Version : 07/02/2007

ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Education

Geography 6036

Specification B

Unit 4 GGB4

Mark Scheme

2007 examination - January series

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting ensures that the mark scheme covers the candidates' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for the standardisation meeting each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting they are required to refer these to the Principal Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of candidates' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

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Dr Michael Cresswell Director General

GGB4

GENERAL GUIDANCE FOR GCE GEOGRAPHY ASSISTANT EXAMINERS

General Instructions to Examiners on Marking

It is important that every Examiner marks the scripts to the same standard as the rest of the panel. All Examiners must operate the Marking Scheme in a similar and consistent manner, and hence, they must all participate in the application of that scheme at the Standardisation Meeting. In particular, they should take careful note of all decisions taken or changes made at the meeting. Examiners are allocated to a Team Leader for the period of examining, and any difficulties that arise should be discussed with that person.

The Marking Scheme

The Marking Scheme consists of two sections for each question or sub-question – the Notes for Answers and the Mark Scheme itself.

Notes for Answers (NFA)

These indicate the possible content for the various sections of the question paper. In some cases (for example short answer questions), the NFA may indicate the only response that is acceptable, but in many cases they indicate either a range of suitable responses, or an exemplar of the type of response required. Therefore, in most cases the NFA do **not** provide model answers, and should not be regarded as such. More NFA may be added at the standardisation meeting if it is felt by the Principal Examiner that details of appropriate ways of answering the question have been omitted.

The Mark Scheme

This is provided in italics and provides the instructions to Examiners as to how they are to assess the work of candidates. The number of marks allocated within the mark scheme to a question should correspond to the number of marks for that question on the question paper.

There are two ways in which the Mark Scheme operates:

(a) it indicates how the marks to short answer questions are to be allocated – usually to a maximum of 4 marks.
(b) it indicates how Examiners should move through the Levels in a level response mark scheme – usually to all questions of 5 marks or more. Each Level has a levels descriptor, with clear statements of the "triggers" to move candidates from one level to another. Each Level contains a range of marks as shown on the Mark Scheme.

A number of features have been used to distinguish between Levels, for example:

- a number of characteristics, reasons, attitudes etc.
- the degree of specification, for example the use of specific case studies, or accurate detail
- responses to more than one command word, for example, describe and suggest reasons
- the degree of linkage between two aspects of the question
- the depth of understanding of a concept.

The Marking Process

A sample of an Examiner's marked scripts will be marked again by a Senior Examiner according to the procedures set out by the Board. Also, the scripts may be re-examined at the Awards Meeting and the subsequent Grade Review. Therefore, it is most important that Examiners mark clearly according to the procedures set out below.

- All marking should be done in red.
- The right-hand margin should be used for marks only.
- The overall mark for a question must be ringed at the end of the answer.
- The total mark for the question must be transferred to the front of the script.
- The left-hand margin is where an indication of the level achieved is written. Comments and codes (see below) may also be written on the left.
- Indications of the levels achieved may also occur in the body of the answer if this is easier for the Examiner to apply (e.g. in the marking of diagrams).
- Ticks should be used for short answer responses and Level I responses only, with one tick representing one mark (to the maximum allowed in a Levels scheme).
- Levels II, III and IV should be indicated with a Roman II, III or IV on the script, and this symbol should be used each time this Level is achieved. Examiners may wish to bracket an area of text where this level of response has been achieved.
- Once a candidate has reached Level II, additional Level I credit should be indicated using a + symbol. If these points are of sufficient quality **one additional mark** can be awarded (assuming no further Level II points are made).
- Examiners may indicate strong Level II or III material by writing "Level II (or III) – "good" in the left hand margin of the script. The Examiner should ensure that this is reflected in the **awarding of an appropriate number of marks** at the end of the answer.
- Level III is to be used only for questions of 9 marks or more, and Level IV is to be used only for questions of 25 marks in total.

