Geography Now!

New Junior Cycle

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The Educational Company of Ireland

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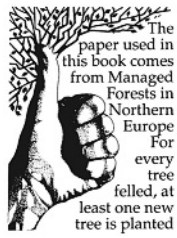

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Foreword

The Educational Company of Ireland is proud to present *Geography Now!* This textbook is designed to meet the needs of the new Junior Cycle Geography course. *Geography Now!* has been written by two highly experienced teachers.

The book offers a well-structured and thorough coverage of the new specification. Each of the learning outcomes is comprehensively covered.

Geoliteracy, the development of students' ability to develop far-reaching decisions through geographic thinking and reasoning, is actively fostered through the text. The components of geoliteracy – interaction, interconnections and implications – are examined throughout the three strands that make up the Junior Cycle Geography specification.

The sustainable use of resources in our fragile planet is treated through numerous case studies. The life chances for young people in countries at different stages of development are examined.

Great care has been taken to ensure that the language level is appropriate to Junior Cycle Geography students. Age-appropriate literacy and numeracy skills are developed. Bullet points and bold typeface highlight key terms and concepts.

A wide range of visual stimuli including photographs, charts, graphs and maps are an important learning instrument in every chapter. Learning activities, individual, paired and in larger groups, provide students with opportunities for independent thought and interaction with their peers through discussions and debates.

There is a comprehensive range of Ordnance Survey maps along with aerial photographs and satellite images.

Each chapter begins with learning intentions and definitions and there is wide use of geo facts throughout each chapter. End-of-chapter reflections will help students to assess their learning. Linkages between topics are used to help students to learn in a non-linear way.

Geography Now! is part of a package of textbook, student activity book, e-book, students' graphic organiser, teacher's resource book and online digital resources. The Educational Company of Ireland is very confident that this package provides a full and comprehensive treatment of the syllabus.

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Contents

Digital Resources

The *Geography Now!* digital resources will enhance classroom learning by encouraging student participation and engagement. They support the New Junior Cycle Specification's emphasis on the use of modern technology in the classroom and are designed to cater for different learning styles.

To provide guidance for the integration of digital resources in the classroom and to aid lesson planning, they are **referenced throughout the textbook** using the following icons:

Student website – **www.edco.ie/geographynow** – with interactive activities and quizzes

A series of stimulating **videos**, covering a variety of different topics, allows students to observe geography in action

