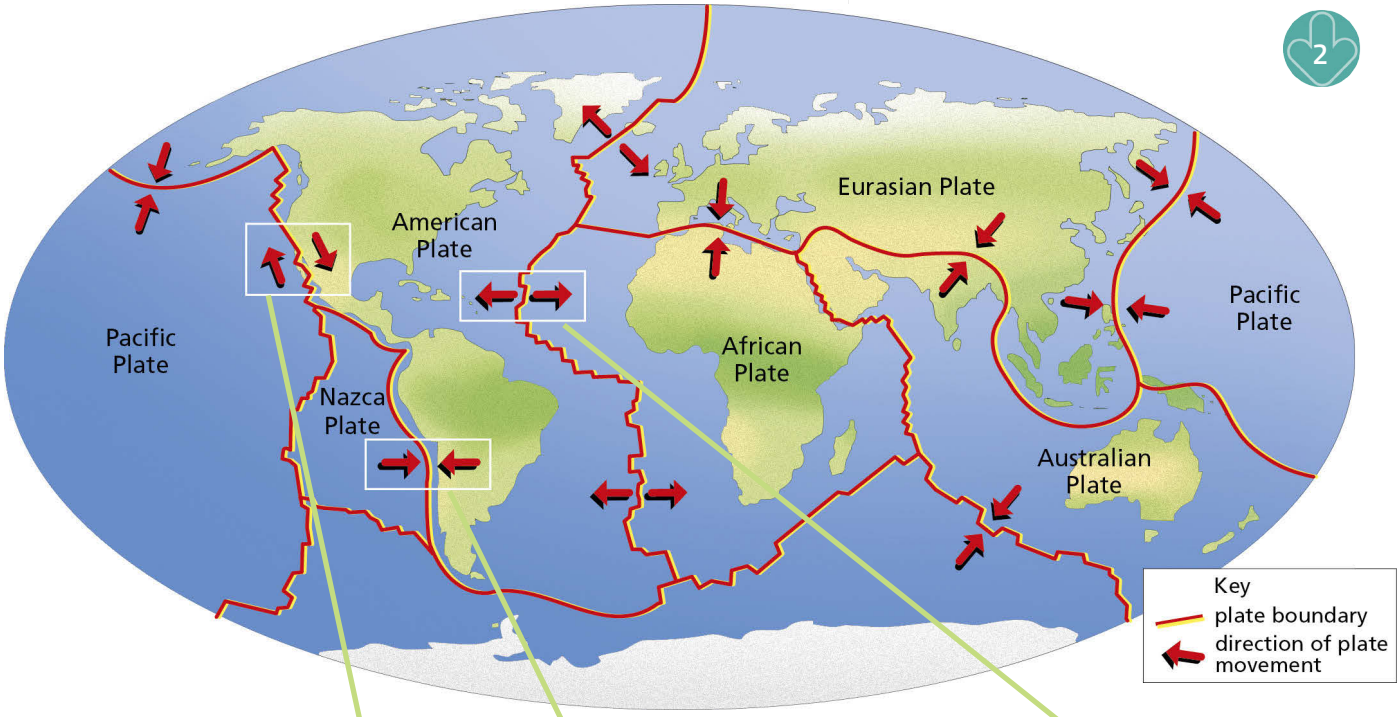
Figure 2 shows the world's principal *plates*. It also shows *plate boundaries* where plates **separate** from each other, where plates **collide** and where plates **slide past** each other.

The principal crustal plates

(a) Learn the names and locations of these plates.

(b) With the help of your atlas, decide whether plates separate, collide or slide past each other at each of the following places: California (Western USA); Iceland; the Andes mountains.

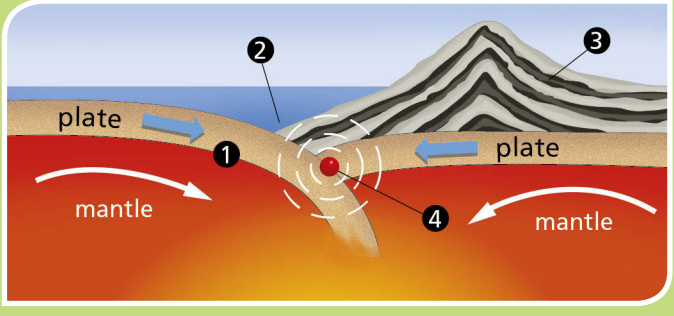
2



Sliding Plates

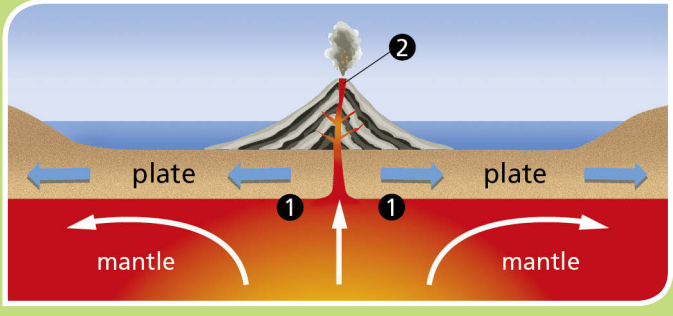
Where plates push past each other, earthquakes may occur.

Where plates collide



1. Currents of molten rock in the earth's mantle drag the plates slowly towards each other.
2. Deep **ocean trenches** (valleys) might occur where one plate is pulled under the other.
3. **Fold mountains** and **volcanic mountains** are formed.
4. **Earthquakes** happen.