Other Mechanics of Marking

- Underline all errors and contradictions.
- Cross out irrelevant sections using a line from top-left to bottom right. (However, be careful to check that there is no valid material, however brief, in the mass of irrelevance).
- Indicate repeated material with "rep".
- Other useful marking codes can be used, for example, "va" for vague, "NQ" or "Not Qu." for failure to answer the question, "Irrel" for irrelevant material, and "SIF" for self-penalising material.
- Put a wavy line in the left-hand margin to indicate weak dubious material.
- If the rubric is contravened, mark all answers but count only the best mark towards the candidate's total mark for the script. Put the mark for the question on the front of the script in the usual way, but also write "RAM Rubric" on the front of the script.
- Large areas of text must not be left blank – use the wavy line or write "seen" alongside the text. All pages must have an indication that they have been read, especially supplementary sheets.
- Unless indicated otherwise always mark text before marking maps and diagrams – do not give double credit for the same point made in the text and a diagram.

Quality of Language Descriptors

The following descriptors concerning the quality of language must be applied to **all** questions in which candidates are required to produce extended writing. To attain full marks available at a level of response, the appropriate Quality of Language descriptor must be achieved. Use the same quality of language levels as are used in the geographical element of the mark scheme under consideration.

Three-level descriptors

LEVEL I	• Style of writing is suitable for only simple subject matter. • Expression of only simple ideas, using a limited range of specialist terms. • Reasonable accuracy in the use of English.
LEVEL II	• Manner of dealing with subject matter is acceptable, but could be improved. • Reasonable clarity and fluency of expression of ideas, using a good range of specialist terms, when appropriate. • Considerable accuracy in the use of English.
LEVEL III	• Style of writing is appropriate to subject matter. • Organises relevant information and ideas clearly and coherently, using a wide range of specialist vocabulary, when appropriate. • Accurate in the use of English.

Two-level descriptors

LEVEL I	• Manner of dealing with subject matter is acceptable, but could be improved. • Reasonable clarity and fluency of expression of ideas, using a good range of specialist terms, when appropriate. • Considerable accuracy in the use of English.
LEVEL II	• Style of writing is appropriate to subject matter. • Organises relevant information and ideas clearly and coherently, using a wide range of specialist vocabulary, when appropriate. • Accurate in the use of English.

Question 1

(a) **Notes for answers**

Mull is a mild humus which is soft, black in colour, and rich in nutrients. It is produced by the action of bacteria and earthworms when the soil is not too acidic. It is associated with temperate deciduous woodlands and temperate grasslands.

Mor is an acidic form of humus. It is common in wet and cold environments and is associated with heathland areas and coniferous woodland. Mor is dark brown to black in colour, poorly decomposed, and lacking in nutrients. Few species of soil fauna can tolerate its acidic conditions, earthworms being rare.

Moder is an intermediate type of humus recognised by some soil scientists.

Mark scheme

Level 1	identification of types of humus, but with no description; or description of one type only.	*(0-3 marks)*
Level 2	description of more than one type of humus.	*(4-5 marks)*

(b) **Notes for answers**

The mineral constituents of the soil are derived from the weathering of the underlying parent material. They are the products of both physical breakdown (freeze-thaw for example) and chemical processes (oxidation, carbonation and hydrolysis). The weathered products can be divided into two groups:

- primary minerals which remain unaltered from the original parent material and are released by weathering

- secondary minerals are produced in the soil by chemical reactions. Unlike primary minerals, they are readily soluble and are predominately carbonates as weak carbonic acid is an input into soils through precipitation. Although weak, carbonic acid can detach potassium, magnesium, and calcium from the parent material in the form of carbonates: K2C03, Mg C03, Ca (HC03)2.

Chemical weathering generally produces clay compounds, and even with resistant rocks such as granite, potassium and magnesium, are released together with sesquioxides of iron and aluminium. Quartz is released as sand grains when the parent material disintegrates. The sand and clay make up the inorganic fraction; the soluble products enter the soil.

The composition of the parent material will influence the make up of the soil and the particle size. The size of particles that make up a particular soil is important because it influences texture which ultimately affects structure, pore spaces and water, and nutrient retention. For particles of 2 mm in diameter and below, three size categories are recognised:

- sand 2-0.06 mm diameter (2000-60 microns)
- silt 0.06-0.002 diameter (60-2 microns)
- clay less than 0.002 diameter (<2 microns).

