

# Geography

## OUR PLANET AND ITS PEOPLE

An important part of your preparation for the Leaving Cert geography exam is that you are familiar with the layout and structure of the exam paper, writes Institute of Education geography teacher **Michael Doran**



### INTRODUCTION

Students preparing for the 2013 exam will be the eighth group to sit the Leaving Cert geography examination under the syllabus introduced in 2004. They will have the advantage, of being able to refer to seven exam papers as part of their preparation. An important part of your preparation for the Leaving Cert geography exam is that you are familiar with the layout and structure of the exam paper.

### EXAM FORMAT

All students should study carefully the layout and questions on all previous exam papers. You will need to know how the paper is organised and how the questions are structured. Unless you are aware of the exam format, you risk wasting valuable time during the exam itself. The paper is laid out as follows:

#### PART 1: SHORT-ANSWER QUESTIONS

- This section has a total of 12 questions.
- 10 questions must be answered.
- Each question carries 8 marks.
- A total of 80 marks can be gained in this section.
- Allow up to 30 minutes to answer this section.
- This part of the paper must be returned with your answer-book.

#### PART 2: STRUCTURED AND ESSAY QUESTIONS

■ This is made up of four sections and is worth a total of 320 marks. The sections appear on the exam paper in the following order:

- **Core Unit 1 – Physical Geography** (80 marks)
- **Core Unit 2 – Regional Geography** (80 marks)
- **Elective Units** (80 marks)
- **Options** (80 marks)

■ You must answer one question only from each of these four

sections.

- Each question is worth 80 marks.
- Allow about 30 minutes to answer each question.

**Note:** You have two hour and fifty minutes to answer all the required questions. This gives you exactly 34 minutes for each part of the exam. It would make sense to allow about 30 minutes for each part of the exam so that you have time to read the questions, organise and recheck your answers.

### PART 1: SHORT-ANSWER QUESTIONS

You should have examined the questions from all seven previous exams and also from the 2005 sample paper in order to familiarise yourself with the type of questions asked here.

■ Only questions relating to Physical Geography, Regional Geography and Geographical Skills are asked in this section.

■ You should try to answer all 12 questions, as your best 10 will be marked.

■ Each question is worth 8 marks.

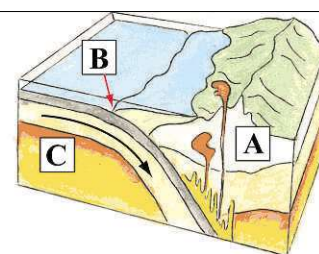
**Note:** You only have to give brief answers such as naming landforms, identifying regions or answering basic skills e.g. Ordnance Survey and Aerial Photograph questions. You do not have to explain your answer.

**Note:** It is very important that you do not simply write down the first thing that comes into your head. Think carefully as you attempt each question. Marks can be easily picked up in this section but they can be just as easily lost.

#### 2012 EXAM

In Part 1, the breakdown of the questions was as follows:

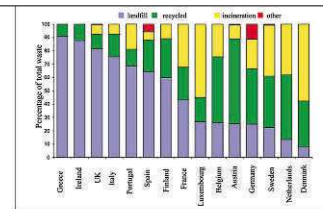
- Four physical geography questions.
- One regional geography question.
- Seven skills based questions including ordnance survey and aerial photograph questions.



Examine the diagram above showing a plate boundary and answer the following questions.

- (i) Name the type of plate boundary shown above. Destructive
- (ii) Name the type of plate at A. Continental
- (iii) Name the process taking place at B. Subduction
- (iv) Name the part of the mantle at C. Asthenosphere

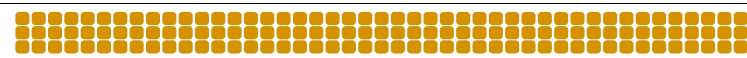
■ **Example 1: 2012 Question 5 – Plate tectonics.** ILLUSTRATION: ADELE MCCANN



Examine the bar graph above which shows the methods used for the disposal of waste by a number of European countries and answer the following questions.

- (i) Which country sent 60% only of its waste to landfill?  
Finland
- (ii) Which country recycled the largest percentage of its waste?  
Austria
- (iii) Which country incinerated the largest percentage of its waste?  
Denmark
- (iv) State one reason why Ireland has no waste incinerator at present.  
Reason Public objections to locations

■ **Example 2: 2012 Question 12 – European waste disposal.**



## PART TWO: SECTION 1 – CORE: PHYSICAL GEOGRAPHY

This section contains three questions. They will be indicated as Question 1, Question 2 and Question 3. You must answer one question only.

- Each question is worth 80 marks.
- Each question is divided into three parts: A, B and C.
- Answer each part from the same question. You cannot answer parts from different questions.
- Ensure you are familiar with how the questions are organised.
- Part A is worth 20 marks – this part may be skills based such as identifying landforms, interpreting diagrams, maps and photograph. You will not be expected to go into detail on this part.
- Part B is worth 30 marks – you will be expected to give written explanations here.
- Part C is worth 30 marks – you will be expected to give written explanations here.

The Physical Geography section is wide but you must ensure that you have at least done an overview of all the main topics. It would be very unwise to omit any sections. You can still focus on certain areas but do not limit your choice of questions.

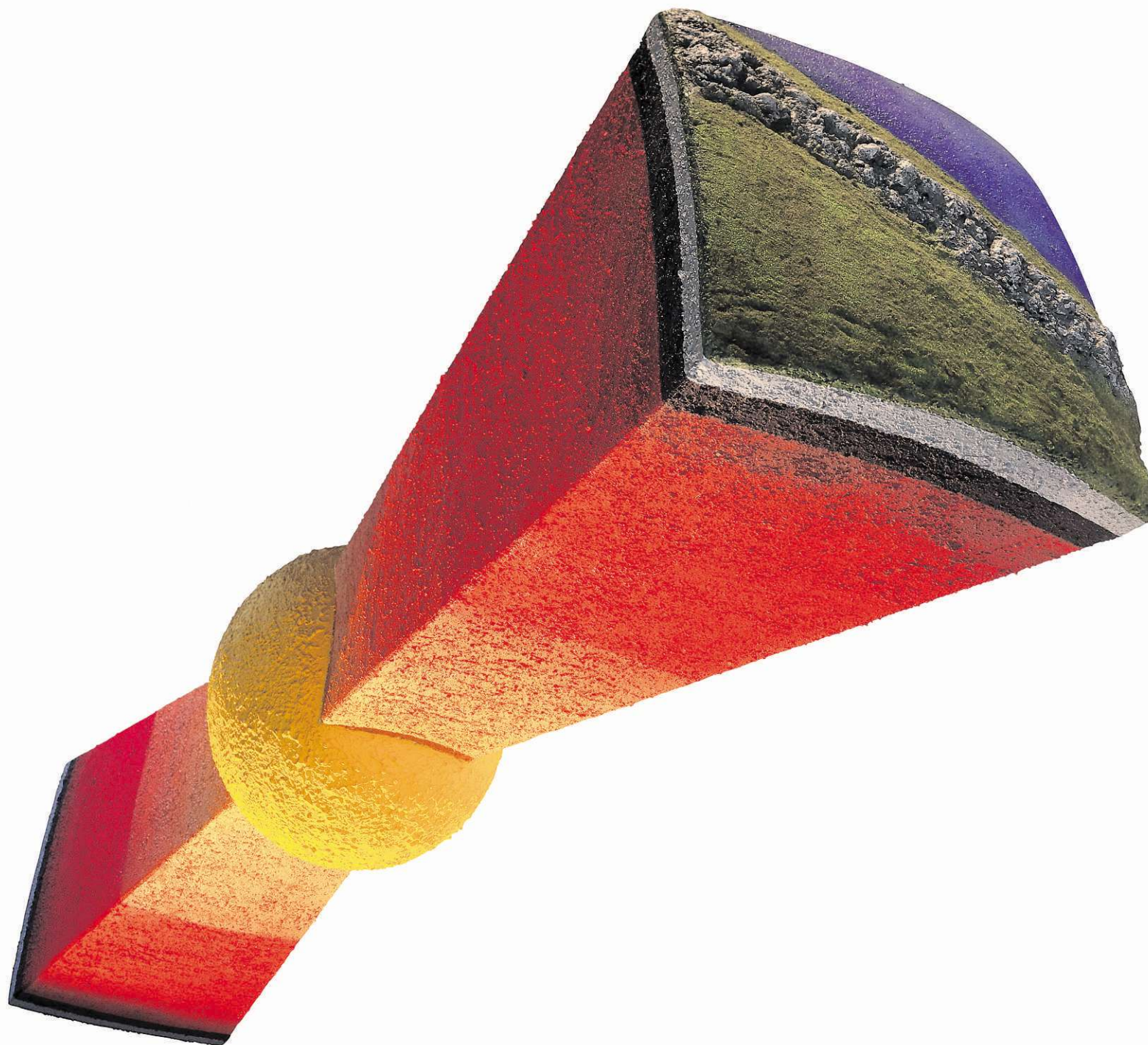
### NOTE – QUESTION STRUCTURE:

The exam question can be made up of different physical geography topics.

Consider Question 1 on the 2012 exam:

- Part A – this question related to an aerial photograph sketch map.
- Part B – this question related to sedimentary and metamorphic rocks
- Part C – this question related to earthquakes

This shows that you will not be able to answer questions properly if you have not studied all the topics.



## How to get your A1 Geography

**Name:** Liam Roe  
**From:** Clontarf, Dublin  
**School:** Institute of Education (sixth year)  
**Course:** Law in Trinity College, Dublin

**Facts and Figures**  
Geography is a subject of facts and figures. It demands long hours, application and organisation. A great way to get started

is by going through the past papers, identifying questions that are cyclical and those that share facts in common. For example, look for a pattern in the rock cycle questions. Write out a list of the most important questions. But be warned: In 2011 the Minister for Education announced a review of the Leaving Cert with a view to reducing predictability. It remains to be



seen what will come of this.

### Exam Time

Take 15 minutes to read and pick your questions. Choice is everything in Geography. A major stumbling block is the inability to answer a full three-part question. A simple way to pro-

tect against this is familiarising yourself with the questions asked in Part A. Equally, don't be blinded on the day by a part that you have learnt off. Make sure you can attempt the entire question before beginning. The short questions should be done in 10 minutes. They are simple but the more you practice, the more speedily and accurately you'll be able to do them, meaning more time for the longs. Do the options section after the shorts as you'll have prepared this best. Discuss it under at least three headings and finish in 40 minutes. The long questions should take 35 minutes each. Live by the marking scheme for them. What I did for

these was write out my essay, remove any non-essential words, transfer it onto a flash card (one SRP per line) and keep condensing until I could remember each SRP by one word. Test yourself regularly using a template, eg "In the case of a landform: feature named; definition; example; etc." Mind maps are useful too.