Where plates separate

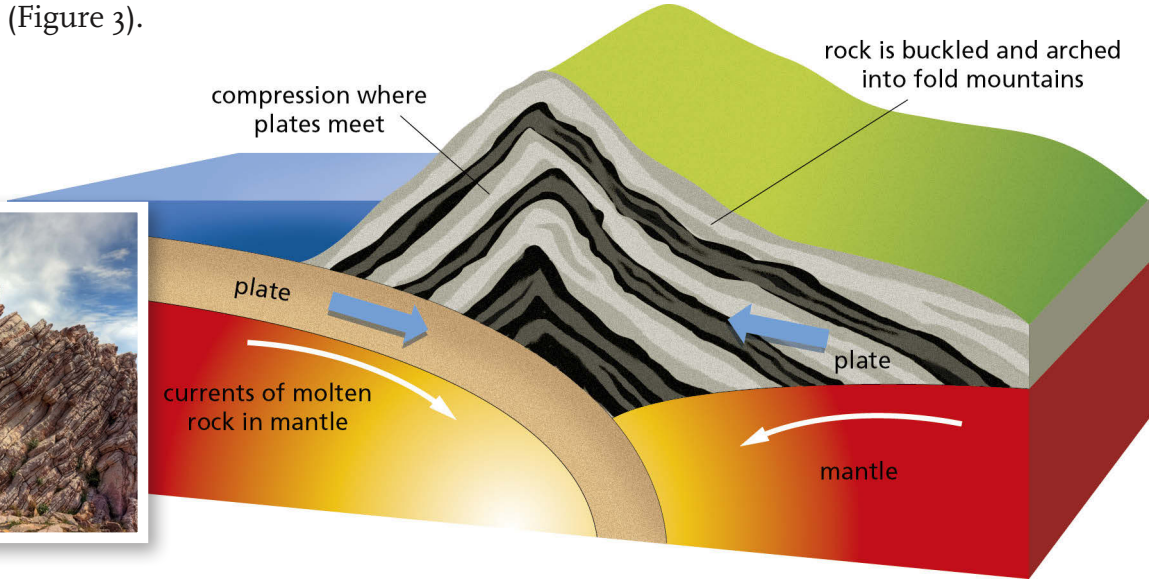


1. Currents of molten rock in the earth's mantle slowly drag plates apart from each other.
2. Where the plates separate, volcanic material rises up from the mantle to form **volcanic islands**, **volcanic mountains** and long **mid-ocean ridges**.

Folding

When moving **plates collide** with each other, tremendous **compression** (pushing together) occurs where the plates meet. This compression may cause the earth's crust to become **very slowly buckled and arched upwards**, forming fold mountains (Figure 3).

Fold mountains form where plates collide 3



How do you know that this rock has been folded?

Fold Mountains

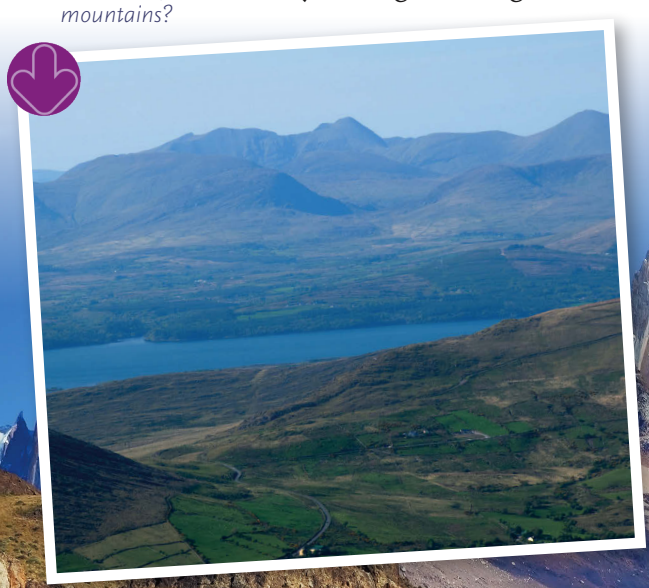
The world's youngest fold mountains include the *Alps* in Europe, the *Rocky Mountains* in North America and the *Andes* in South America. These mountain ranges were formed during the **Alpine foldings** only about 35 million years ago. They are very high because they have not yet been worn down as much as other fold mountains.

Ireland's fold mountains were formed very long ago and so have been worn down to quite low heights. Mountains in Munster, for example, were formed 250 million years ago during the **Armorican foldings**.

These pictures show MacGillycuddy's Reeks in Co. Kerry (left) and the Andes in South America (right).

(a) Which mountains are higher? Why?

(b) With the help of your atlas, locate the Andes. Which two plates collided to form these mountains?

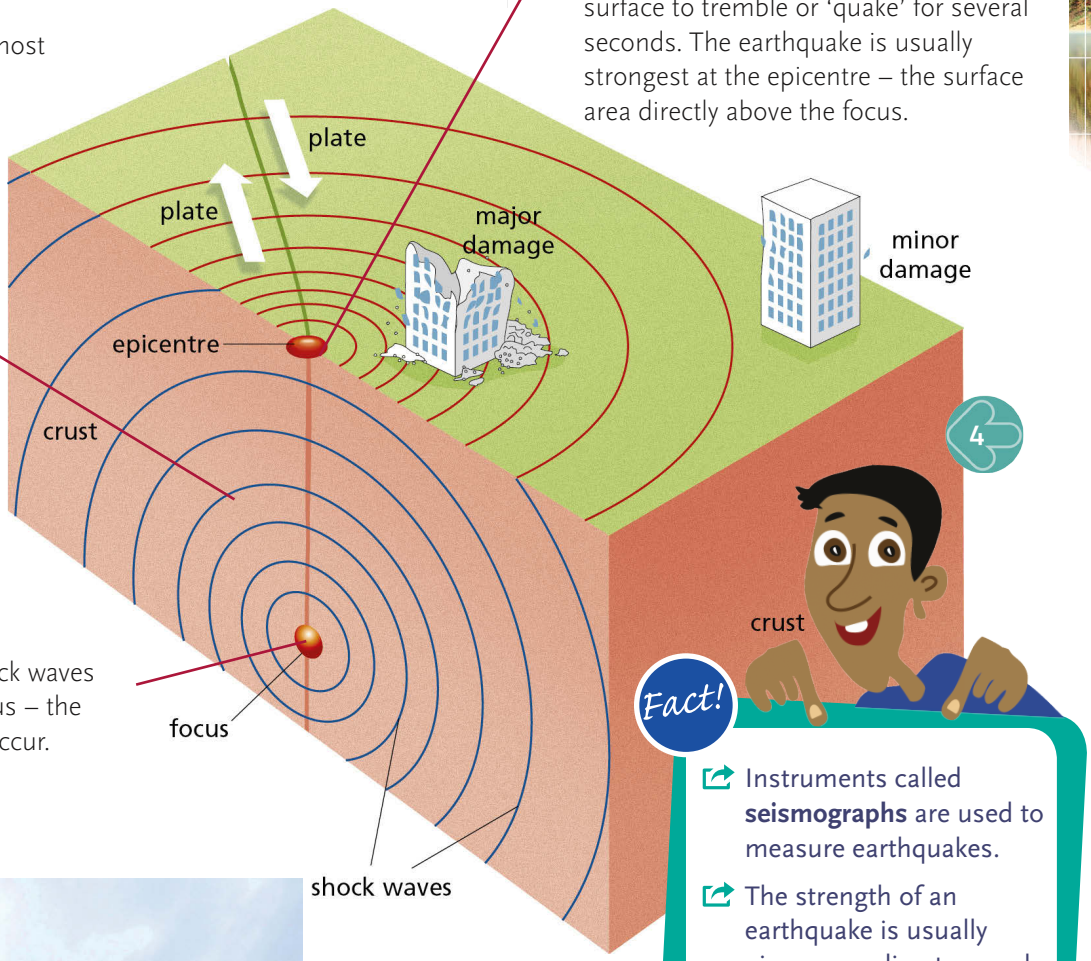


Earthquakes

1 Earthquakes take place most commonly where plates collide or slip past each other. The colliding or slipping plates cause such compression that rock beneath the surface bends and then cracks suddenly.

