Version 1.0

ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Education

Geography 5036
Specification B

GGB2 The Physical Options

Mark Scheme

2005 examination – June 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.

General Guidance for GCE Geography Assistant Examiners

Quality of Written Language

As required by QCA, the marking scheme for this unit includes an overall assessment of quality of written communication. There are no discrete marks for the assessment of written communications but where questions are "Levels" marked, written communication will be assessed as one of the criteria within each level.

Level 1: Language is basic, descriptions and explanations are over simplified and lack clarity.

Level 2: Generally accurate use of language; descriptions and explanations can be easily followed, but are not clearly expressed throughout.

Level 3: Accurate and appropriate use of language; descriptions and explanations are expressed with clarity throughout.

Levels marking – General Criteria

The following general criteria relate to knowledge, understanding and their critical application and the quality of written communication as outlined in the AQA Geography A subject specification. They are designed to assist examiners in determining into which band the quality of response should be placed, and should be used when assessing the level of response an answer has achieved. It is anticipated that candidates' performances under the various dimensions will be broadly inter-related and the general guidelines for each level are as follows:

Level 1: An answer at this level is likely to:

- display a basic understanding of the topic;
- make one of two points without support of appropriate exemplification or application of principle;
- demonstrate a simplistic style of writing, perhaps lacking close relation to the term of the question and unlikely to communicate complexity of subject matter;
- lack organisation, relevance and specialist vocabulary;
- demonstrate deficiencies in legibility, spelling, grammar and punctuation, which detract from the clarity of meaning.

Level 2: An answer at this level is likely to:

- display a clear understanding of the topic;
- make one or two points with support of appropriate exemplification and/or application of principle;
- demonstrate a clear style of writing which clearly addresses the terms of the question
- demonstrate a degree of organisation and use of specialist terms.
- demonstrate sufficient legibility of and quality of spelling, grammar and punctuation to communicate meaning clearly.

Level 3: An answer at this level is likely to:

- display a detailed understanding of the topic;
- make several points with support of appropriate exemplification and/or application of principle;
- demonstrate a sophisticated style of writing incorporating measured and qualified explanation and comment as required by the question and reflecting awareness of the complexity of subject matter and/or incompleteness/tentativeness of explanation;
- demonstrate a clear sense of purpose so that the responses are seen to closely relate to the requirements of the question with confident use of specialist vocabulary;
- demonstrate legibility of text, and qualities of spelling, grammar and punctuation, which contribute to complete clarity of meaning.

NB A perfect answer is not usually required for full marks. Clearly it will be possible for an individual candidate to demonstrate variable performance between the levels. In such cases the principle of best-fit should be applied. Experience suggests that the use of exemplars within this mark scheme and the discussion which takes place during the Standardisation Meeting normally provides sufficient guidance on the use of levels in marking.

Annotation of Scripts

- Where an answer is marked using a levels of response scheme the examiner should annotate the script with a 'L1' 'L2' or 'L3' at the point where that level is thought to have been reached. The consequent mark should appear in the right-hand column. Where an answer fails to achieve Level 1, zero marks should be given.

- Where answers do not require levels of response marking, each script should be annotated to show that one tick equals one mark. It is helpful if the tick can be positioned in the part of the answer which is thought to be credit-worthy.

General

It is important to recognise that many of the answers shown within this marking scheme are only exemplars. Where possible, the range of accepted responses is indicated, but because many questions are open-ended in their nature, alternative answers may be equally credit-worthy. The degree of acceptability is clarified through the Standardisation Meeting and subsequently by telephone with the Team Leader as necessary.

GGB2

Question 1

(a) **Accumulation** is the net gain in an ice mass. Inputs to the ice can include:
Precipitation
Re-freezing of meltwater
Avalanche
Drifting
It is dominant in upper parts of a glacier.
Ablation is the collective loss of water from a glacier or ice sheet. It could be from:
Melting (meltwater streams)
Calving
Evaporation/sublimation

Level I *Simple definition of either accumulation or ablation. Name of an input or output.* **(0-2 marks)**

Level II. *More detailed definition of either accumulation or ablation linked to change in mass. Both must be defined at level II to gain maximum marks.* **(3-5 marks)**

(b) (i) NW Highlands; W Scotland; Grampians; Southern Uplands; Snowdonia/N Wales; Lake District/Cumbria; N Ireland; SW Ireland. (Any named mountain)
1 mark each for 2 correctly named locations. **(0-2 marks)**

(ii) Ice sheets moved across the N Sea and then down the east coast of GB. Other localised sheets flowed down from highland source areas into the surrounding lowland. The Ice from SW Scotland moved south through the Irish Sea Basin as far as SW Wales, etc.