### Grabbing Marks

If you're ever stuck for SRPs on the day the following are of great use:  
■ Examples – your best friend. Long questions allow up to two examples. Make it painfully clear that it's an example by starting on a new line.

■ Labelled diagrams – even if it contains no additional info it counts as an SRP.

■ Minimising (only use if stuck) – see where you can break up one big SRP into two small ones. Worst case scenario: the examiner will join them back to count as one.

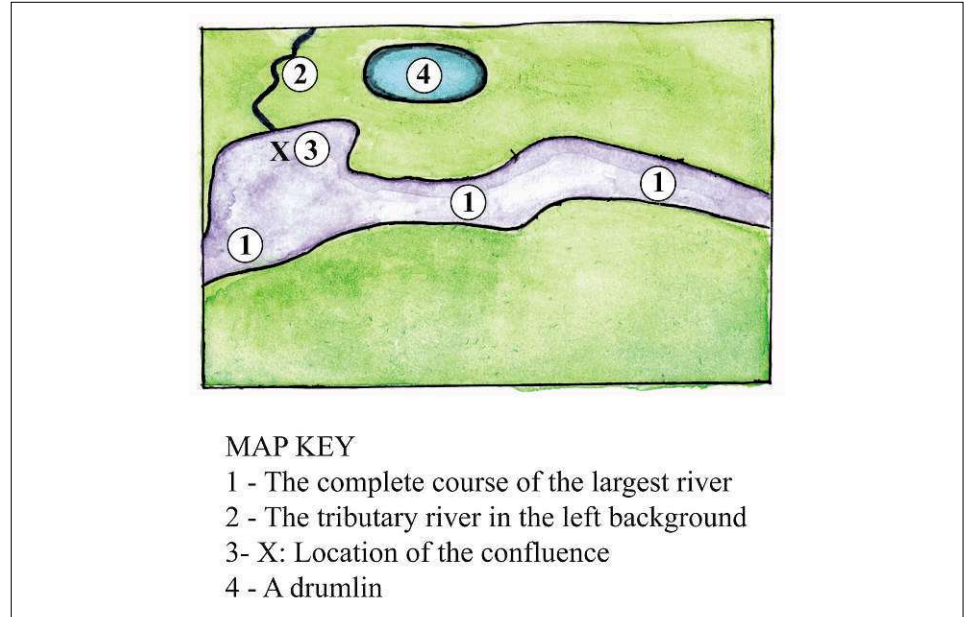
■ Use statistics liberally – don't be hesitant if you're not totally sure of a relevant date or percentage. The examiner won't have an exhaustive list of figures on front of her.

■ Study maps and weather charts meticulously. Last year they were worth over 60 marks. Get your field investigation perfected and you'll have less to worry about in June.

# EXAMPLES OF QUESTIONS - PHYSICAL GEOGRAPHY



■ Aerial photograph of Carrick-on-Shannon.



MAP KEY

- 1 - The complete course of the largest river
- 2 - The tributary river in the left background
- 3- X: Location of the confluence
- 4 - A drumlin

■ Sketch map based on photograph. ILLUSTRATION: ALICE MARIA GEORGE

**EXAMPLE 1: SKETCH MAPS**

■ This type of question has been asked on the 2007, 2008, 2009, 2010, 2011 and 2012 exams. Up to 2011, it was always a question that asked students to draw a sketch map from the ordnance survey map. In 2012, this changed to drawing a sketch map based on the aerial photograph provided.

■ It is always asked as a Part A question and is worth 20 marks. Students should carefully examine the three previous exam questions. It is important to practice answering these questions in order that not too much time is spent answering them. It is a very good way to pick up marks. On its own, it is worth 4% of the total marks.

All three questions have followed the same format:

- Draw a sketch map to half scale (half the length and half the breadth) of the entire map area.

- Show and name four features from the ordnance survey map on your sketch map.

**2012 - QUESTION 1A: ORDNANCE SURVEY MAP**

Examine the aerial photograph of Carrick-on-Shannon accompanying this paper. Draw a sketch map of the aerial photograph, half the length and half

the breadth. On it, show and label each of the following:

- The complete course of the largest river.
- The tributary river in the left background.
- Locate the confluence and mark it with an "x" on the sketch map
- A drumlin. (20 marks)

**MARKING SCHEME**

- Proportion and frame: two plus two marks.  
- Correctly showing location of each feature: three marks each graded (three/one/zero).  
Correctly naming each feature: one mark each.

**Note:**

- Proportion includes drawing the correct scale.
- Do not trace the map or draw only a section of the aerial photograph.

**EXAMPLE 2: IGNEOUS ROCKS**

Questions are asked every year about the Rock Cycle. This includes a number of questions. They can include:

- Labelling or explaining diagram of the Rock Cycle (Part A question).
- Formation of a rock type.
- Formation of a rock type and the resulting landscape.
- Formation of Karst landform.

**FORMATION OF IGNEOUS ROCKS**

■ Igneous rocks are formed from the cooling of molten rock, ie magma and lava. This cooling process will solidify them into rock.

- Magma: this is hot molten/semi-molten material found below the surface and within the crust.

- Lava: this is the molten/semi-molten erupted onto the surface during volcanic activity.

■ Igneous rocks can be divided into two main types, those formed on the surface and those formed underground within the crust.

- Surface rocks: these are formed from the cooling of lava during volcanic activity. They are referred to as extrusive rocks. Basalt is the most common of the extrusive igneous rocks.

- Underground: these are formed from the cooling of magma in the crust. They are referred to as intrusive or plutonic rocks. Granite is the most common of the intrusive rocks.

■ The molten or semi-molten rock that forms all igneous rocks is formed in the upper part of the crust - the asthenosphere. At this stage it is called magma.

- Temperatures of magma may be over 1000 degrees (Celsius).

As it hotter than the overlying rocks of the crust, it will be able to melt them as it moves upwards.

- The magma is also less dense (lighter) than the overlying rocks of the crust. This will allow it to rise upwards.

■ An important process in the formation of igneous rocks is the crystallisation of the minerals in the magma/lava.  
- As temperatures fall near and on the surface, magma/lava will cool. The minerals in the magma/lava will form crystal shapes.

- As cooling continues, the crystals will join together or interlock to form a solidified rock. The rate of cooling will determine the size of the mineral crystals in the rock.

**GRANITE**

■ Granite will form as magma cools within the crust. This is because:

- The upward pressure is too weak to break onto the surface and the temperatures of the crust are lower than the magma.

■ The cooling period occurs over a long period of time, ie from thousands to millions of years.

- This long cooling period allows large mineral crystals to grow. They can be seen by the human eye and are said to be coarse grained.

- Granite is made up of three minerals, mica, feldspar and quartz. This gives it a generally pale colouring. The mica can be easily seen as small shiny and reflective flakers.

■ Over time, the intrusive granite will be exposed on the surface as the overlying layers are eroded and weathered.

■ Example: the Wicklow mountains

**BASALT**

■ Basalt will form as volcanic lavas cool on the surface. The lava will tend to spread over a wide area.

- The cooling will be due to the much lower surface temperatures and the fact that the lava is spread wide and thin.

■ The cooling period is short compared to within the crust. This could be from a few days to months.

- This short cooling period ensures that the mineral crystals get little time to grow. This results in small crystals that are too small to be seen by the human eye. They are said to be fine-grained.

■ Basalt tends to be dark in colour.

- Basalt tends to form at constructive boundaries, subduction zones and hot spots.

■ Example - Giant's Causeway,

County Antrim

**EXAMPLE 3: LANDFORM DEVELOPMENT**

■ This is a popular choice for study. It has been asked on all exams to date. Ensure that you have done a general overview of:

- Rivers.
- Coasts.
- Glaciation.
- Mass movement.

**Note:** Part A of the exam question could refer to any one of the above four topics. Ensure that you have the basic knowledge of all four topics. In Question 2A on the 2006 exam, a picture of coastal landforms was used.

You only need to learn in detail landform formation of one of these topics.

■ In every question asked to date, the answer required an explanation of the formation of one landform (usually from the Irish landscape).

■ 2011 Question 2B - The selected landform had to be on the Ordnance Survey map. The answer needed a grid reference to show its location.

■ 2012 Question 2 B - the answer required an explanation of the formation of a landform of deposition.