2 When this happens, shock waves spread out from the focus – the place where the cracks occur.

3 The shock waves may cause the earth's surface to tremble or 'quake' for several seconds. The earthquake is usually strongest at the epicentre – the surface area directly above the focus.



Fact!

- Instruments called **seismographs** are used to measure earthquakes.
- The strength of an earthquake is usually given according to a scale called the **Richter Scale**.

Some Effects of Earthquakes

Strong earthquakes can result in terrible loss of life and property:

- **Buildings** close to the epicentre sway and collapse.
- **Roads** crack and railway lines bend.
- Gas pipes break, causing terrible **fires**.
- Huge tidal waves called **tsunamis** can result from earthquakes beneath the seabed. In December 2004 a giant tsunami destroyed coastal towns and killed up to 300,000 people in Indonesia and other countries in Asia (see photograph on the next page).

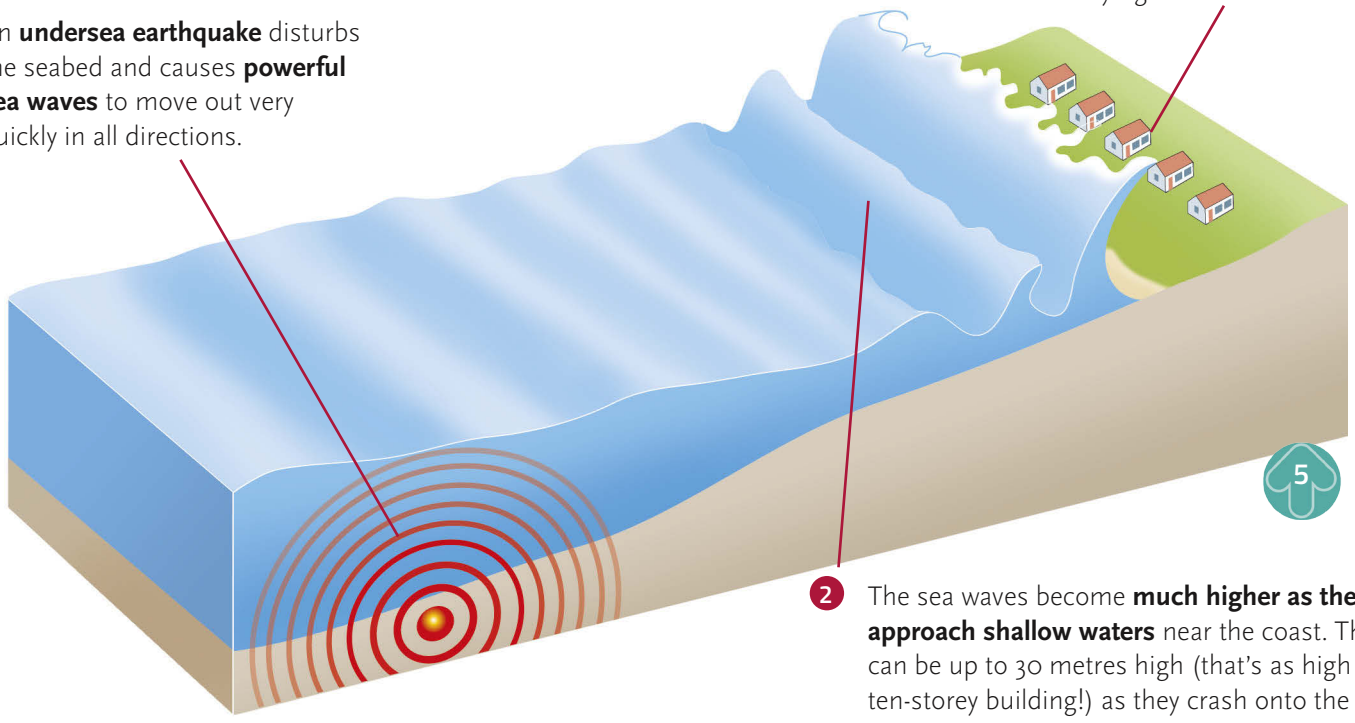
The result of a strong earthquake in Italy
Describe the scene

A terrible tsunami

In 2004 a huge tsunami destroyed coastal towns and killed up to 300,000 people in **Indonesia** and other countries in southern Asia.

How a tsunami happens

1 An **undersea earthquake** disturbs the seabed and causes **powerful sea waves** to move out very quickly in all directions.



3 A tsunami can devastate low-lying coastal areas.

2 The sea waves become **much higher as they approach shallow waters** near the coast. They can be up to 30 metres high (that's as high as a ten-storey building!) as they crash onto the shore.

Some results of Indonesia's terrible tsunami

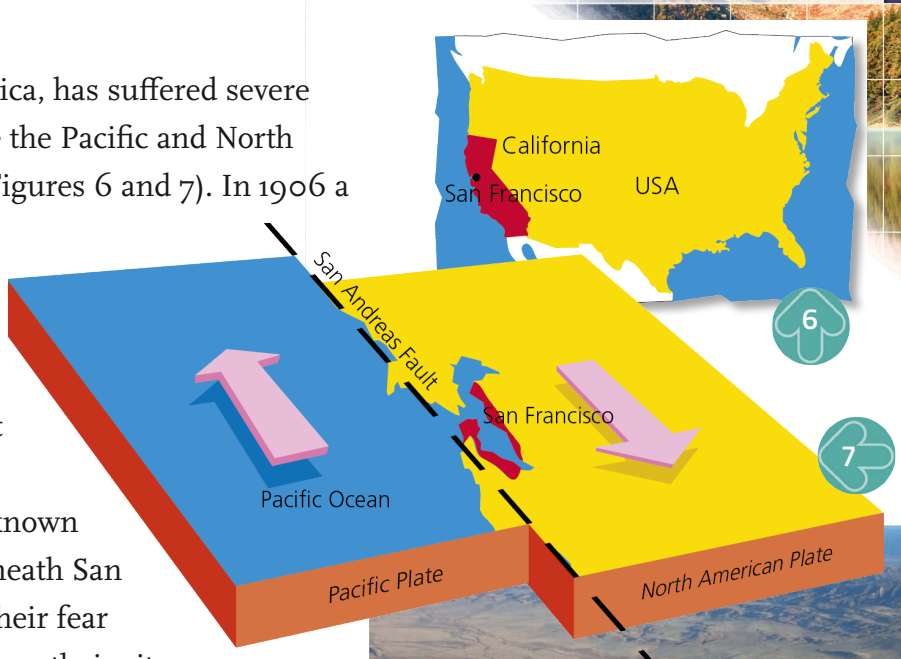
(a) Locate Indonesia on a world map

*(b) **Concentration exercise:***
Concentrate on this picture for one minute. Then close the book and allow yourself one minute to write down the results of the tsunami that are shown. With the book open, compare your answer to that of the student sitting closest to you.