Mark scheme

Level 1 identification of mineral constituents, but with limited commentary on their origin and/or characteristics. Statements such as “sands”, “clays”, and “weathered rock”. *(0-3 marks)*

Level 2 more sophisticated description, which may include chemical and other characteristics such as particle sizes. *(4-5 marks)*

(c) **Notes for answers**

Nutrients are elements found in the soil that are essential for plant growth and are derived from three main sources:

- nutrients dissolved in the soil water. These are available to plants but easily lost through gravitational water
- nutrients within the clay-humus complex. Humus and clay undergo a linkage within the soil to form the clay-humus complex. These complexes can retain mineral nutrients in exchangeable form (ionic exchange), by attachment (absorption). This is the most important store available to plants
- nutrients stored in minerals within the inorganic fraction of the soil. These are not available to plants until released by weathering and they become dissolved in soil water.

If the clay-humus complex were not present in the soil, then rainwater would easily remove all the soluble salts. Nutrients exist in soil solution as positively charged ions (+) called **cations** and negatively charged ions (-) called **anions**. The clay-humus complex, which has a negative charge, attracts the positively charged minerals in the soil, notably calcium, magnesium, potassium, ammonium and sodium. This is when the cations are said to be absorbed to the clay-humus complex. The process of **ionic exchange** allows cations to be moved from the clay-humus complex to soil solution or from solution to plant roots. The measure of the ability of the soil to retain cations for plan use is known as the cation exchange capacity **(CEC)**. Sandy soils have a low CEC as they are less able to keep essential soil nutrients and are, therefore, less fertile unlike clay-humus soils that have a high CEC.

Mark scheme

Level 1 simple statements of the principles of ionic exchange, with correct use of technical terms, e.g. anions, cations. *(0-3 marks)*

Level 2 sophisticated statements of process, including the clear idea of exchange and role of hydrogen and other named chemical ions in the process. *(4-7 marks)*

(d) **Notes for answers**

Soils may be upgraded or degraded by human activity.

Upgrading: afforestation, wind breaks; rotation systems, planting of legumes; marling, mulching, liming; drainage; contour ploughing, terracing.

Degrading: reduction or removal of vegetation cover leading to soil erosion; soil compaction by ploughing, heavy vehicles, footpaths; overgrazing; acid rain; over fertilisation.

Mark scheme

Level 1 a simplistic list of human activities on soils; or an explanation of one human activity and its influence on soils. *(0-3 marks)*

Level 2 an explanation of more than one way in which human activity has changed one or more soils. *(4-8 marks)*

Question 2

(a) **Notes for answers**

Earthquake/Volcanoes
Convergent p. boundaries - Japan, South America.
Divergent p. boundaries - Mid Atlantic Ridge, E. African Ridge.
Hot spots - Hawaii.
Others - S. Europe + conservative boundaries for earthquakes.

Mark scheme

Level 1 simple statements with regard to distribution, such as broad names of areas. No elaboration of location. *(0-3 marks)*

Level 2 accurate statements of location with some attempt to categorise locations. More sophisticated statements of distribution. *(4-5 marks)*

(b) **Notes for answers**

Earthquakes
The vast majority of earthquakes occur along plate boundaries, the most powerful being associated with destructive margins. At conservative margins, the boundary is marked by a fault movement along which produces the earthquake. Perhaps the most famous of these is the San Andreas fault of California where the fault line represents the boundary between the North American and Pacific plates. Some earthquakes occur away from plate boundaries and are associated with the reactivation of old fault lines. It has also been suggested that man could be the cause of some minor earthquakes by building large reservoirs where the water puts pressure on the surface rocks or by the subsidence of deep mine workings.

Volcanoes
Most volcanic activity is associated with plate tectonic processes and is mainly located along plate margins. Such activity is therefore found:

- along ocean ridges where plates are moving apart. The best example is the mid-Atlantic Ridge where Iceland represents a large area formed from volcanic activity
- associated with rift valleys. The East African Rift Valley has a number of volcanoes along it, including Mount Kenya and Mount Kilimanjaro
- on or near subduction zones. The line of volcanoes, the 'Ring of Fire' that surrounds the Pacific Ocean is associated with plate subduction. This tends to be the most violent of all activity
- over hot spots such as that which occurs in the middle of the Pacific Ocean and gives rise to the Hawaiian Islands.