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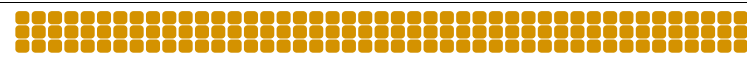
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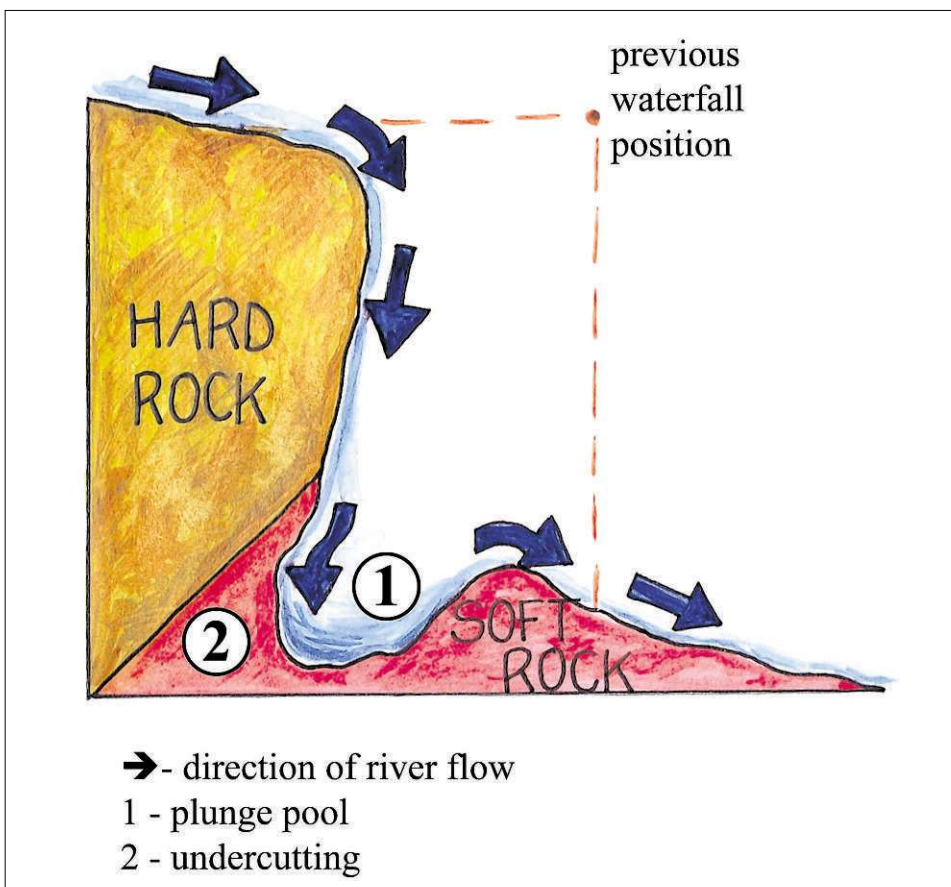
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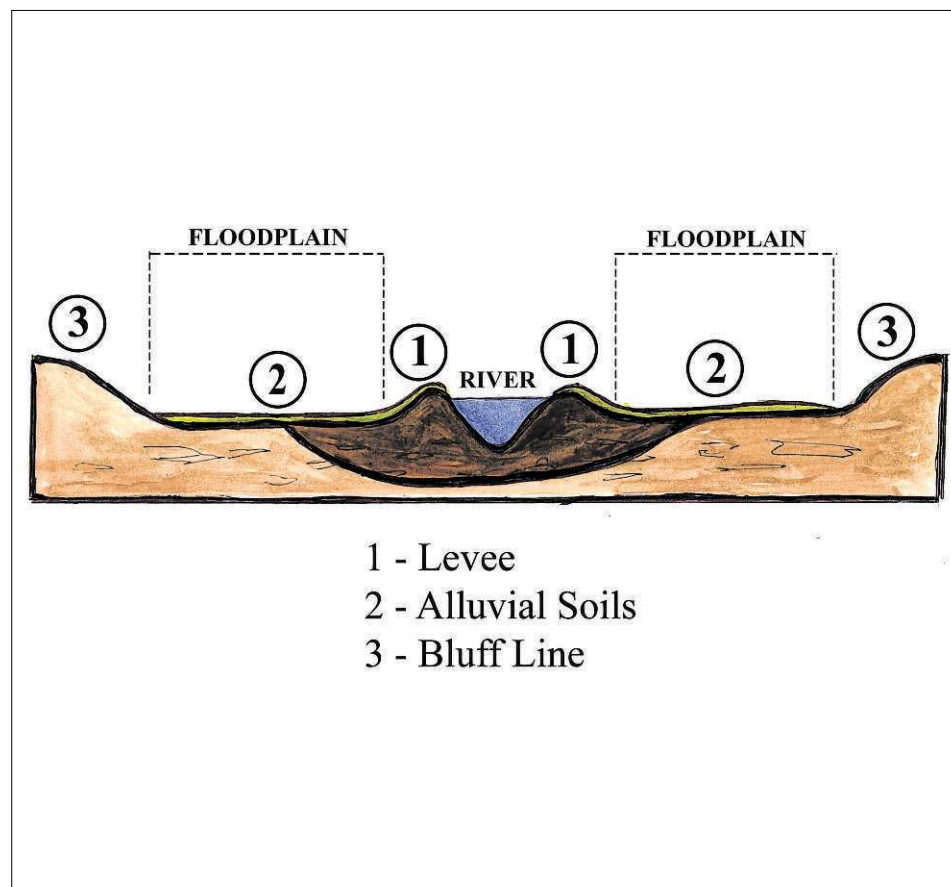
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# LANDFORM DEVELOPMENT



Waterfall diagram. ILLUSTRATION: SARAH AHMED



Floodplain diagram. ILLUSTRATION: SEÁN CORBET

## WATERFALL

### LANDFORM DEVELOPMENT 1 – WATERFALL

This is an example of a landform shaped by the geomorphic process of river erosion.

#### EXAMPLE

Powerscourt Waterfall on the River Dargle in Co. Wicklow.

#### DESCRIPTION

A typical waterfall has the following characteristics:

- The flowing water in a river channel falls from a higher riverbed level down onto a lower level.
- A very steep or vertical slope will be found at this point.
- The flowing water may fall with great force and energy.

#### FORMATION

A waterfall usually forms in the upper course of a river valley. This is likely to be an upland/mountain area where a narrow/shallow stream river is flowing downwards at varying slopes. This downward flow results in a gradual erosion and downward deepening of the riverbed. This is called vertical erosion.

Waterfall formation will most likely occur where:

- The channel slope becomes steeper. This allows a faster flow of water. River energy increases.
- The channel slope is made up of bands of hard and soft rock.

Waterfalls develop because the bedrock is eroded downwards at different rates. Soft rocks (sandstone) will be eroded at a faster rate than hard rocks (granite).

Erosion is most likely when the volume and speed of water flow in-

creases, eg after heavy rainfall or snowmelt. As the river runs from the harder rocks onto the softer rocks, the faster flow of a greater amount of water leads to increased vertical erosion (deepening) of the soft bedrock.

#### EROSION PROCESSES ARE ACTIVE

HYDRAULIC ACTION	ABRASION	SOLUTION
<p>This is the force of the fast flowing water.</p> <ul style="list-style-type: none"> <li>■ Twisting currents (eddies) cause great turbulence in the water.</li> <li>■ Weak points in the soft bedrock are attacked.</li> </ul> <p>Rocks/materials are dislodged and carried downstream.</p>	<p>The river's load erodes the soft bedrock.</p> <ul style="list-style-type: none"> <li>■ The bed-load rolls and rubs against the bedrock.</li> <li>■ Potholes form as pebbles cut into the bedrock due to the twisting water motion.</li> </ul> <p>The soft bedrock is loosened and is vulnerable to hydraulic action.</p>	<p>Natural acids (carbonic acid) in the water erode the soft rock.</p> <ul style="list-style-type: none"> <li>■ These acids dissolve the minerals in the rocks.</li> </ul> <p>This weakens the rock structure making it vulnerable to other erosion processes.</p>

**Note:** These processes are ongoing at the same time.

The combined effect of these processes is to deepen the soft bedrock to a lower level below that of the hard bedrock level. A steep drop forms at the border of the hard and soft rocks.

■ The flowing water will fall from the higher level down onto the lower level. This is the waterfall.

Vertical erosion will continue at the base of the waterfall. The falling water has great force and will deepen the bedrock even faster at the point where it hits the soft bedrock.

The process of erosion is ongoing at the front of the waterfall. The flowing water at the fall will have great energy.

- There will be great turbulence in the water at the point where the falling water hits the soft bedrock.
- The impact of hydraulic action is greatest here.
- The soft bedrock at this point is deepened to form a plunge pool.
- The swirling turbulence of the water in the plunge will lead to undercutting at the base of the waterfall.

The overlying hard rock becomes unstable and can no longer support its weight. It collapses due to the influence of gravity. This collapsed rock adds to the river's load and increases the effect of abrasion.

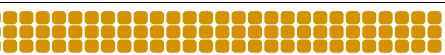
■ Waterfall formation is a sign that the river is achieving a graded profile.

■ The above erosion processes will be greater if the rocks have been weakened by:

- Weathering – processes such as carbonation will weaken rock structure.
- Mass movement – downward movements such as rockfalls add to the impact of abrasion.

■ This retreat leaves a channel with steep sides.

■ The erosion of the front of the waterfall is called headward erosion. There is a constant repetition of undercutting and collapse. This causes the front position of the waterfall to retreat back upstream. It may increase in height as it does so. This forms a feature called a gorge.



# FLOODPLAIN

## LANDFORM DEVELOPMENT 2 – FLOODPLAIN

■ This is an example of a landform shaped mainly by the fluvial processes of transportation and deposition.

### DESCRIPTION

■ This is the wide and very gently sloping area of land found beside a river channel. It extends out from the river channel until the slope of the land rises to form a bluff line.

■ The flood plain will lie between the bluff lines on both sides of the channel. The floodplain will lie just above the water level of the river and suffers flooding when the channel overflows.

■ The soils of the floodplain are formed from sediments deposited during many floodings.

■ It is a feature that forms in the middle course and becomes wider as the river continues into the lower course.

### EXAMPLES

Middle course of the Rivers Shannon and Liffey.

## FORMATION

In the middle course, the slope and height of the land beside the channel falls. The river's water volume increases due to more tributaries from a larger basin. Lateral erosion of the sides of the channel occurs from erosional processes such as hydraulic action (force of flowing water that loosens and removes material from the sides) and abrasion (impact of the river's load hitting against the sides of the channel).

■ These erosion processes widen the river channel and cut back interlocking spurs beside the river to form a bluff line. The river valley is widened. Meanders form in the river valley. Deposition builds up on the inside (convex) side of the meander to form a point bar. This leads to a wide and flat river valley. It is now vulnerable to flooding.

■ Flooding of the floodplain is most likely after prolonged and heavy rainfall or the melting of snow. River volume rises and the river is said to have a high discharge. At this stage, the river will be carrying a large load. The load is carried as follows:

- Suspended load - this is the lightest part of the load and is carried in solution or suspension.

- Bedload - this is the heavier part of the load carried by saltation and traction.

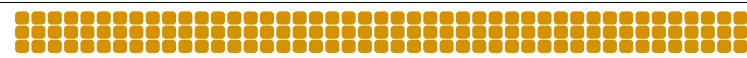
When the water level of the river reaches the level of the banks (bank-full discharge), it will burst or flow over its banks. Floodwater flows onto the land beside the river.

■ River deposition will be the main process at this stage. This will occur because the flooded waters lose energy. This is because the depth of the flooded water is shallow. This leads to friction between the ground surface and the floodwater. The speed and flow of the floodwater is low due to the frictional drag of the ground water.

■ As the floodwater loses energy, deposition will happen. The capacity and competence of the floodwater is reduced. The heaviest part of the load is dropped first and nearest the channel. Over time, ridges of deposition will form beside the river channel. These are called levees.

■ The smaller and finer material of the suspended load is carried further and deposited over a wider area. After the water evaporates or drains away, a fresh layer of sediment remains. This deposited material is called alluvium.





# REGIONAL GEOGRAPHY

## INTRODUCTION

This section has three questions. These will be Questions 4, 5 and 6. Only one question is to be answered.

- Each question is worth 80 marks.
- Each question contains three parts: A, B and C.
- All three parts of the same question must be answered.

– Part A is worth 20 marks. Answers to this part can be kept short. On the sample paper questions asked included drawing a sketch-map of Ireland, identifying regions from a map of Europe and defining the term “region”.

– Part B is worth 30 marks. A written explanation is required here.

– Part C is worth 30 marks. A written explanation is required here.

For this section you need to be able to describe regions under the following headings:

- Relief.
- Climate.
- Socio-economic: core, peripheral and declining industrial regions.
- Culture: language/religion.
- Urban.
- Administration.

You must also ensure that you can refer to each of the following:

- Two examples of regions in Ireland.
- Two examples of regions in Europe (non-Irish).
- One example of a subcontinental region.