Earthquakes in California

California, in the United States of America, has suffered severe earthquakes because it is situated where the Pacific and North American plates push past each other (Figures 6 and 7). In 1906 a strong earthquake rocked the city of **San Francisco**. Buildings collapsed. Gas pipes were broken, causing fires which destroyed much of the city. In 1989 another strong earthquake hit the city. It measured 7.1 on the *Richter Scale*.

At the present time, compression is known to be building up in the earth's crust beneath San Francisco. Some Californians speak of their fear of 'the Big One' which may one day destroy their city. But wide streets and specially reinforced 'earthquake-proof' buildings are expected to lessen the effects of any further Californian earthquakes.



6

7

Earthquake damage in San Francisco

The *San Andreas Fault* in California is a large crack in the earth's crust which marks part of the boundary (meeting place) between the Pacific and North American plates

A volcanic eruption in Iceland
Volcanic ash produces fertile soil for farms on the lower slopes of the mountain. The volcano is also a tourist attraction. But violent eruptions can endanger the lives and property of those living nearby.

Volcanic Activity

Beneath the earth's crust there is hot, liquid rock called **magma**. Where plates separate from or collide with each other, the magma can sometimes force its way up through cracks in the crust until it reaches the surface. When the magma reaches the surface, it cools and hardens. It is then called **lava**.

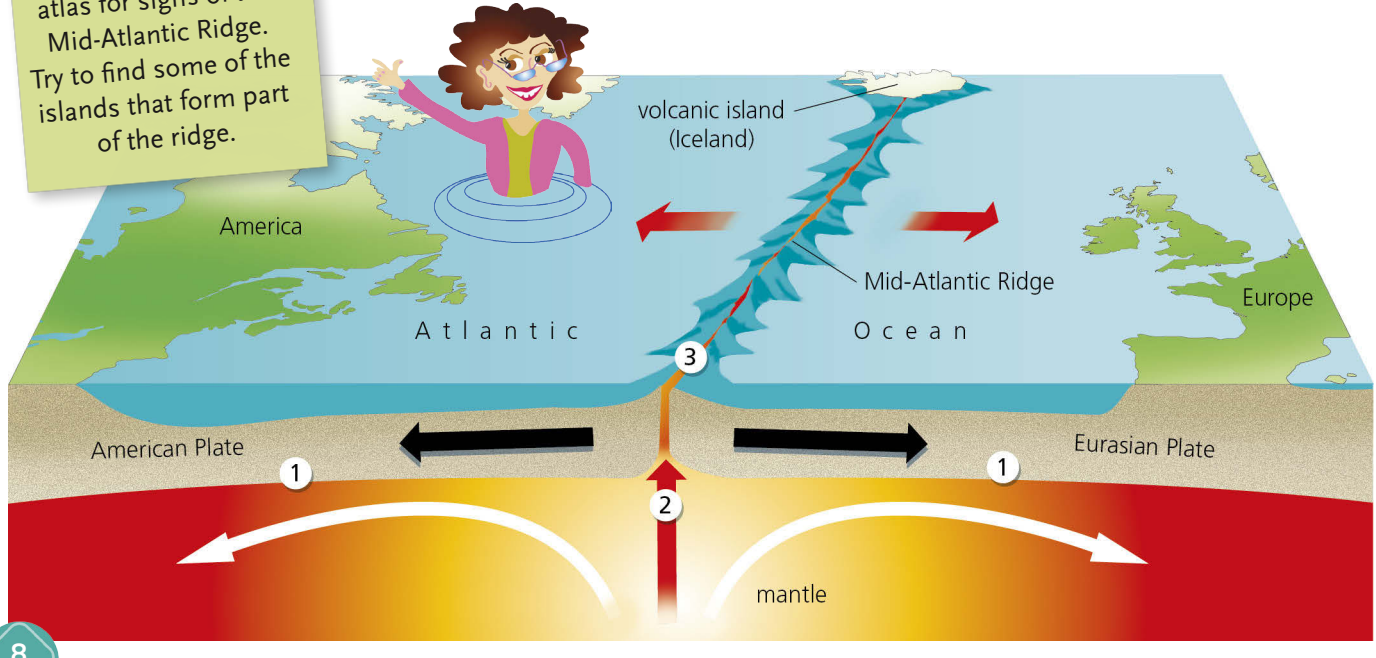
- Where plates separate, lava may pour quietly through long cracks in the earth's surface. This lava may build up **mid-ocean ridges** such as the Mid-Atlantic Ridge.
- Lava may also force its way violently through a small hole called a **vent**. When this happens, a **volcanic mountain** is formed.

The Mid-Atlantic Ridge

Deep beneath the middle of the Atlantic Ocean there lies a long, narrow chain of mountains called the Mid-Atlantic Ridge (Figure 8). This ridge runs roughly in a north–south direction, with some of its peaks rising above the surface of the sea to form volcanic islands.

The Mid-Atlantic Ridge is volcanic in origin. It lies along a zone where the American and the African/Eurasian crustal plates are slowly moving away from one another. Figure 8 shows how the Mid-Atlantic Ridge was formed.

Study a wall map or atlas for signs of the Mid-Atlantic Ridge. Try to find some of the islands that form part of the ridge.