Mark Scheme

Level 1 simple and generalised statements of causes of the hazards (i.e. of process) with no depth or detail. Specific locations are not given. *(0-3 marks)*

Level 2 specific causes of specific hazards access this level, with good use being made of case studies and named plate boundaries, earthquakes, volcanoes. *(4-5 marks)*

(c) **Notes for answers**

Effects will depend on the level of economic development of the country affected.

Earthquakes
- human casualties if not evacuated
- loss of crops, animals
- flooding of land
- damage to property
- transport routes destroyed
- large insurance losses
- homelessness and disease

Volcanoes
- human casualties if not evacuated
- destruction of land, property
- avalanches, mudflows, lahars, ash, gases
- infrastructure collapse
- homelessness and disease
- weather events after the eruption

Mark scheme

Level 1 simple statements of effects which could apply to any such hazard. No specific detail provided. *(0-3 marks)*

Level 2 specific statements which can be clearly attributed to named hazard(s) access this level. Reserve 7 marks for consideration of both physical and human effects. *(4-7 marks)*

(d) **Notes for answers**

Again, responses to the hazards and their effects will depend on the level of economic development of the affected area.

Earthquakes

- an inability to leave area, or reluctance
- preparation in the event of earthquakes - FEMA (USA)
- modification of buildings - variety of ways could be described
- education to minimise loss of life, including earthquake drills, emergency supplies in the home, posters
- fire prevention - smart meters
- pre-planning of emergency services
- land-use planning to minimise damage and risk

Volcanoes

- inability to leave area, or reluctance
- monitoring systems - external and gaseous
- evacuation procedures
- attempts to divert lava flows
- planning to reduce potential damage

Mark scheme

Level 1 simple statements of management strategies which could apply to any hazard. No specific detail provided. *(0-3 marks)*

Level 2 specific statements of management strategies which can be clearly attributed to named hazard access this level. *(4-8 marks)*

Question 3

Notes for answers

Immediately after the ice sheets had retreated (15,000 years ago?) Britain had a periglacial climate with tundra conditions prevailing. The maximum temperatures would have been 6/7 °C in the summer months with temperatures well below freezing in the winter. With time, temperatures slowly increased. There was a slight glacial advance 10,000 years ago when tundra conditions re-established themselves over Northern Britain.

About 8000 years BP boreal forests were established across Britain. Temperatures had risen, and summers were warmer than today, but winters were colder - the climate was much more continental. Similarly, winters were drier than at present. As sea-levels rose between 6000 to 3000 BC, Britain became more maritime. Winters became milder, summers cooler, with equable rainfall. This continental and then maritime pattern was repeated in the period of time from 3000 BC to 0 AD.

During the last 2000 years, there have been similar periods of colder and warmer temperatures. For example, during Roman times the climate was warmer as evidenced by the cultivation of vineyards in southern England. This also encouraged the growth of extensive deciduous woodlands. From 1550 to 1800, a Little Ice Age occurred across Europe. The River Thames froze, and it was stormier, with many storms affecting the east coast of England.

Global warming is now said to be causing temperatures to rise, and ppt levels to increase.

A variety of sources of evidence could be identified. They could include dendrochronology, pollen analysis, historical records - written and drawn/painted, and landform evidence, e.g. evidence of glaciation/fluvioglaciation. Depending on the source identified, candidates would be expected to then provide some elaboration of how the source could be used to show that climatic change has occurred. For example, pollen analysis provides information of dominant plants at a time in the past. They deposited pollen which became preserved in areas such as a set peat bog (anaerobic conditions). Since the type of vegetation at one time is a response to the climate at that time, we can use changes in pollen types in the same peat bog to provide evidence of climatic change.