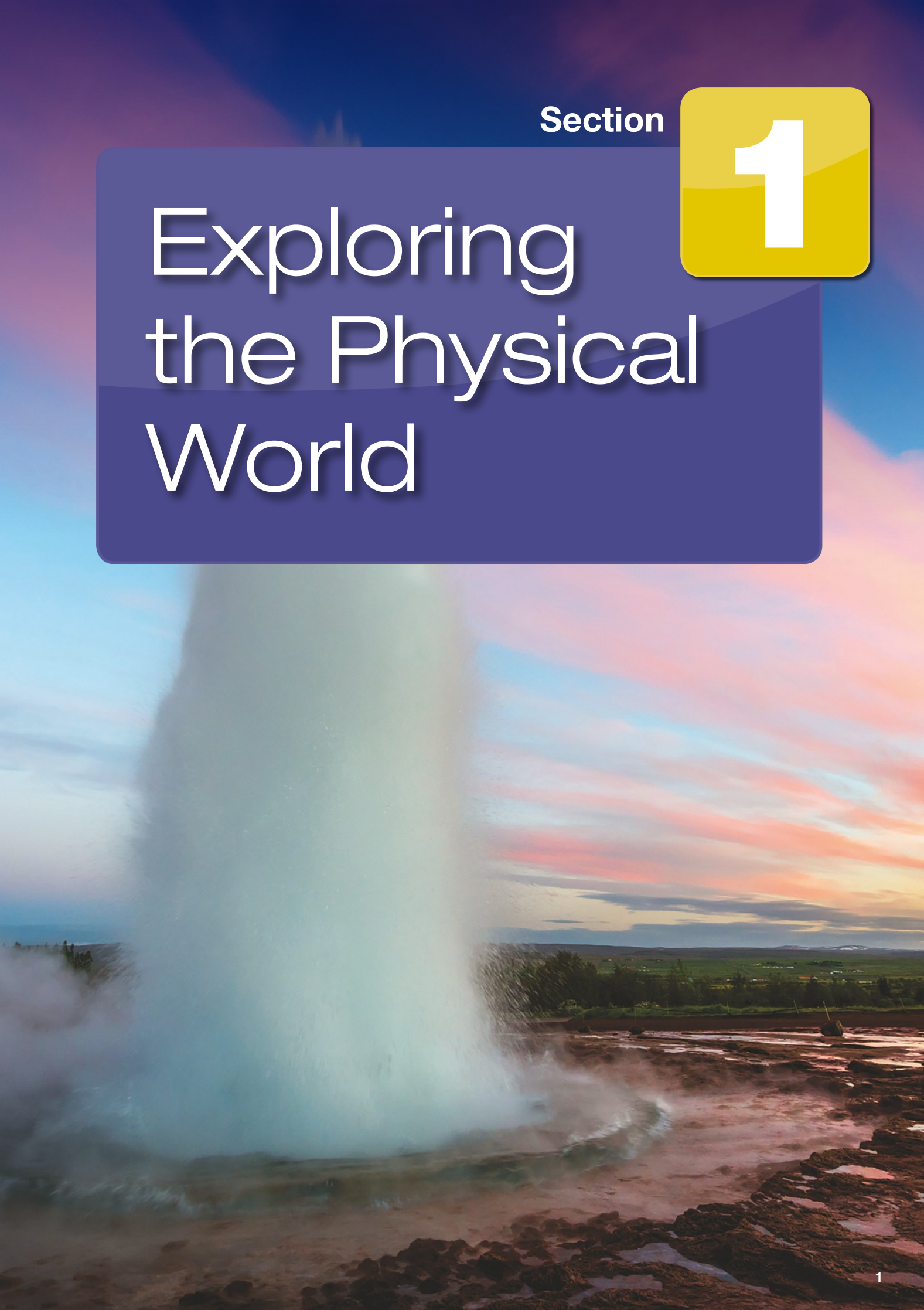
Animations bring key diagrams from the textbook to life and reinforce the topic at hand

PowerPoint presentations provide a summary of key chapters of the student textbook, highlighting main themes and topics.

Teachers can access the *Geography Now!* digital resources – which also includes **editable lesson plans** – via the *Geography Now!* interactive e-book, which is available online at **www.edcolearning.ie**.

Section 1

Exploring the Physical World



Section 1

Our restless Earth

1

Go to **www.edco.ie/geographynow** and try the interactive activities and quizzes.

Learning intentions

When you have completed this chapter you will be able to:

- State Earth's position in the solar system
- Describe the structure of Earth
- Examine the plates that make up Earth's crust
- Identify the seven main tectonic plates on a world map
- Describe the results of plates moving (fold mountains, volcanoes, earthquakes)
- Explain the concept of continental drift.

Learning Outcomes

1.1 Describe the formation and global distribution of volcanoes, earthquakes, and fold mountains in the context of **plate tectonics** and **structure of the Earth**

You are also working towards:

1.10 Investigate a range of physical processes active in a chosen location and the connections between them

Key terms

crust
mantle
core
magma
plates
plate tectonics
convection currents
transform boundary
destructive boundary
constructive boundary
continental drift
Pangaea

The structure of Earth

Earth is one of the eight planets of our solar system.

GEO FACT

Our solar system is made up of the Sun and its eight planets. They are, in order from the nearest to the Sun: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune.

Learning Activity

Curiosity Responsibility Numeracy

1.1 Work with a partner. As you work through the following, complete the Investigation sheet in your Activity Book (page 2).

Investigate answers to the following questions to the nearest million kilometres.

(a) How far is Earth from the Sun in kilometres (km)?

(b) What is the name of the imaginary line around the widest part of Earth?

(c) What is the circumference of Earth in kilometres?

(d) What length is the radius of Earth (the distance from the edge to the centre) in kilometres?

Earth was formed about **4.5 billion years** ago. At first it was a giant, boiling sea of molten (melted) material. As it began to cool, the heavier material sank, while the lighter material floated to the surface. As a result, Earth is made up of **three different layers**:

- The **crust** – the layer that we live on
- The **mantle**
- The **core** (outer and inner).