### OUTLINE MAPS

Every year to date, the drawing of outline maps has been a requirement of Part A questions. This is worth 20 marks and four

percent of the total result. For the last three years, this type of question has been asked as Part A of two of the three regional geography questions. It is a good way to pick up marks so it is important to practice answering these questions. The question could be asked as:

- Draw an outline map of Ireland to show one or two Irish regions that you have studied.
- Draw an outline map of a European region (not Ireland).
- Draw an outline map of a continental/sub-continental region.

**Note:** In the last two exams, the outline map question has referred to continental/sub-continental regions.

### OUTLINE MAP EXAMPLE 1 2007 QUESTION 4 A: IRISH REGIONS

Draw an outline map of Ireland. Show and name the following on it:

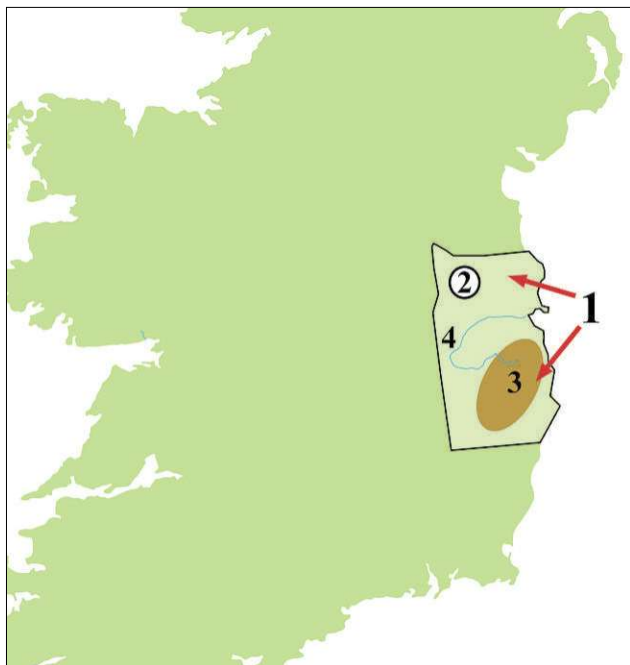
- (i) Any one Irish region that you have studied.
  - (ii) One urban centre in the region.
  - (iii) One relief feature in the region.
  - (iv) One drainage feature in the region.
- (20 marks)

### MARKING SCHEME

- Outline map: four marks graded.
- Showing and naming region: two marks graded + two marks.
- Showing and naming urban centre: two marks graded + two marks.
- Showing and naming relief feature: two marks graded + two marks.
- Showing and naming drainage feature: two marks graded + two marks.

### SOLUTION

See diagram below.



■ Solution diagram. Key: 1 – Greater Dublin area, 2 – Navan (urban centre), 3 – Wicklow mountains (relief feature) 4 – River Liffey (drainage feature). ILLUSTRATION: ALICE MARIA GEORGE

# PARIS BASIN VERSUS MEZZOGIORNO

## REGIONAL GEOGRAPHY: REVISION TOPIC 2

### DEVELOPMENT OF AGRICULTURE (NON-IRISH EUROPEAN REGIONS)

#### QUESTION

Examine the development of agriculture in two contrasting non-Irish European regions that you have studied. (30 marks)

#### ANSWER

■ Two contrasting non-Irish European regions are the Paris Basin (located in northern France) and

the Mezzogiorno (located in southern Italy including Sicily/Sardinia).

■ The regions contrast with each other in many ways. One of the main contrasts is the level of economic development:  
– The Paris Basin is an economic core region. This means that it is an area of vital economic importance. It has a high concentration and wide range of economic activities.  
– The Mezzogiorno is an economic peripheral region. This means that it is an area that is less economically developed and is marginal in terms of its geographical location.

■ The overall economic contrast is seen in the development of agriculture. Both regions have differ-

ent farming activities.  
– The Paris Basin has a very intensive and commercial agricultural sector. It is characterised by very high levels of output even though it is the smallest economic sector.  
– The Mezzogiorno has a greater dependence on agriculture (10 percent of the workforce) but many farming activities are limited by physical/human factors.

#### REGION 1: THE PARIS BASIN

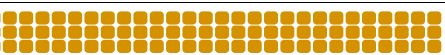
■ Agriculture has continued to successfully develop in the Paris Basin because it benefits from a wide range of physical and human advantages.

■ Climate – the mix of cool, tem-

perate, maritime and continental climate ensure mild temperatures and good rainfall levels. This results in a long growing season for a wide range of crops such as wheat.

■ Soils and relief – much of the region has well drained and very fertile soils, eg alluvial and limon soils. This ensures good growth. The landscape is low-lying and undulating which allows use of modern machinery for planting and harvesting of crops.

■ Markets – commercial farming developed because of access to large markets. The Paris Basin has a population of over 20 million people (12 million around Paris city). Average incomes are among



# REGIONAL CLIMATE EXAMPLE



## CLIMATE REGION - COOL TEMPERATE OCEANIC CLIMATE

■ A climate region is an area that has the same general climate conditions. This means that it experiences the same average weather conditions over a long period of time, eg 30 years. These average weather conditions include temperature, rainfall, sunshine, wind, etc.

■ A climate region can extend over a very large area, ie part of a continent such as Europe. It can include many countries.

■ An example of a climate region is the Cool Temperate Oceanic climate. This climate region is located in the northwest of Europe in lands that border the Atlantic Ocean. It extends from northern Spain to Norway. It is the climate type for Ireland.

It is so named because:

■ It usually experiences moderate weather conditions (temperate). This means that it rarely experiences extremes of heat or cold, drought or heavy rainfall.

■ It is influenced by being beside or close to large oceans (oceanic/maritime).

■ The main features of this climate region are:  
– Warm, wet summers and cool, wet winters.  
– Regular rainfall at all times of the year.

### MAIN INFLUENCES

The Cool Temperate Climate is influenced by the following factors:

(i) **LATITUDE**  
This refers to distance from the equator. The Cool Temperate Oceanic Climate region is found in the mid-latitudes between 40 degrees and 60 degrees north of the equator. Temperatures decrease further from the equator because the sun is at a lower angle in the sky – heat is spread over a wider area.

(ii) **THE NORTH ATLANTIC DRIFT**  
This is a warm water current which originates in the Gulf of Mexico. It heats up the waters around the northwest of Europe. It means that coastal areas in this region do not suffer freezing temperatures that occur in areas in the same latitudes such as Canada.

(iii) **DISTANCE FROM THE SEA**  
The oceans/seas such as the Atlantic act as a moderating influence on land temperatures. It takes longer to heat up and cool down than land areas. This means that it helps cool land temperatures in summer and

keep land temperatures warmer in winter. This influence is less important further inland. The influence of the sea also explains why the temperature range (diurnal) is low compared to other climates, ie, around 10 degrees.

(iv) **PREVAILING WINDS**  
This refers to the most common wind direction. In the northwest of Europe, the prevailing wind is from the southwest. These winds pick up moisture as they move over the Atlantic Ocean. This leads to depressions forming bringing regular rainfall to the region. They explain why weather conditions can vary.

(v) **ALTITUDE**  
Temperatures decrease as land height increases. Temperatures generally fall by one degree for each increase in height of 100 metres. This means that upland and mountain areas tend to be colder and wetter.

### MAIN CHARACTERISTICS

**SUMMER TEMPERATURES**  
■ Summer temperatures are regarded as warm and do not usually reach very hot levels. Temperatures average between 15 and 20 degrees across this climate region.

■ Temperatures are lower in coastal areas due to the cooling influence of the sea. Inland areas are warmer.

■ Average temperatures also decrease from north to south, eg summer temperatures in Norway are lower than summer temperatures in northwest Spain.

**WINTER TEMPERATURES**  
■ Winter temperatures are cool and the region does not usually experience long spells of very cold freezing conditions. Temperatures average between 4 and 6 degrees.

■ Temperatures are milder in coastal areas due to the winter warming influence of the sea. Inland areas that are distant from the sea are colder.

**RAINFALL (PRECIPITATION)**  
■ This climate region receives generally high and regular rainfall. It may occur at all times of the year. There is no dry season.

■ Most rain comes from depressions that travel with the prevailing southwest winds. This brings frontal rain.

■ Rainfall levels are higher in upland and mountain areas – relief rain. They also tend to be higher in western areas that border the coastline. This explains why rainfall levels in the west of Ireland are higher than in the east.

■ Overall, annual rainfall levels can range from 600 mm to 2,500 across the region.

the highest in Europe (average income in the Ile de France was over 40 percent above the EU average in 2010). This ensures a high level of demand for food products. Good infrastructure also allows access to much of the EU for farm produce.

■ Common Agricultural Policy (CAP) – past policies encouraged high output levels. This led to much capital investment, eg machinery, fertilisers, etc. This led to a growth in farm size. This has led to greater efficiency of production.

■ The range of advantages has led to a high level of output of a wide range of food produce.

As parts of the Paris Basin have different landscapes (pays), it allows each area to specialise, eg: – Brie: this is an important dairying area producing milk and dairy produce, eg Brie cheese. – Beauce: this is the most productive cereal growing area of the EU. – Champagne: vineyards are found

on south facing slopes of the southern edge of the Basin.  
– Normandy: this region has many activities including fruit growing (particularly apples).

■ The success of the agricultural sector is an important base for the region's economy. Many secondary activities (food processing, etc) and tertiary activities (transport) have expanded because of this.

### REGION 2: THE MEZZOGIORNO

■ In the past, farming was the main economic activity (50 percent of the labour force in 1950) but it faced serious physical and human obstacles to growth. Some still remain. The main obstacles are:

– Relief: 85 percent of the region is upland and mountain. This makes access and use of machinery difficult. Many slopes have suffered serious soil erosion.  
– Climate: the hot summer of the Mediterranean climate results in

low rainfall and even drought conditions. This restricts crops such as cereals.

– Markets: the region has 20 million people but is widely dispersed. Average incomes are low (70 percent of EU average in Calabria in 2009). The region is also distant from large markets of Northern Europe.

– Farm size: despite reform, average farm size is still small. In Calabria, most farms are less than 20 acres in size. Many are fragmented which also deters investment.