Recent global warming is attributed to an increase in 'greenhouse gases' - which is preventing heat escaping out into space making the atmosphere warmer. The main culprit in this is carbon dioxide which is increasing in amount in the atmosphere from the burning of fossil fuels and deforestation. Other such 'gases' include CFCs, methane, and nitrous oxide. Many of these are produced by human activity, direct and indirect (e.g. CFCs, refrigeration and foams; methane - cattle ranching, rice production). Temperatures are higher in the current decade compared with past records but is this a small-scale natural blip? Carbon dioxide levels in the atmosphere are much higher than air samples taken in ancient ice cores. The argument mainly concerns whether these two phenomena are inter-related and not all countries believe this to be the case (viz. USA refusing to ratify the Kyoto Protocol).

In terms of the British Isles, the effects of global warming may be:

- a rise in sea level flooding marshes, wetlands and destroying sand dunes
- the overwhelming of coastal defences by storm surges
- the flooding of low lying cities e.g. London and its underground system
- changes to farming practices and crops - longer growing seasons (vineyards again?), more storm damage of crops
- an invasion of alien weeds, pests and diseases into agriculture
- shrinkage of soils, especially clays, which may affect foundations of buildings
- greater use of air conditioning systems
- allow climatic effects, e.g. "Conveyor belt", "North Atlantic Drift".

Mark scheme

G	Level 1 (0-6 marks)	Level 2 (7-12 marks)	Level 3 (13-17 marks)	Level 4 (18-20 marks)
	Simple statements of climatic change, loosely attributed to a time period.	More detailed description of climatic change, with clear sense of time and sequence.	Well developed detail of climatic change, with clear chronology, covering a wide time period.	
	Simple statements of pieces of evidence of climatic change.	More detailed outline of one piece of evidence for climatic change.	Well developed explanation of a variety of pieces of evidence for climatic change.	
		Simple statements of causes of global warming and effects.	Detailed statements of causes and effects of global warming.	Recognition of complexity of the issue of global warming. Some recognition of the debate. Clear effects which are attributable to the BI.
S	**Level 1** **(0-1 marks)**	**Level 2** **(2-3 marks)**	**Level 3** **(4-5 marks)**	
	Information is adequately organised and presented with a reasonably accurate use of English.	Well organised and presented with an accurate use of English. Limited examples.	Well organised and presented in a clear and logical manner with a very accurate use of English. Range of examples.	

Question 4

Notes for answers

The Core - Periphery relationship

Friedmann produced a model of the economic development of a country with particular reference to the changing economic relationships within that country. From this model four types of areas can be designated:

a) the **core region** - the focus of the national market, and seedbed of new industry and innovations. It has a concentration of economic development

b) **upward transitional areas -** regions with some form of natural endowment characterised by inward migration of people and investment

c) the **periphery** or **downward** transitional areas, regions with unfavourable locations and resource bases, characterised by outward migration of people and investment. Unemployment is high and there are low living standards

d) **resource-frontiers** - areas where new resources are discovered and exploited.

For example **Portugal**.
Manufacturing is concentrated in **two** major industrial regions.

The **core**, Lisbon-Setubal in the south-central region and a **sub-core** Porto-Aveiro-Braga in the north. Together they account for about three-fourths of Portugal's net industrial output. The Lisbon area includes such major industries as iron and steel; shipbuilding and repair; oil refining, machinery, chemicals, cement and electronics; food and beverages. Setubal, about eighty kilometres to the southeast of Lisbon, also has a large shipyard and automobile assembly and machine industry plants, as well as cement, wood pulp, cork and fish processing.

Sines, **a resource frontier**, located about 140 km south of Lisbon is the site of a major deepwater port and heavy industrial complex. It includes an oil refinery, petrochemical plants, and a 1200-megawatt coal-fired power plant. Porto is primarily a centre of light industry including textiles, footwear, furniture, wine, and food processing. Porto is also the location of the nation's largest petroleum refinery; the other is located at Lisbon. Portimao is a centre for fishing. Aveiro specialises in wood pulp and other wood products but also produces footwear and machinery. Braga specialises in textiles and clothing, cutlery, furniture, and electronics. Covilha is also an active textiles area.