Figure 1.1 Earth is a sphere. It is shaped like a ball

The structure of Earth

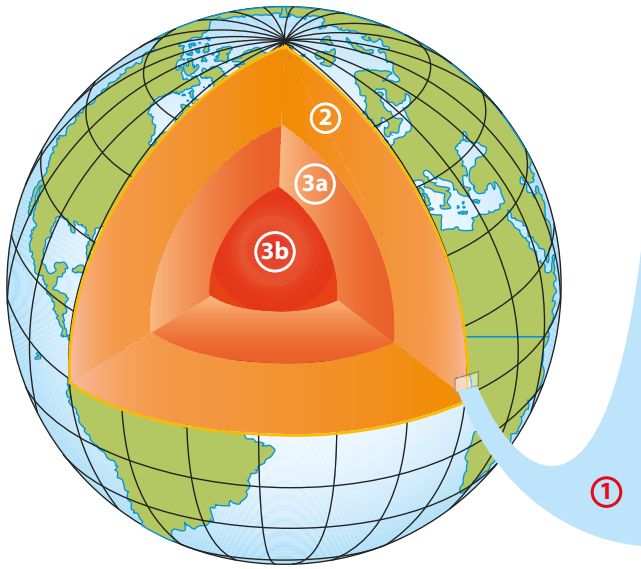


Figure 1.2 The layers that make up Earth

1 **The crust** Earth's outer skin. It is made up of solid rock. It can be up to 60 km thick beneath the continents, but as thin as 10 km under the oceans.

2 **The mantle** A layer of hot, soft rock that the crust floats on. The temperature in the mantle is about 4,000°C. As a result, the rock is in a molten or semi-molten state and is called **magma**.

3 **The core** This is at the centre of Earth. It is made of nickel and iron. At over 5,000°C, it is the hottest layer of Earth. The outer core **(3a)** is molten, while the inner core **(3b)** is under so much pressure that it is solid.

DEFINITION

Continents

The large land masses on Earth's surface, e.g. Europe, Asia.

Magma

The molten or semi-molten material that makes up Earth's mantle.

Plate tectonics

Earth's crust is not one continuous layer. It is broken up into different sections, called **plates**, which fit together like a jigsaw.

There are seven large plates and several smaller ones. They float on the semi-molten magma of the mantle. The edges of the plates meet at **plate boundaries**.

The plates are constantly moving. The theory that tries to explain the movements of the plates and the features that result is called **plate tectonics**. The plates are known as **tectonic plates**.