■ Up to the 1950s, farming in this region suffered from low output and poverty. In 1950, a State agency the Cassa per il Mezzogiorno attempted to modernise farming. There was much investment in irrigation, infrastructure and land reform. By the time it was ended in 1984, farming had greatly improved. Today, in 2012, the overall situation is as follows:

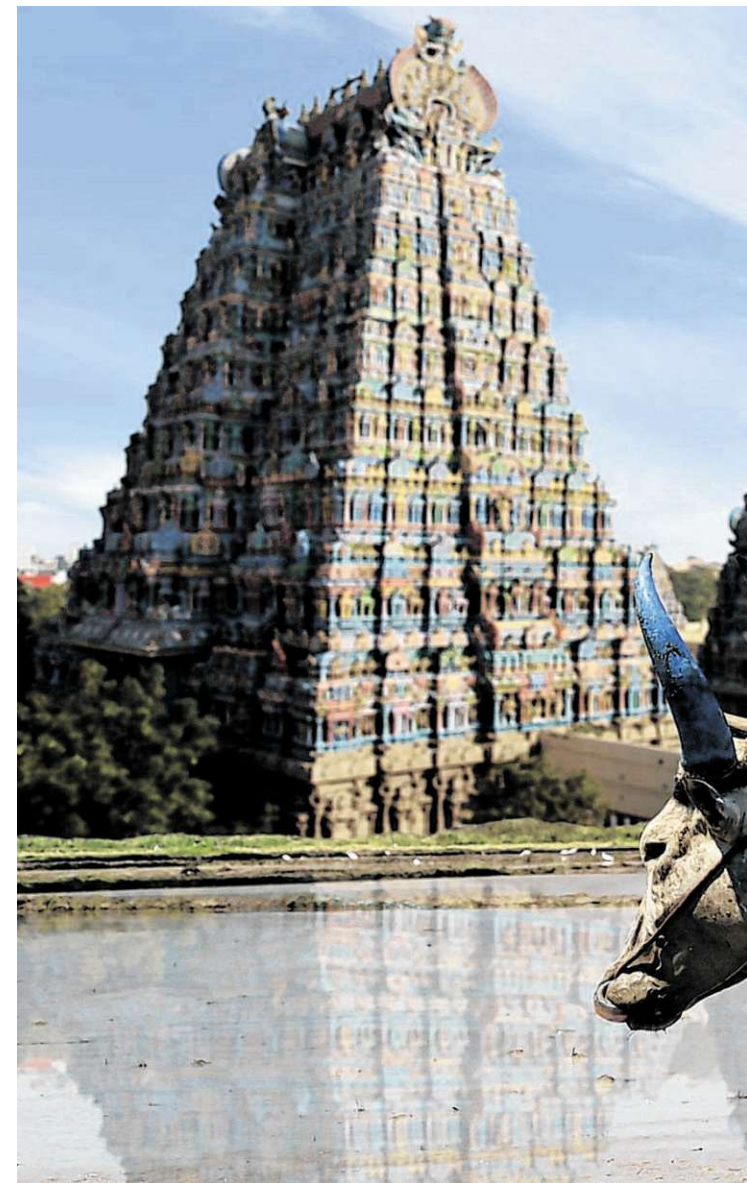
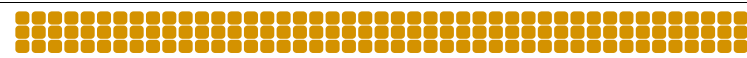
– Coastlands: commercial farming has developed with high output

levels. It has benefited most from modern infrastructure, irrigation and land reform. Physical conditions are more suitable, eg lowland relief on the Plain of Campania. Tree crops (olives pears, peaches), flowers, citrus fruits (lemons, limes, oranges) and salad crops (tomatoes, lettuce) are successfully grown. Winter wheat is grown which is used for pasta production.

– Inland areas: farming is less successful in these upland areas. In many areas, it is in decline.

The age profile of farmers is rising while an increasing number farm only on a part-time basis. Pastoral farming still continues (sheep, goats) but the commercial return is limited.

■ Unlike the Paris Basin, farming in the Mezzogiorno still faces problems and is a factor in the region's economic struggle. The overall limited success of farming in this region is a clear contrast with the Paris Basin.



# URBAN GROWTH

## REGIONAL GEOGRAPHY: REVISION TOPIC 3 URBAN GROWTH – KOLKATA

■ An urban region is the area of a city and its surroundings (hinterland). Urban regions have characteristics such as high population density, concentration of economic activities and good transport links.

■ A key feature of urban areas today is urban growth. This is the increase in the size (area) and population of an urban area. It is part of the trend of urbanisation (the increase in the proportion of the overall population living in towns and cities).

■ An example of urban growth in a sub-continent region is the city of Kolkata in India. This city is located in the state of West Bengal in northeast India.

■ In the past it was known as Calcutta, when India was part of the British Empire.

■ The growth of Kolkata reflects the present trend in urbanisation. Most urban growth is occurring in the developing world. This is leading to great increases in population size of cities and resulting in the physical expansion of cities.

■ Kolkata was founded as a trading port in 1690. It expanded to become the largest city and the capital of India (until 1912). Since 1950, its population has risen rapidly and the city area has greatly expanded.

■ In 1950, the population of the city and its surrounding area was about three million.

■ By 2009, the population of the city and its suburbs is now estimated to be greater than 15 million.

■ The area of the city and its suburbs is about 1800 square kilometres.

■ The expansion of Kolkata is caused by the following factors:

### (i) RURAL TO URBAN MIGRATION

– People are moving from rural areas of India to cities such as Kolkata because of rural

“push” factors such as lack of jobs, land pressure, poverty, etc.

– People are drawn to cities in search of jobs, access to services (education) and a better quality of life.

– Since the 1990’s, Kolkata has become an economic core area of India. There is a wide range of manufacturing and tertiary industries located there.

### (ii) RISING POPULATION

– India population continues to rise. It has high birth rates of 2.2 per cent and a natural population increase of 1.4 per cent (2009 estimate).

– This is leading to population pressure in the countryside on existing land while the actual population in the city continues to rise naturally.

■ The combination of rising population and economic expansion has caused the expansion of the urban area of Kolkata.

– The city is developing in a north-south direction along the Hoogly River. Its expansion east and west westwards is limited

by wet marsh lands.

– Industry is expanding outwards along the main roads leading to the centre.

■ The expansion of the city has created a range of problems:

### (i) POOR HOUSING

– Much of the population is now living in areas of very poor quality housing. These settlements develop into slums areas known as bustees.

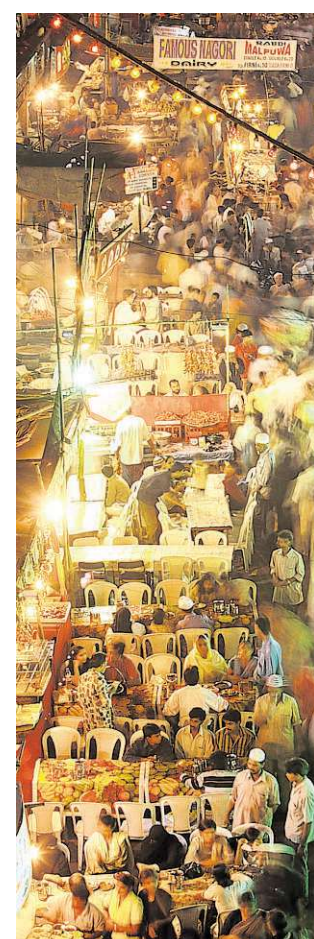
– It is estimated that in the area that at least a third of the population is living in slums. This is at least four million people.

– At least half a million people are homeless and are forced to sleep in the open. These living conditions contribute to problems of health.

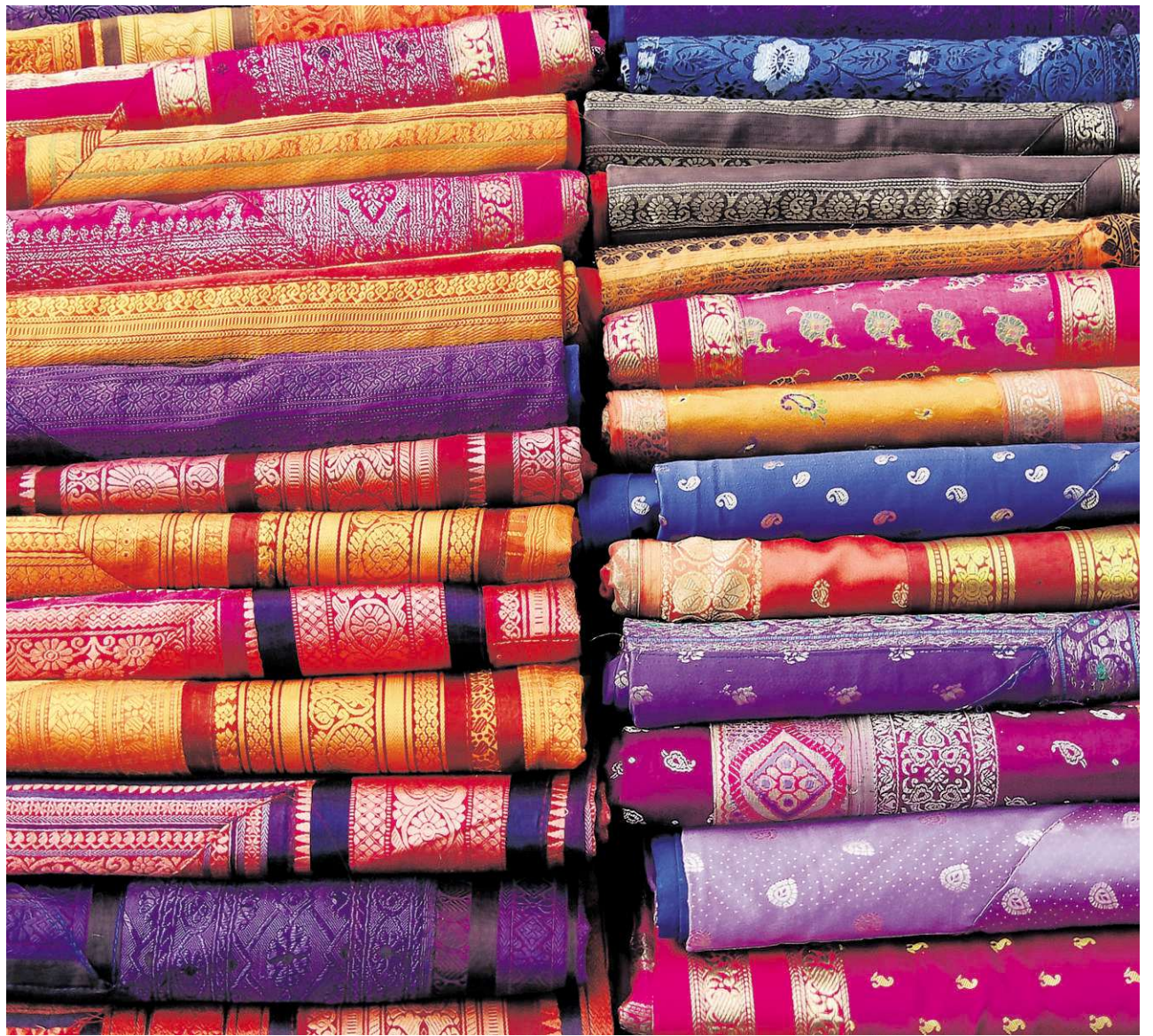
### (ii) POLLUTION

– The economic expansion of the city has contributed to serious problems especially of air pollution. This is creating serious respiratory disease and lung cancer.