Level I *Simple description of the movements with no detail of location. Direct lift from the map* **(0-2 marks)**

Level II *More detailed description of the movement with named routes or destinations.* **(3-5 marks)**

(c) (i) Glaciers transport moraine supraglacially, englacially or sub-glacially.
The supraglacial moraine is rafted on the surface. The material can range greatly in size because of the solid nature of the ice.
Englacial material is carried within the body of the ice.
At the ice/rock boundary, where pressure melting occurs, sub-glacial moraine is gradually almost wholly absorbed by the ice and is carried along as the ice moves. This regelation process may cause the sub-glacial moraine to be incorporated as englacial material.
Debris in transit may remain in one of these positions or may move to another. Englacial debris may reach the surface by being moved along thrust planes.
The role of meltwater in the movement of glacial material within, under or upon the ice is relevant.

Mark scheme:

Level I Simple description of moraine transport or naming of the three main ways of transport. **(0-3 marks)**

Level II Detailed description of, and/or definitions of the main types of transport. At least 2 of the forms of transport must be at LII to gain maximum marks. **(4-6 marks)**

(ii) Depends on the landform chosen. Includes those below plus erratic, ground moraine, lateral moraine.

Feature	Drumlin	Medial Moraine	Terminal Moraine
Size	150m-1200m long 75m-600m wide 20-50m high	1km-20km 50m-100m wide 3m-30m high	0.5km-100km 20-500m wide 3m-50m high
Shape	Steep stoss, gentle lee/streamlined/highest point near stoss.	Width-50m to 100m Height-3m to 30m Length- 1km to 20 km	Width- 20m to 500m Height- 3m to 30 m Length- 0.5km to 100km
Field location	Usually found in lowland locations on valley floors where ice emerged from highlands	found on the floor of previously glacial valleys aligned with the direction of ice movement.	Found on floor across previously glaciated valleys at the farthest extent of the ice.
Deposits	Fine clays to boulders. Poorly sorted and angular.	Angular and poorly sorted.	Angular and poorly sorted.

Level I *Simple description with little or no detail. Named example/location.* **(0-3 marks)**

Level II *Detailed description (2 X LIIQ max) of either a generic feature or an example studied.* **(4-6 marks)**

(d) (i) **The nature of the question allows candidates to use generic descriptions of their chosen landform.**

2a is an esker. It appears to be rounded in x-section. (8 to 12m wide). It is sinuous, bending away to the right in the distance. It is in a valley and is surrounded by flat land. (1 – 2.5m high).
2b is a kame It appears to be between 7 and 10m high. It is rounded/conical and is found in a valley floor that is rather hummocky.

Level I *Simple description of the feature with little detailed reference to its size or location. Name of landform.* **(0-3 marks)**

Level II *Detailed description of the feature. It need not relate to the* **(4-6 marks)**

photograph. 2 X LII Q max.

(ii) For both landforms the meltwater acts as a transporting agent either within, at the base or through the ice from surface to base. The water causes the sediment to be sorted and rounded.
Eskers are sinuous ridges of sorted, rounded silts, sands and gravels. They mark the course of a subglacial stream. They are formed at right angles to the ice front. They also can be subject to slumping.

Kames are mounds of meltwater deposits that are formed along the front of a melting glacier. They can be delta like where streams have emerged from the ice or they can be where supraglacial streams have fallen through the ice.
If GLACIAL feature chosen in (d)(i) then allow any modification of the chosen landform by meltwater.

Level I *Simple link made between meltwater and the named landform with no detail of the role of water in either shaping, locating or sorting/rounding the sediment.* **(0-3 marks)**

Level II *Details of the role of water in either locating, shaping or sorting/rounding the sediment. There must be at least 2 of these at LII to gain the maximum marks.* **(4-7 marks)**

(e) (i) Permafrost is perennially frozen ground. It can be continuous, discontinuous and sporadic. Continuous PF occurs where the temperature of the ground is below 0°C all year round. Discontinuous permafrost is usually only shallow and occurs in patches, often where it is warmer. Sporadic permafrost occurs where there are small isolated pockets of frozen ground. Could also describe mountain permafrost.