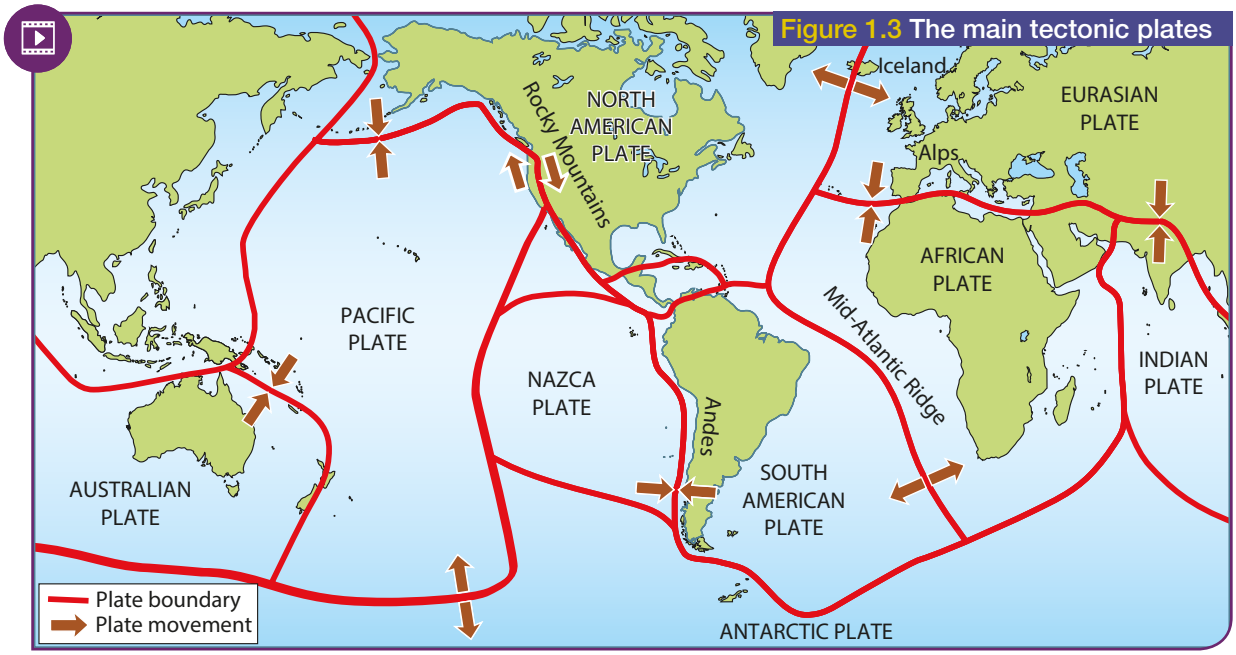


Figure 1.3 The main tectonic plates

Learning Activity

Curiosity

1.2 Answer these questions in your copy. With reference to figure 1.3 on the previous page:

(a) On which plate is Ireland located?

(b) Is the plate with Ireland on it moving towards or pulling away from the North American Plate?

(c) Which plate has the least land on it?

Plate boundaries

For most of the time, the plates are locked together and pressure builds up. When the pressure is eventually released, the plates move. The movement causes the boundaries to slide, collide or separate and this results, over millions of years, in:

- Mountain building
- Volcanic eruptions
- Earthquakes.

We will look at each of these in the following chapters.

Table 1.1 gives the characteristics of each type of boundary.

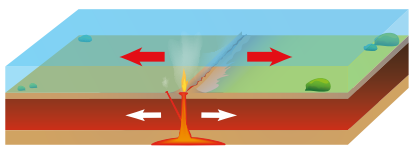
Table 1.1 The three types of plate boundary

	Transform plate boundary	Destructive plate boundary	Constructive plate boundary
What happens	■ Plates **slide past** each other ■ Crust is neither created nor destroyed	■ Plates **collide** ■ Crust is **destroyed** ■ Huge pressure is built up and the **heavier plate is forced downwards** into the mantle where it melts	■ Plates **separate** ■ As the plates pull apart, **molten magma rises** from the mantle ■ It **cools and solidifies** ■ Crust is **created**
What you find there	■ Fault lines ■ Earthquakes	■ Fold mountains ■ Volcanic mountains ■ Earthquakes	■ Mid-ocean ridges ■ Volcanic islands ■ Volcanic mountains
Examples	The Pacific Plate is sliding past the North American Plate along the **San Andreas Fault**	The Nazca Plate is colliding with the South American Plate The Indian Plate is colliding with the Eurasian Plate	The North American Plate is separating from the Eurasian and African Plates

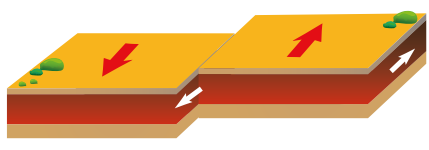
Learning Activity

Curiosity

1.3 Match the following figures, **A**, **B** and **C**, to the type of boundary explained in table 1.1 (transform, destructive, constructive). Sketch the drawings into your copy with the correct headings.



A



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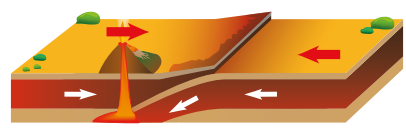

C

GEO FACT

North America and Europe are drifting further apart at a rate of about 2 cm per year, a distance of 20 km over a million years.

Learning Activity

Communicating Co-operating Literacy Curiosity Creativity

1.4 In groups of three, each of you select one boundary type and describe it to the others. Use objects (pieces of paper, pencils, etc.) to help you demonstrate the movement. Provide one example of your boundary type, identifying it on a world map, to help your partners to understand.

1.5 Examine figure 1.3 on page 4. Suggest why Ireland has no active volcanoes or large earthquakes. Discuss your answer with your group.

Why do plates move?

The plates float on the semi-molten magma in the mantle. The magma moves with a circular motion because of **convection currents**.

These convection currents cause the plates to move in different directions and at different speeds. You can see from the arrows on the map in figure 1.3 on page 4 the different directions the plates are moving in.

How do convection currents work?