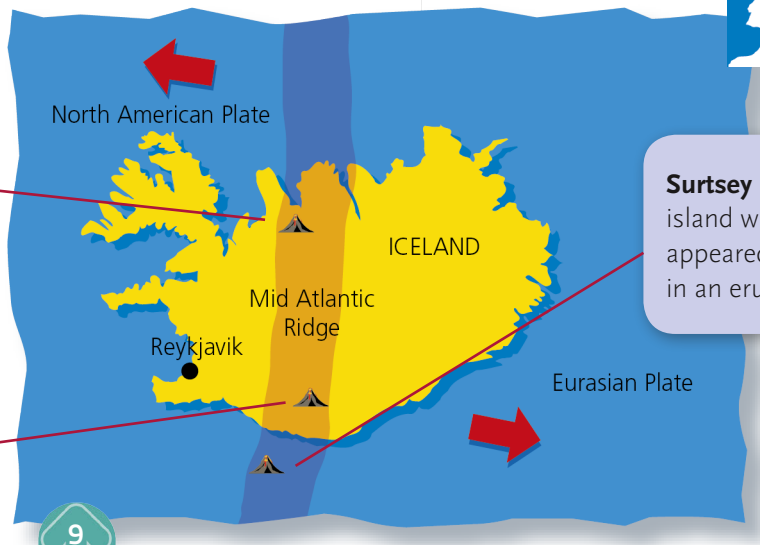


8
How the Mid-Atlantic Ridge was formed

1. The American and Eurasian plates float on heavy, semi-molten rock. Moving **currents** of the semi-molten rock **drag** the plates apart.
2. As the American and Eurasian plates move apart, a long **crack** occurs in the earth's crust.
3. **Molten magma** from beneath the crust wells up through this crack. The magma then cools and hardens to form a long **ridge** beneath the Atlantic Ocean.

Iceland – the Land of Ice and Fire

Iceland is not only a place of winter snow and ice. It is also a volcanic island of the Mid-Atlantic Ridge and contains several volcanic mountains. Volcanic activity causes hot springs to rise from the ground and this provides hot water for the houses in Reykjavik, Iceland's capital city. Many tourists visit Iceland to see its unique volcanic scenery.

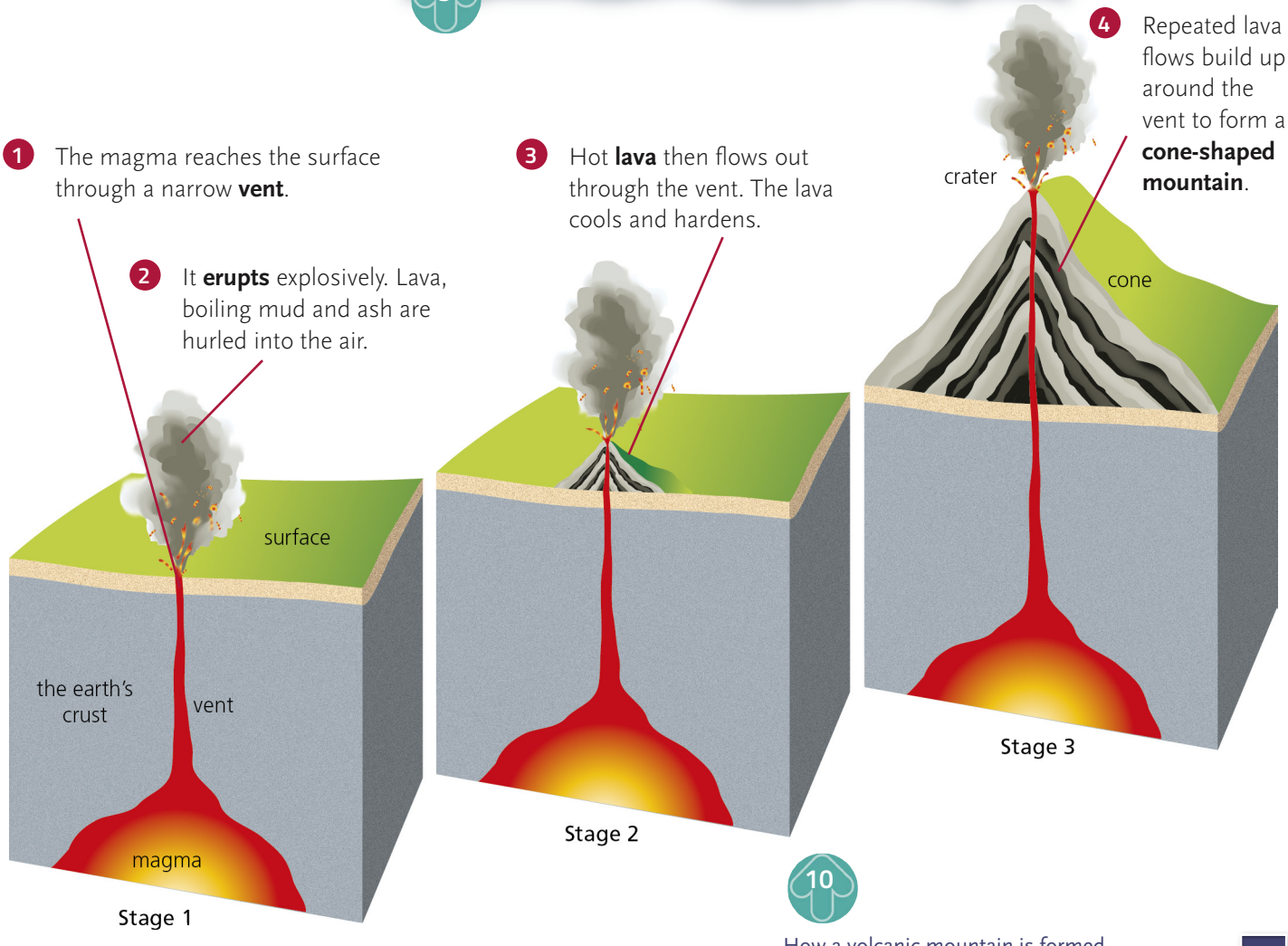


Mt Krafla has been erupting continuously for almost 30 years.

Surtsey is a volcanic island which first appeared above the sea in an eruption in 1963.

Mt Hekla is Iceland's most active volcano.