– Water pollution is a serious problem from industrial waste and untreated sewage.







**REGIONAL GEOGRAPHY: REVISION TOPIC 4 INDIA-SECONDARY INDUSTRY**

# INDIA – SECONDARY INDUSTRY

India is regarded as a developing economy. The characteristics of a developing economy include:

- A large primary sector, eg agriculture.
- Poor infrastructure, roads, rail, etc.
- Low standards of living, widespread poverty.

In the last twenty years, India has experienced high levels of economic growth. This has led it to be also described as a New Industrialising Country (NIC).

Much of the reason is because of the remarkable expansion of secondary industry. This refers to manufacturing industry which the making of finished products.

In India, a wide range of industries (light/heavy manufacturing) are now expanding. These include:

- Textiles.
- Food Processing.
- Car manufacturing.
- High-technology industries, computers (hardware and software).

**PAST SITUATION – SMALL MANUFACTURING SECTOR**

In the past, India had a small manufacturing sector, eg in 1950, only 2 per cent of the work force worked in secondary industries. This was because:

- There was a small home market (widespread poverty).
- Raw materials were exported (not processed in India).

In the past, the Indian government tried to develop secondary industry in the following ways:

- A series of five-year plans with production targets were introduced.
- There was development of heavy industries, eg steel.
- Growth centres around the country were developed, eg Kolkata (Calcutta), Mumbai (Bombay).

By the 1980s, these policies had produced disappointing results. Industrial production had failed to reach targets due to a range of problems, eg low investment, poor infrastructure, corruption, etc.

India's lack of success was

contrasted by the success of other Asian countries, eg South Korea. New policies were needed.

**EXPANSION OF SECONDARY INDUSTRY**

From the 1990s, the expansion of industry was based on a number of advantages.

**FOREIGN DIRECT INVESTMENT (FDI)**

To overcome the problem of low domestic investment, the Indian Government allowed foreign companies to invest in India. This stimulated growth.

**LOW WAGE COSTS**

Average labour costs are as low as 10 per cent of the developed world. This will attract Multi-National Corporations (MNCs) as production costs are low.

**GROWING DOMESTIC MARKET**

Increasing wealth means that there is a growing home market for products. By 2020, this is expected to number 300 million people.

**DOMESTIC ENERGY SOURCES**

India has a range of energy sources, eg coal (northeast), oil and HEP. This reduces dependency

on imports and lowers electricity costs.

**RAW MATERIALS**

India has a range of mineral resources, eg copper, iron ores, etc. Agriculture also produces raw materials such as cotton and jute.

**EXAMPLES OF SECONDARY INDUSTRY**

**TEXTILES**

This ranges from the production of craft goods to consumer goods.

The textile industry accounts for 14 per cent of all industrial output, 10 per cent of export earnings and five per cent of national wealth. It is the second biggest activity after agriculture.

30 million workers are directly employed in this industry.

Many key companies have located production there – JC Penney, Nautica, Dockers, etc.

**CAR PRODUCTION**

Many car companies have production plants in India. These include Nissan, Suzuki, Honda, etc.

In 2010, 10 million vehicles were produced (cars, lorries, etc.)

Indian car companies are developing their own cars for the

“

**The textile industry accounts for 14 per cent of all industrial output, 10 per cent of export earnings and five per cent of national wealth.**

domestic market, eg the Nano.

**HIGH-TECH INDUSTRIES**

These include the production of computer parts, mobile phones, etc.

**LOCATION OF INDUSTRY**

Industry is located mainly around city regions. They are now core economic regions. This is because they have advantages of access, skilled labour, markets, etc. They include:

- Kolkata: textiles, iron and steel, chemicals, etc.
- Mumbai: food processing, textiles, electronics, pharmaceuticals, etc.
- Bangalore: electronics.

**PROBLEMS OF INDUSTRIAL GROWTH**

The rapid growth of India's secondary sector is a great overall success but there still problems remaining which include:

- Pollution: air pollution, water pollution and lack of waste disposal.
- Safety concerns: lack of enforcement of safety laws, eg Bhopal disaster.
- Ethical issues: child labour, poor working conditions, etc.
- Poor infrastructure: despite improvements, much infrastructure needs development.



# ELECTIVES: REVISE YOUR STRENGTHS

## ELECTIVES

You must make a choice between:

Patterns and Processes in Economic Activities

or

Patterns and Processes in the Human Environment

■ Each elective has three questions. Answer only one.

■ Each question is divided into three parts – A, B and C.

■ Part A is worth 20 marks – it is likely to be a skills based question, eg interpreting statistics – see example 4 (Question 7 A from the sample paper).

■ Part B is worth 30 marks. A written explanation is required here.

■ Part C is worth 30 marks. A written explanation is required here.

### DRAWING GRAPHS

The drawing of graphs is another regular question that is asked in the electives section. It is always asked as a Part A question and is worth 20 marks. You need to practice this type of answer, as it is quite easy to spend too much time completing it.

**Note:** Use graph paper.

### EXAMPLE – 2012 QUESTION 12 (a): LIFE EXPECTANCY

Female Life Expectancy at Birth (years)

Examine the data in the table above showing female life expectancy at birth in a number of European countries.

Country	1990	2009
Bulgaria	75	77
Ireland	78	83
Germany	80	83

(i) Using graph paper, draw a suitable graph to illustrate this data.

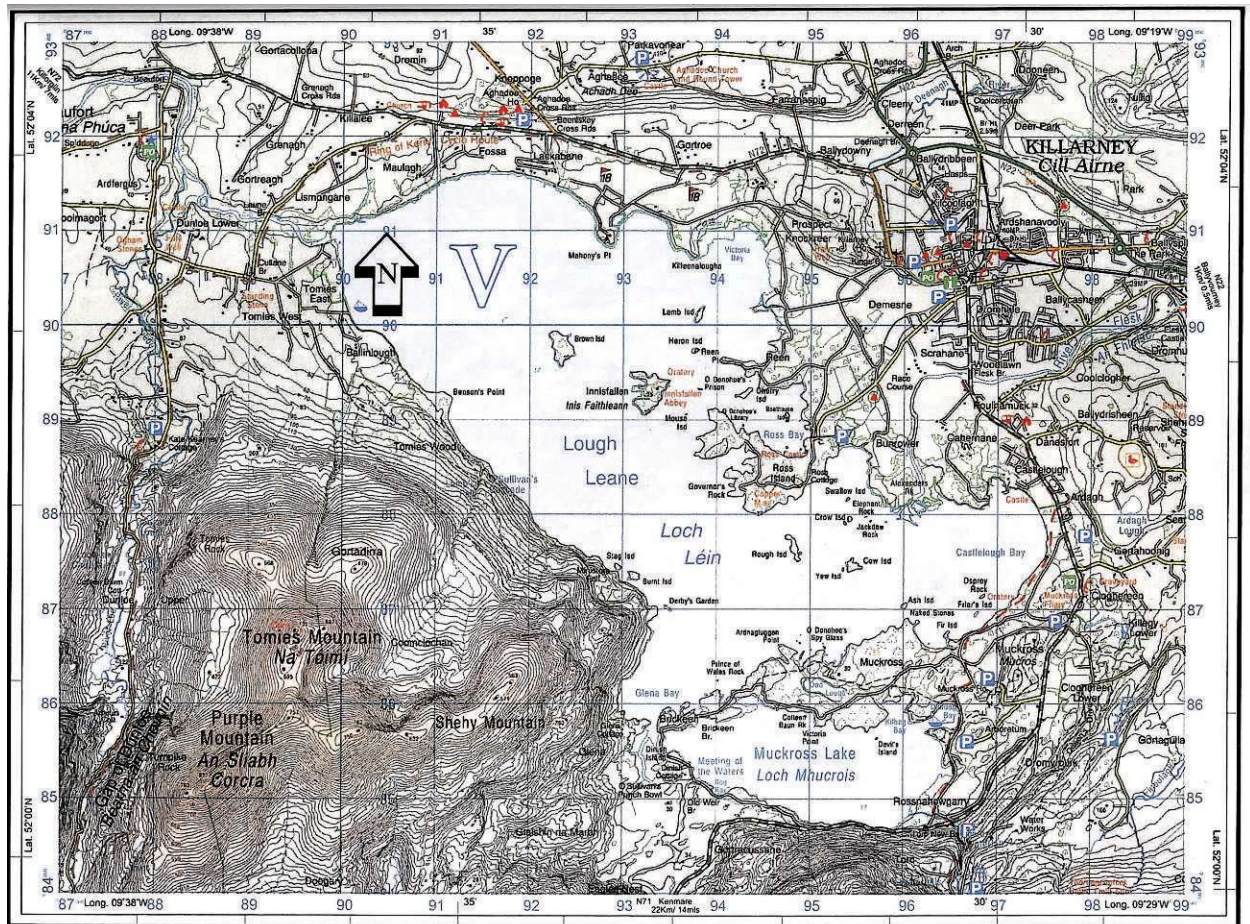
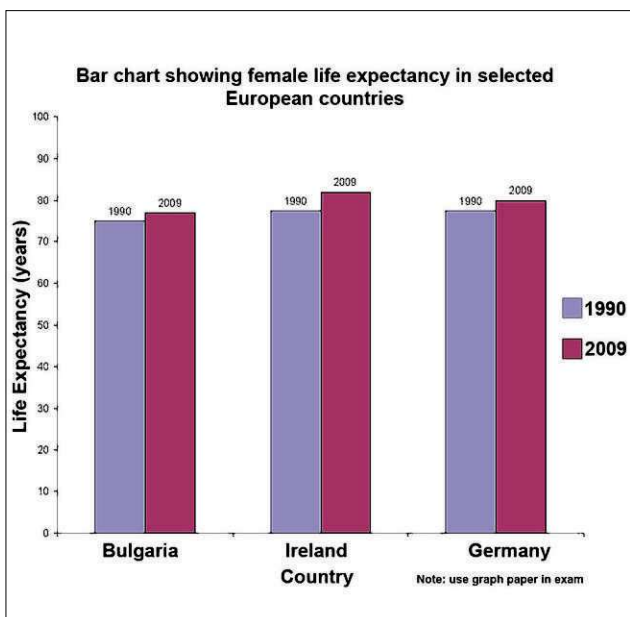
(ii) State two reasons why life expectancy in general is increasing in Europe. (20 marks).

### MARKING SCHEME BAR CHART

- Title: two marks.
- Scaled axis: two marks (one plus one).
- Six items illustrated: two marks each graded.
- If graph paper not used: two marks deducted.
- Stating two reasons: two marks each.

### SOLUTION

See bar chart graph below.