The two premier industrial regions offer the greatest concentrations of population, thereby stimulating market-orientated manufacturing operations. Furthermore, because of the dependence of modern industry on imports of raw materials, machinery and fuel, the location of processing plants near the two major ports minimises their operating costs.

The rest of the country can be regarded as the periphery. The north is mountainous with a rainy, moderately cool climate. This zone contains about 2 million hectares of cultivated land and is dominated by small-scale, intensive agriculture. High population density, particularly in the northwest, has contributed to a pattern of tiny, fragmented farms that produce mainly for family consumption interspersed with larger and often mechanised farms that specialise in commercial production of a variety of crops. On average, northern levels of technology and labour productivity are among the lowest in Western Europe. Extreme under-employment of agriculture workers accounts for the north being the principal source of Portuguese emigrant labour.

The centre is a diverse zone that includes rolling hills, suitable primarily for tree crops, poor dry soils, and the fertile alluvial soils of the banks of the Rio Tagus. A variety of crops are grown on the productive areas under irrigation: grains, mainly wheat and corn, oil seeds (including sunflowers), and irrigated rice.

The Alentejo, a vast rolling plain with a hot, arid climate, dominates the south. The Alentejo occupies an area of approximately 2.6 million hectares, about 30% of the total area of mainland Portugal, and produces about 75% of the country's wheat. Although much of the area is classified as arable land, poor soils dominate most of the area, and consequently yields of crops and pasture are low by West European standards. The Alentejo is also known for its large stands of cork oak and its olive groves. The Algarve, less than a third of the area of Alentejo, occupies the extreme southern part of Portugal. This area is characterised by smallholdings where animal grazing, fishing, and tourism are the principal occupations of the inhabitants.

Portugal's economic growth over the last decade has been accompanied by a heavy investment in infrastructure improvements, largely funded by the EU. Following accession to the EU Portugal began dismantling its system of state ownership and the country has adopted an aggressive privatisation program. In 1988, the Portuguese public sector accounted for 19.7% of GDP and 5.5% of the country's total employment. By the end of 1997, these numbers had fallen to 8% and 2.5% respectively. From 1987 to 1999, Portugal received net financial flows from the EU of approximately $27 billion. The greatest portion of these funds was disbursed through the European Regional Development Fund. As a result the country has made a number of major infrastructure improvements, most notably the construction of 800 km of main roads, modernisation of railroads and ports, improving environmental quality for 90% of the population (including the supply of water and solid waste and industrial waste disposal), aid to industry and agriculture, and plans for intensive promotion of regional integration. Additional infrastructure projects are expected over the next several years, including a new international airport (to be build at Ota, north of Lisbon), new metro systems in Porto and Lisbon, an upgrade of the country's rail system, a second phase of a natural gas pipeline system and additional highways, dams and port projects. Portugal is scheduled to receive approximately $25 billion from the EU for the period 2000-2006. Approximately $20 billion of this total is earmarked for basic infrastructure.

Mark scheme

G	Level 1 (0-6 marks)	Level 2 (7-12 marks)	Level 3 (13-17 marks)	Level 4 (18-20 marks)
	Simple statements of the core-periphery relationship in the identified country.	More detailed description of the core-periphery relationship. Some use of named examples.	Well developed detail of the core-periphery relationship. Good use of case study material.	
	Simple statements of description.	More detailed description, with correct identification of areas of development or underdevelopment.	Well developed description of areas of development, and/or under-development. Recognition of changes in time, e.g. resource frontiers.	
		Simple statements of the policies that have been put in place by national government.	Detailed statements of the policies that have been put in place by national government. Recognition of problems/issues /changes through time as effects have come into place.	Discussion of the overall effectiveness of the policies - areas of success, comments on success or otherwise.
S	**Level 1** **(0-1 marks)**	**Level 2** **(2-3 marks)**	**Level 3** **(4-5 marks)**	
	Information is adequately organised, and presented with a reasonably accurate use of English.	Well organised and presented with an accurate use of English. Limited examples.	Well organised and presented in a clear and logical manner with a very accurate use of English. Range of examples.	