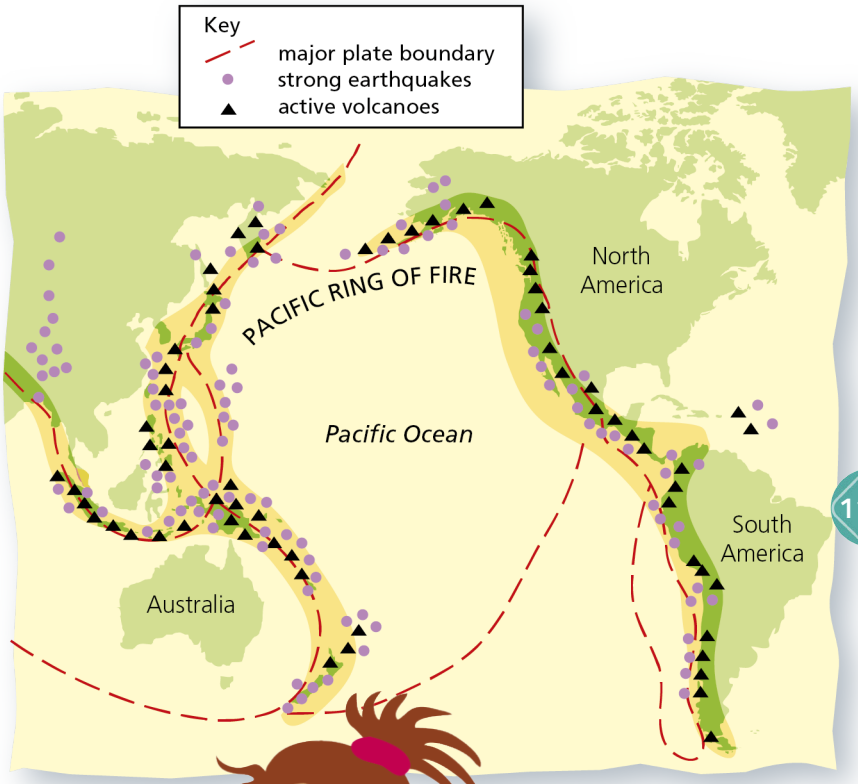
9



10

How a volcanic mountain is formed

Types of volcano		
Active	still erupt regularly	Etna and Vesuvius (Italy)
Dormant	have not erupted for a long time, but may erupt again	Cotopaxi (Ecuador)
Extinct	have not erupted in historic times	Slemish, Co. Antrim



The Pacific Ring of Fire

Figure 10 shows that earthquakes and active volcanoes occur near the meeting places of the earth's great crustal plates. The largest earthquake and volcanic zone lies along the edges of the Pacific Ocean. This zone is known as the **Pacific Ring of Fire**.

11 The locations of active volcanoes and earthquake zones
(a) Why do you think the Pacific Ring of Fire is so called?
(b) Why do volcanoes, earthquakes and fold mountains occur near the Pacific Ring of Fire? Answer precisely. Consult Figure 2 if necessary.
(c) Explain why Ireland does not experience major earthquakes or volcanic activity.

Volcanic mountains in Japan
(a) Identify a volcanic cone and crater in the photograph.
(b) Identify Japan in Figure 11.

Fact!

Volcanoes can be useful as well as dangerous.

- Volcanic eruptions have buried cities, destroyed farmland and spewed out great quantities of poisonous gas.
- But lava breaks down into fertile soil and some volcanoes provide valuable hot water supplies.

Recap Map

Plates collide, separate or slip past each other at *plate boundaries*

Folding occurs where plates *collide*. Compression gives rise to **fold mountains**.

Earthquakes happen especially where plates *collide or slip past* each other. Compression causes rock to snap. Shock waves spread out from the focus. They may cause the earth's surface to tremble.

Volcanic **mid-ocean ridges** may form where *plates separate*. The Mid-Atlantic Ridge contains volcanic islands such as Iceland.

Earthquakes **damage** buildings, roads, gas pipes, etc. **Tsunamis** may follow undersea earthquakes.

The **Pacific Ring of Fire** is the world's largest earthquake and volcano zone.

Volcanic mountains also form where *plates collide*. Magma comes to the surface through vents and then forms volcanic cones. Volcanoes can be active, dormant or extinct.

Activities

1. Describe briefly but clearly the meaning of each of the following terms: *continental drift*; *plate boundary*; *fold mountains*; *epicentre*; *San Andreas Fault*; *magma*; *volcanic cone*; *crater*; *Pacific Ring of Fire*.

2. (a) Name two countries where earthquakes occur.
   (b) Name two results of an earthquake hitting a large city.
   (c) Name one method of reducing the impact of an earthquake in an urban area.
   (*J.C. Higher and Ordinary Level*)

3. (a) Describe THREE types of damage caused when a volcano erupts.
   (b) Explain TWO ways volcanoes can be useful to people.
   (*J.C. Ordinary Level*)

4. Describe how plate movements lead to the formation of earthquakes and volcanoes.
   (*J.C. Higher Level*)

See Chapter 1 of your Skills Book

2 Rocks

Learning Focus

- Igneous, sedimentary and metamorphic rocks
- Origins and characteristics of Ireland's principal rock types
- Rocks as natural resources

The earth's crust is made up of many different types of rocks. Most of these rocks have different **physical characteristics**. They may differ in colour, hardness, density (their weight) or texture (how they feel). *But rocks are usually divided into* ***three groups*** *depending on their* ***origins*** *or how they were formed*. These groups are described below.

Igneous rocks

were formed when hot, molten **volcanic material cooled down** and became solid.

Examples:

- granite, basalt

Sedimentary rocks

were formed from the **compressed remains** (sediments) of animals, plants or other rocks.

Examples:

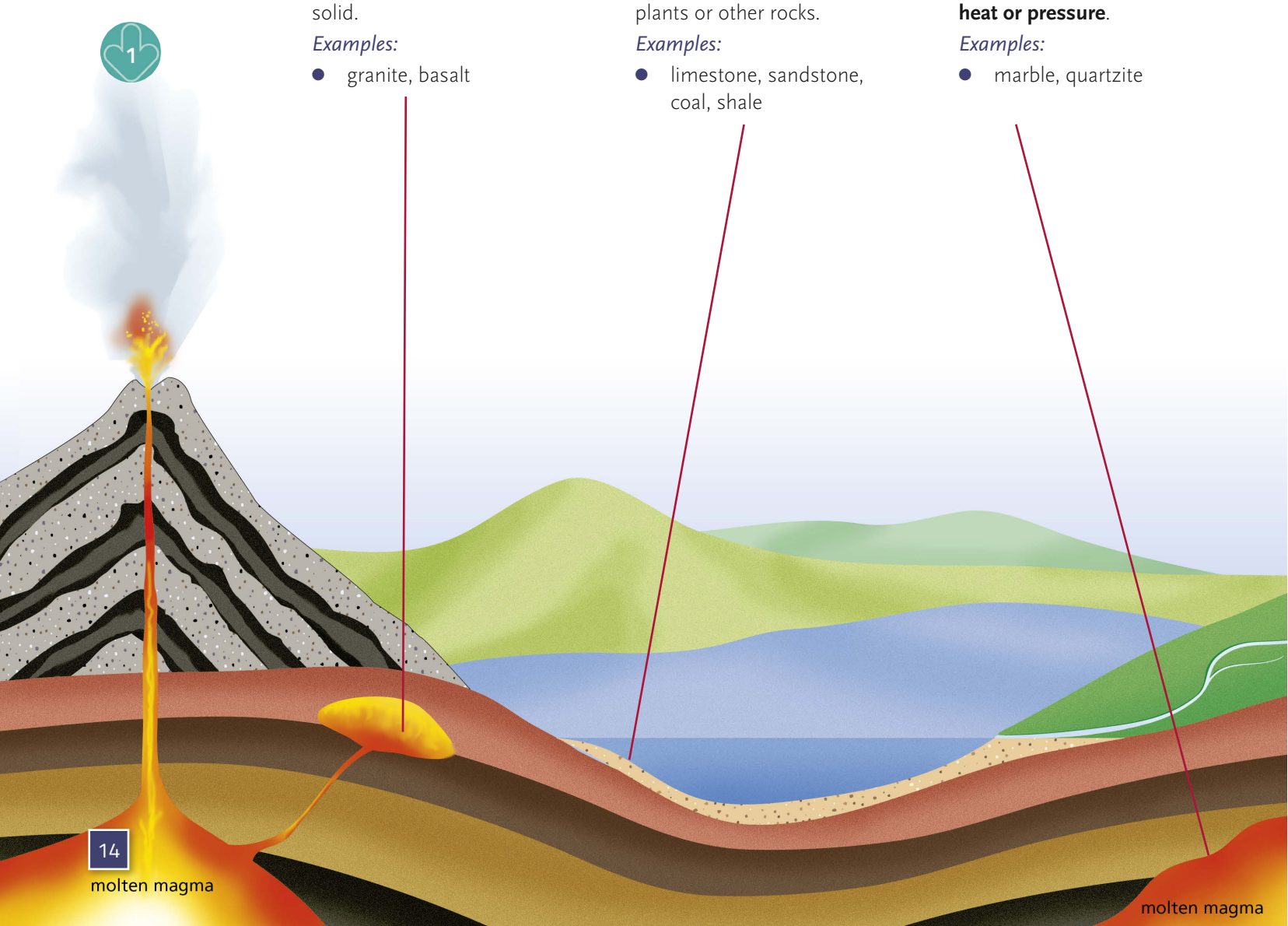
- limestone, sandstone, coal, shale

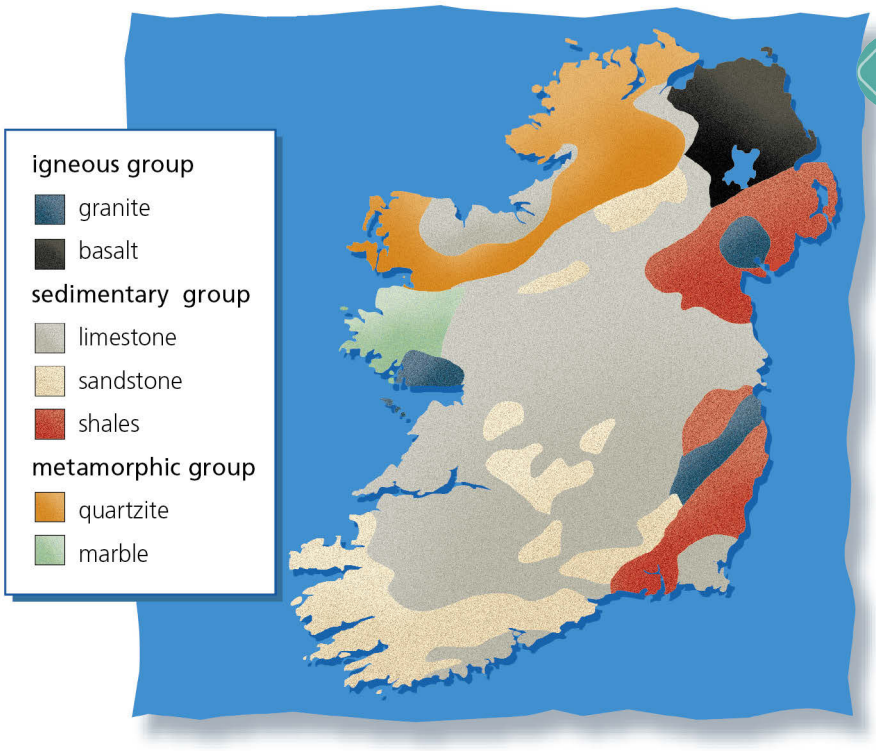
Metamorphic rocks

were once igneous or sedimentary rocks which were **changed by great heat or pressure**.

Examples:

- marble, quartzite





2 This is a geological map of Ireland. It shows the general distribution of the most common rock types.

Which rock is most common:

(a) in Ireland;
(b) in your own county;
(c) in the Antrim Mountains;
(d) in the Wicklow Mountains;
(e) in the Burren (north Clare);
(f) in the Central Plain?

Granite

Some Igneous Rocks

Granite

Granite is a **hard, coarse, multi-coloured** rock. It contains pink or grey feldspar and crystals of mica or quartz.

It was formed when **magma cooled** deep within the earth's crust. The magma cooled so slowly that visible crystals had time to form.

Granite is found in the **Wicklow and Mourne Mountains** (see Figure 2).

Basalt

Basalt is a **heavy, black** rock. It was formed when **lava cooled on the earth's surface**.

The lava cooled too rapidly for any crystals to form.

Basalt is found in the **Antrim Plateau** and at the **Giant's Causeway** (see Figure 2).

Basalt formations at the Giant's Causeway, Co. Antrim
As lava cooled quickly at the surface, it dried and cracked into these regular-shaped columns.

Some Sedimentary Rocks

Sandstone

Sandstone is usually **coarse** and **brown/red** in colour. It is formed when large amounts of sand are worn from the earth's crust, carried away by rivers or wind and deposited on the beds of seas or lakes. The **sand grains** are then very gradually **compressed and cemented together** to form rock.

The **Macgillicuddy's Reeks**, **Comeragh** and other mountains of Munster are made up mostly of sandstone (see Figure 2).

Sandstone

Sedimentary rocks are usually laid down in flat layers called **strata**, with lines called **bedding planes** between the layers. They may also contain vertical cracks called **joints**.
Can you identify strata, bedding planes and joints in this photograph?