The cycle for convection currents follows this pattern:

- The very hot core **heats the magma** in the mantle.
- The magma nearest the core gets hotter first. It **expands**, gets **lighter and rises** towards the top of the mantle.
- As it rises, it **cools**, because it is moving away from the heat source. It becomes **semi-molten**.
- The magma rises to the top of the mantle and **moves left or right** as it hits the bottom of the crust. This results in the circular motion of the material that you can see in figure 1.4.
- The **friction** between the crust and the moving magma drags the plates with it.
- As the magma continues to **cool** it becomes more solid and **heavier**. It begins to **sink** back towards the core.
- When it reaches the core it **reheats** and the cycle starts all over again.

Learning Activity

Curiosity

1.6 Answer these questions in your copy. Look at figure 1.3 on page 4 to help you.

(a) The plate that Ireland is on has a constructive boundary with which other plate?

(b) The plate that Ireland is on has destructive boundaries with which two plates?

(c) Which two plates have a transform boundary?

GEO FACT

If you've ever watched a lava lamp, you've seen convection currents at work.

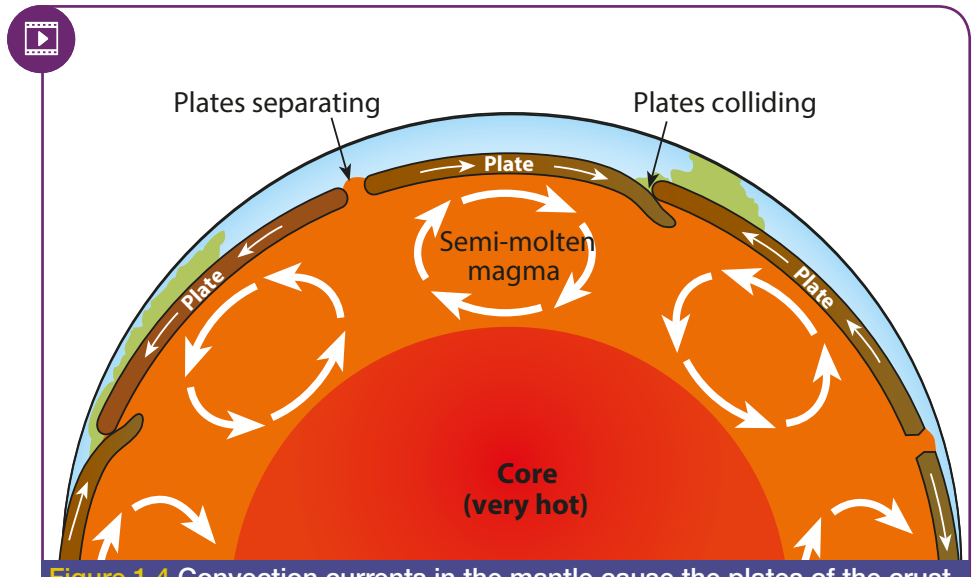

Figure 1.4 Convection currents in the mantle cause the plates of the crust to move

Figure 1.5 The continents as they might have looked about 200 million years ago, before continental drift (left); during the early stages of continental drift (centre); and a present-day map of the continents (right)

Continental drift

Earth's continents are **passengers on the plates** that float beneath them. As the plates move, they carry the continents with them. This movement is very slow and it has taken millions of years for the continents to reach where they are today.

The continents began as one large landmass, called **Pangaea**. It gradually began to break up. The individual sections started to drift apart, carried along on the moving plates. This process is known as **continental drift**.

Continental drift continues today. For example, Europe is slowly moving away from North America, while India continues to push northwards into Asia.

Learning Activity

Communicating Co-operating Curiosity Literacy

1.7 **(a)** In pairs, examine figures 1.3 on page 4 and 1.5 above. With the aid of an atlas or world map, identify the Mediterranean Sea. (See the map section starting on page 396.) Mark this on the blank world map on pages 6/7 of your Activity Book.

(b) Predict what will happen to the Mediterranean Sea over the next 50 million years. Discuss this with your partner; then share your thoughts with the rest of the class.

Reflecting on my learning

Reflecting Communicating Literacy

Write sentences using each of the following terms from this chapter. You may use more than one of the terms in your sentence if appropriate.

constructive boundary	core	magma	plate tectonics
continental drift	crust	mantle	plates
convection currents	destructive boundary	Pangaea	transform boundary

PowerPoint summary

Revision
Go to **www.edco.ie/geographynow** and try the interactive activities and quizzes.