# URBAN DEVELOPMENT

■ **Top:** Ladies View Killarney. PHOTOGRAPH: DON MACMONAGLE Above: ordnance survey map of Killarney.

## HUMAN ELECTIVE: REVISION TOPIC 1

### 2006 - QUESTION 10 (c) URBAN DEVELOPMENT

Study the 1:50,000 ordnance survey map extract that accompanies this paper. Using map evidence to support your answer, explain three reasons why Killarney developed at this location. (30 marks)

### SOLUTION

**REASON 1 – SUITABLE SITE**  
– The site of the town is suitable for building and development. Much of the land in the map area is unsuitable, eg the mountain area in the southwest of the extract and land bordering the lake (poor drainage).

– The land in the northwest of the extract where the town is located is lowland. This is indicated by a spot height of 66 metres at V 953 914. The presence of contours indicates that the site

is at a higher elevation to the land bordering the lake. This suggests that the site of the town is a dry point (not at flood risk). Lowland areas also have better climate conditions, eg temperatures.

– The wide spaces between the contours in the town area such as in V 97 91 indicate that the land at this site is very gently sloping. This makes it easier to build on and expand the town.

– The town is situated between the river Flesk to the south and the smaller Deenagh river on the northwest of the town. These rivers will provide drainage for the site and also are a source of fresh water.

**REASON 2 - ROUTE FOCUS**  
The modern transport system of roads and rail is focused on Killarney.

### Road

– The national primary road, the N22, enters the town from the east at V 990 906. It continues around the northeast of the

town and exits to the north. This road will provide links to national and regional urban centres.

– Two national secondary roads also enter the town. The N71 enters the town from the south and the N72 enters the town from the west. These roads will link to regional urban centres.

### Rail

– The town is served by railway with a railway station located at V 970 908.

This will provide direct national and regional links.

These transport links will benefit the modern development of the town because:

– Business and commercial activity will tend to locate in urban centres with good transport links. This increases the economic and employment importance of the town.

– The town is easily accessible for people from several directions.

### REASON 3 - SERVICES CENTRE

The modern development of the town continues because the town provides a range of functions and services. This can be seen by the presence of the following examples:

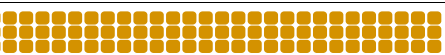
– **MEDICAL:** a hospital is located in the northwest of the town at V 966 917.

– **RELIGIOUS:** a cathedral is located at V957 908. A church is located at V 968 908.

– **COMMUNICATIONS:** a post office is located at V 963 905.

These services add to the importance of the town in the following ways:

- They add to the level of economic and business activity in the town.
- They are an important source of employment.
- Most of these services are only found in the town. They serve the surrounding hinterland.
- They also provide important support services for people and the economy.



# HUMAN ELECTIVE: REVISION TOPIC 2 IMPACT OF MIGRATION

## DONOR COUNTRIES – IMPACT OF MIGRATION

A donor region or country is an area that come people from. This means that people migrate from that area to another area. Donor regions can be part of a country or a country itself.

■ Examples of donor countries include Poland, Turkey, Mexico and the Philippines.

■ Examples of donor regions include the west of Ireland and the Mezzogiorno.

■ Migration can have both positive and negative effects on donor countries/regions.

### POSITIVE IMPACT – ECONOMIC IMPROVEMENTS

■ Remittances are the money sent back by emigrants to their home region/country. It is part

of the money earned in the receiver area.

■ It is estimated that in 2011 worldwide flows of remittances reached a total over \$450 billion. Of this it is believed that \$350 billion goes to developing countries.

■ In the past (up to the 1960s), this inflow of money was very important to the Irish economy. Today, countries such as the Philippines depend heavily on remittances (the Philippines receives nearly \$10 billion each year). India was the main recipient of remittance payments in 2011, ie \$55 billion. For many countries, it is a major source of income, eg in Haiti, remittances make up 15 per cent of national income.

■ The total amount of remittances has risen in recent years as money transfers have improved through the internet.

■ Donor regions/countries are economically poorer than the receiver areas. The inflows of money are important in the following ways:

– Improved standard of living: money received by families helps provide for older family members, pays for education of children and improves living/health conditions.

– Money spent by families help to maintain the local economy, ie shops, businesses, etc. This could help them grow over time.

– Without remittances, it is like-

ly that poverty and problems of economic development in developing countries would worsen.

– Returning emigrants will also spend money in the local economy when visiting on holiday.

– It has boosted the services sector of developing economies as money transfers are now done through bank accounts.

### NEGATIVE IMPACT – LABOUR OUTFLOW

■ People tend to migrate from donor regions due to “push” factors. These are mostly economic influences such as higher unemployment and lower standards of living.

■ Donor regions will then suf-

fer an outward flow of migration. Most of the migrants (emigrants – if they move to another country) come from the younger age groups of the possible working population. This represents a labour outflow and impacts as follows:

– Many skilled and educated workers will leave because with their skills they can obtain better pay and achieve higher living standards in richer areas. In countries such as Poland, there has been an outflow of medical staff and engineers. This outflow of skilled workers is known as the “brain drain”.

– The “brain drain” represents a loss of investment by the donor country. The costs, efforts and time involved in training

these workers does not involve a return on this investment.

– The loss of skilled workers restricts the economic development of donor regions. It means that services and industries are less likely to reach their potential with an ongoing loss of part of the population. This is a problem for peripheral regions such as the Mezzogiorno and the west of Ireland.

– The outflow of a younger section of the population has wider economic implications. It means that there will be a higher proportion of the population remaining that is elderly and also younger. This results in a higher dependency ratio for the region.

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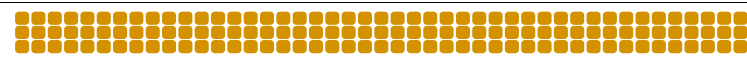
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# ECONOMIC ELECTIVE

## ECONOMIC ELECTIVE: REVISION TOPIC 3

### 2007 QUESTION 8 B – SAMPLE ANSWER

Drogheda is an important centre of economic activity. The map provides the following evidence:

#### ACTIVITY 1 – MANUFACTURING INDUSTRY (SECONDARY ACTIVITIES)

Drogheda is likely to be a local centre for manufacturing industry. This is supported by the following map evidence:

- Industrial estates: there are two estates located on the edge of the town. One is located at the town's western edge at O 075 745 and the other estate is located towards the south-west of the town at O 078 741.

- Some types of manufacturing industry are likely to be found on these industrial estates. These could include activities such as food processing or light engineering.

- They are located near the outskirts of the town as there is likely to be more space available for larger factory units, warehouses and storage yards.

- Being located in the town

makes it easier to access essential services such as electricity, water, internet, etc.

- Access is also easier as the estates avoid the congestion of the town centre. A third class allows both estates to access the M1 motorway at O 068 737. This will allow easier movement of raw material supplies and finished goods.

- The industrial estates are close to likely housing estates, eg in O 07 74. This means that a labour supply (skilled and unskilled workers) are close by.

- Cement factory: this is located about 2km southwest of the town at O 065 716. This factory may be a source of much local employment. It can be accessed by the R 152 which also links up to the M1 motorway.

#### ACTIVITY 2 - TOURISM (TERTIARY ACTIVITY)

Drogheda is a local centre for the tourist industry. This is an important tertiary activity. Map evidence is provided by the following information.

- Tourist services: the town has a tourist information office located at O 084 749. It has regular opening hours. There is also a youth hostel located at O 097 765. This allows the town to cater for a wider range of visitors.

- Historical features: a number of historical features are located

in the town. These include an abbey located at O 092 753 and a priory located at O 089 755. These features will be of interest to many visitors.

- The town also has good access to the surrounding areas. This allows visitors make use of leisure facilities such as the golf links at O 147 779.

- Tourism is an important source of employment and will also generate revenue for the local economy.

#### ACTIVITY 3 – TRANSPORT

- Drogheda is a route focus for the transport system. This means that different transport routes meet there. As a transport centre, Drogheda will also be an important centre for economic activities.

#### MAP EVIDENCE

The map provides evidence that a number of transport types converge at the town. This includes:

##### (i) ROADS

This is the most common form of transport type. A number of roads allow access to the town from different directions.

- Motorway: the M1 motorway bypasses the western edge of the town, travelling in a northwest/southeast direction. There is direct access into Drogheda by a link with the

R152 at O 077 727. The M1 allows access to the national road network and other economic centres.

- National secondary road: the N51 links up with the R132 (Regional Road) at O 074 768 at the north-western edge of the town. This also allows national access.

- Regional roads: a number of regional roads allow direct access from a number of directions, eg the R 150 (access from the east), the R132 (access from the south) and the R 166 (access from the northeast). These routes allow good local access to Drogheda.