Sandstone is a beautiful building material

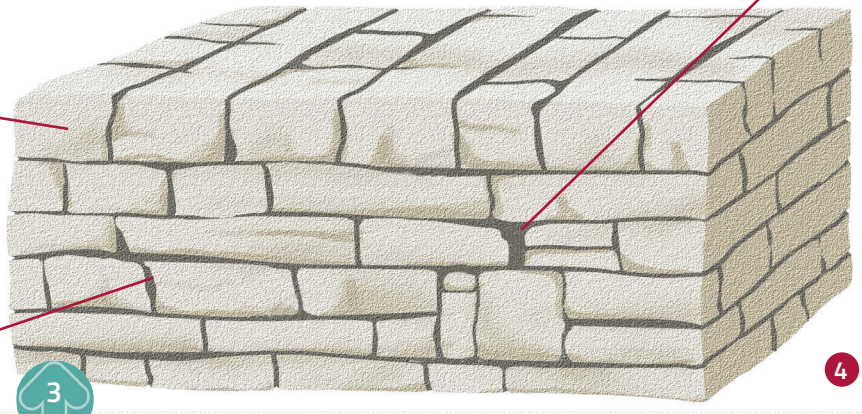
Limestone – Ireland's Most Common Rock

Origin

Limestone is made from the **remains of fish and other sea creatures**. As generations of these creatures died, their **skeletons** were piled up on the beds of shallow seas. The skeletons were crushed by the weight of later deposits and **cemented** together by the seawater until they formed slowly into solid rock.

Characteristics

1. Limestone is laid down in horizontal layers or **strata**. The divisions between the layers are called **bedding planes**.
2. Vertical cracks or **joints** also occur in limestone.
3. Limestone is **permeable**, which means that water can pass through it. It is easy for rainwater to pass down through the many joints and bedding planes.
4. Limestone is **easily weathered** or worn away. The rainwater that passes through it is a weak carbonic acid which dissolves the calcium carbonate that makes up the limestone.
5. Limestone may contain **fossils**. A fossil is the preserved remains of a plant or animal.



The characteristics of limestone

The GPO, O'Connell Street in Dublin is built mainly of limestone

A fossil

Uses of Limestone

Limestone is used in many trades.

- **Manufacturers** use limestone to make cement for the building industry. Limestone is also used to make headstones and in the manufacture of iron and steel.
- **Builders** use blocks of limestone to make public buildings. Limestone chippings are used to surface roads.
- **Farmers** use ground-up limestone as a soil conditioner.

Some Metamorphic Rocks

Igneous or sedimentary rocks can sometimes be changed completely when they come into contact with great **heat** (from magma) or with great **pressure** (due to folding). These rocks can be changed into hard metamorphic rocks such as marble or quartzite.

Sandstone *changes to* **quartzite**

Quartzite is a **light-coloured**, **hard rock** which is sometimes used to surface roads. It occurs at the tops of many hills and mountains, such as at Errigal (Co. Donegal) and the Hill of Howth (Co. Dublin).

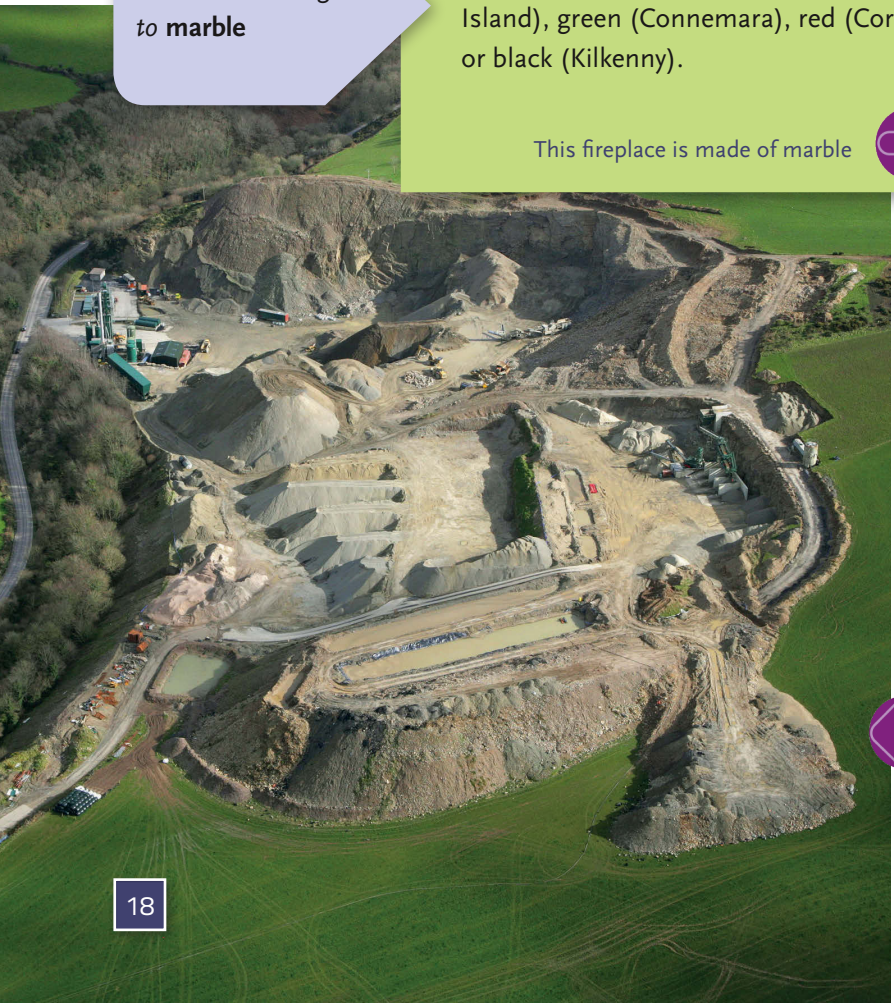
Quartzite

Limestone *changes to* **marble**

Marble is a beautiful **hard**, **crystalline rock**, which is sometimes used to make headstones, fireplaces and ornaments. It can be white (Rathlin Island), green (Connemara), red (Cork) or black (Kilkenny).

This fireplace is made of marble

Rocks provide us with many **natural resources** (things from nature which are useful to people). Such resources include *mineral resources* and *building materials*. These materials can be **extracted** or removed from the earth's crust in the ways described in *Figure 4* on the next page.



A limestone quarry
Quarrying is the most common way of extracting rocks in Ireland. It is much cheaper and is less dangerous than shaft mining, but it can create some environmental problems, as mentioned in Figure 5 on the next page.