##### (ii) RAIL

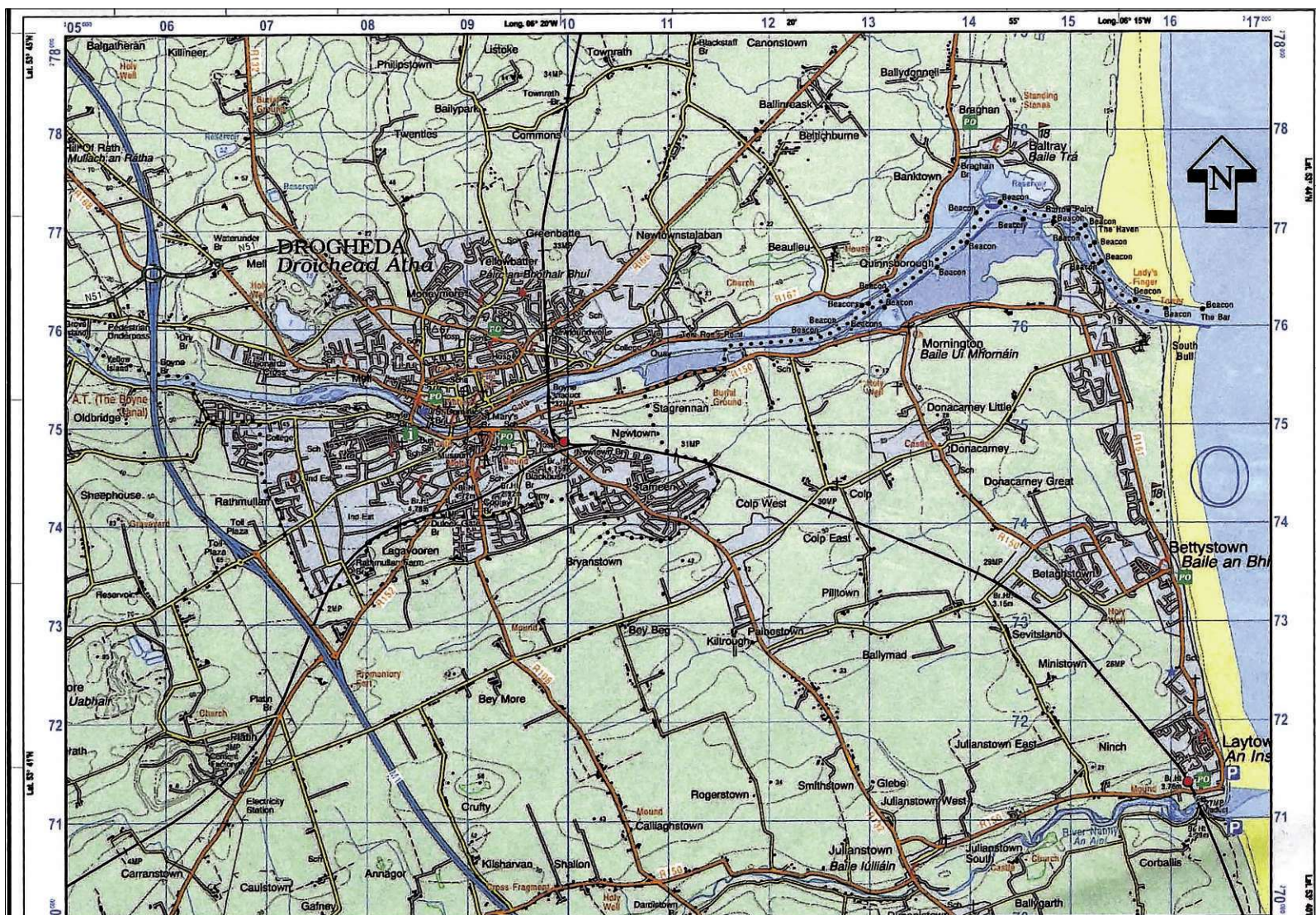
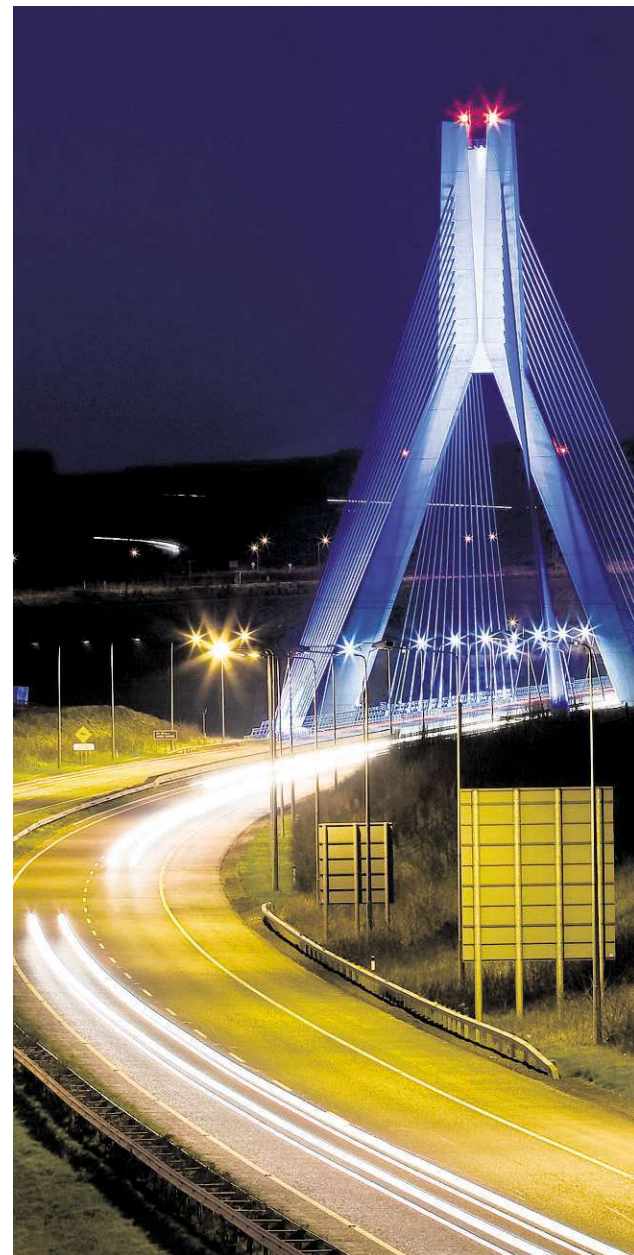
- Drogheda is served by rail with a railway station located in the eastern part of the town at O 099 746. This is likely to be the very important Dublin-Belfast rail link.

There is another rail line that travels southwest from the town.

##### (iii) Water

- Drogheda has access to the sea. There is a quay marked at O 109 758. The mouth/estuary of the river is wide enough to allow smaller vessels up to the town area.

- These transport features will help in the location of industry as raw materials, finished products and the workforce have access in and out of the town.



■ Above: Boyne Valley Bridge, Drogheda, at night. PHOTOGRAPH: DESIGN PICS/PETER MCCABE/GETTY. Right: Ordnance Survey map of Drogheda.

# FROM RAINFOREST CANOPIES TO CULTURAL IDENTITIES

## OPTIONS

YOU HAVE FOUR OPTIONS TO CHOOSE FROM:

- Global Interdependence
- Geocology
- Culture and Identity
- The Atmosphere-Ocean Environment

- Select only one option.
- Each option will have three questions.
- Select only one question from this entire section.
- Each question is worth 80 marks.
- This is an essay style answer.
- The answer will require three or four points. You should plan your answer accordingly.

## EXAMPLE QUESTION – 2007 QUESTION 18

Describe how plant and animal life adapt to soil and climatic conditions in a biome which you have studied. (80 marks)

## EXAMPLE ANSWER

The answer needs to have three or four aspects (parts). Examples of two aspects are shown below.

### BIOME TYPE – TROPICAL RAINFOREST BIOME

#### VEGETATION ADAPTATIONS TO CLIMATE

■ There is a clear link between the vegetation (plants, trees, etc) and climate of the tropical rainforest biome.

■ The climate will determine the environment of the biome. This directly influences the vegetation of this natural region as plants and trees grow in response to climate conditions.

■ The vegetation itself will have to adapt to the climate conditions of the biome. This means that they will develop special characteristics in order to survive and grow.

#### THE CLIMATE OF THE TROPICAL RAINFOREST BIOME

■ The tropical rainforest biome has an equatorial climate. It's main characteristics are:

- High temperatures all year - they average 27 degrees in the Amazon rainforest.

- High levels of rainfall with an-

nual levels over 2000 mm.

- These climate conditions allow a continuous growing season throughout the year for plants and trees. This has allowed the rainforest to develop.

#### THE VEGETATION OF THE RAINFOREST

■ This biome has a large number of plants/trees. Key features of the biome's vegetation are:

- Wide variety of species, eg the Amazon rainforest has over 13,000 plant species. Over 300 tree species have been identified in one square kilometre of this rainforest.

- Different forest layers: rainforests have four different layers of growth. The lowest level is the forest floor layer. Above this are the dense layers of the undercanopy and the canopy. Above them rise the high trees of the emergent layer (up to 50 metres high).

#### PLANT/TREE ADAPTATIONS TO CLIMATE

■ As there is such dense vegetation, the plants and trees have to compete with each other in order to survive. This has led to many adaptations to the conditions of the biome. They include:

- The emergent trees grow high to reach the light. To allow this, they grow tall and straight trunks. They are branchless at the lower levels. Each tree will grow apart from each other.

- The trees in the upper layers (canopy/emergent) are exposed to both direct sunlight and heavy rainfall. Leaves are thick and waxy to reduce transpiration (water loss) when exposed to sunlight. The leaves also have "drip tips" to allow water to flow off them much easier. This stops them breaking with the weight and also stops mould forming.

- The undercanopy is in constant shade and little direct sunlight reaches this layer. Many plants/trees adapt by growing very large leaves to be able to absorb any light that gets through.

■ Many plant species will use other plant/trees species to

reach the light. These include:

- Epiphytes: these are plants that grow on trees in order to reach the light. Their roots absorb the moisture in the air. They do not harm the trees they grow on. Examples include orchids and bromelids.

- Lianas: these are vines (climbers) that grow around tree trunks. Over 2,000 species have been identified in the rainforests. They will grow upwards as the tree grows. It is in this way that they will be able to reach the light and photosynthesize.

#### VEGETATION ADAPTATIONS TO SOILS

■ In the tropical rainforest biome, there is a very strong relationship between the vegetation and soils of that natural region. The nature of the soils is influenced by the vegetation of the biome. The type of vegetation that grows is directly influenced by the tropical rainforest soils.

#### THE SOILS OF THE TROPICAL RAINFOREST BIOME

■ The tropical rainforest soils are known as latosols. Their most visible characteristic is their colour which is red or yellowish red. This is because of two key soil formation processes:

- Laterisation: this is the heavy leaching of the soil caused by heavy rainfall. This will wash out nutrients/minerals, etc from the topsoil. Only iron and aluminium oxides remain.

- Weathering: intense chemical weathering due to hot temperatures have caused the breakdown of the parent rock. Deep soils have formed up to 30 metres deep.

- The combination of these processes will result in the formation of poor, infertile soils. This seems surprising given that the rainforest has such a rich density and diversity of vegetation cover. The reason for this is the relationship between the vegetation and soils of the biome.

#### THE NUTRIENT CYCLE

■ This is the ongoing cycle of where vegetation decays and the nutrients released provide the food source for plants,

trees, etc. This process is known as humification.

■ Plant and animal remains fall onto the ground surface. The hot and humid conditions allow a rapid rate of decay. This decay is aided by the action of microorganisms, eg bacteria.

■ This process of decay is much faster than in other biomes. Leaves can decompose completely within four months (over two years in temperate climates).

■ The breakdown of the decaying matter forms a jelly like substance known as humus. The nutrients released during this process are used up by plants for growth. It is estimated that over 90 per cent of nutrients are used in this way.

■ This process is repeated over and over again, ensuring the rich vegetation of this biome.

#### HOW DOES VEGETATION ADAPT TO THIS PROCESS?

■ The process of humification and the ongoing nutrient cycle takes place in the O horizon of the topsoil. This influences tropical vegetation as follows:

- The organic layer of the topsoil is only about 20cm (eight inches) deep. This is where most nutrients are found. Trees and plants have developed shallow roots to reach them.

- Many tree species have developed wide and extensive root networks that can extend across the O horizon. Some of these root networks extend for over 100 metres from the tree.

- Some of these root networks grow out of the ground to form a type of surface mat network that allows them to absorb nutrient more easily.

- The largest trees, the emergents (over 30 metres tall) have developed high and thick support roots. They grow from the ground up to heights of 20 feet (7 metres). They are known as buttress roots. They allow the highest trees to maintain their nutrient supply.

- Other trees, eg palm trees have grown stilt roots. This is where roots grow down from their branches.