Level I *Simple description.* **(0-2 marks)**

Level II Detailed description with information on locality, temperatures or types of PF. **(3-5 marks)**

(ii) This depends on the landform chosen. Any landform that can occur in periglacial areas would be valid. These include patterned ground (stone polygons [including garlands and stripes]; felsenmeer; tors; scree; solifluction terraces; ice wedges; nivation hollows; asymmetrical valley profiles.
Ice wedges and polygons. The wedges can be 0.5m to 20m thick and 10m deep. With the polygons between 5m and 50m in diameter. The area in the polygon is marshy. Polygon marked by slight rise in the ground. Found on flat permafrost plains in unconsolidated material. Ground becomes very cold and contraction cracks occur. Surface thaws and water gets into crack and freezes. Water expands when freezing and opens crack. Next winter very low temperatures produce cracks in the ice and more water can enter the following spring. This continues for a long time until crack widens considerably. 1 L2 for freeze/thaw.
Stone polygon: 1 – 5 m diameter; dome height 0.1 – 1 m. Elongated polygons 2 – 6 degrees, stripes 6 – 35 degrees. Created by frost heave i.e. ice lens develops directly under stones pushing the stone upwards. Once

on the surface they are sorted by rolling down the slope of hummocky ground etc.
Scree: slope 30 – 35 degrees. Created by freeze/thaw. Sorting by gravity and water.
Nivation the migration of water in the permafrost on hollow: 5m to 1 km diameter, 2 – 20 m depth. Created by nivation processes of snow accumulation, freeze/thaw and seasonal washing out of debris.
Pingo: 50 – 500 m diameter, height 10 – 60 m. Formed by the migration of water in the permafrost, the subsequent freezing and expansion of that water etc. Decay of pingo relevant.

Level I *Simple description of the chosen feature with no detail OR simple explanation of process using unexplained vocabulary. Named of landform and/or example.* **(0-3 marks)**

Level II *More detailed description of the feature with details of the size/shape etc. Explanation of how the feature forms with processes accurately described OR process linked to one of the characteristics of the landform. There must be both Level II description and explanation to access the top of the level. Max 2 L2Q.* **(4-8 marks)**

Question 2

(a) (i) Notes for answers
Max rise is in the SW of Highland Region of Scotland, or in the Central Valley to E of Glasgow. Max rise is 2 metres.

Mark scheme:
1 mark for correct location, one for correct amount. **(2 marks)**

(ii) Notes for answers
Max sinking is east coast of East Anglia. Max point in mouth of Thames/London(-1.9) or on the E Norfolk coast (-2.0)

Mark scheme:
1 mark for correct locations, 1 for correct amount. **(2 marks)**

(iii) Notes for answers
The area of greatest accumulation of ice is likely to have been forced, through isostatic movement, down into the mantle. This was in the Highland region. Further south, the amount of ice was less and so there was less depression. Once south of the English Midlands, the ice was thin or non-existent (as in SE England). This area may well have been forced to rise slightly. Once the ice has melted there is isostatic readjustment. The area with greatest ice thickness is now the fastest rising, and the area without ice is in fact sinking. NB allow converses.
Mark scheme:
Level I *Simple statement linking the accumulation or melting of ice with some crustal change.* **(0-3 marks)**

Level II *Proof that response is clearly linked to fig 3. Link made between the amount of ice and the amount of depression and/or rise.* **(4-6 marks)**

(iv) Notes for answers
This part of the coastline is characterised by raised beaches and relic coastal features (stacks and rock platforms) now above sea level. Because there is more than one raised platform, then it might seem that there were periods when the isostatic rebound halted when there was enough time for beach features to be created. There are 4 periods of beach formation. The oldest at or around 10m, then 4-6m, around 2 m and then present day.

Mark scheme:
Level I Simple description of the coastline section or simple link made between falling sea levels and any raised feature.

(0-3 marks)

Level II *Detailed description of the cross-section or clear link made between the local sea level and a raised feature. There must be at least one explanation (E) at LII to gain maximum mark.* **(4-7 marks)**

(b) (i) Notes for answers
Abrasion: Waves hurl pebbles and sand grains at a cliff face and they are able to hammer, scrape, rub and grind the cliff face. The main feature caused by this is the wave cut notch.
Hydraulic action: Breaking waves apply hydraulic shock by trapping water or compressed air in front of the wave. The impact is greatest in a storm and can be as much as 30,000kg/m^2. Air trapped between the wave and rock gets compressed. As the wave recedes this air expands explosively. The effect of this can reach far beyond the water and so can create geos and blowholes.

Mark scheme:
Level I *Simple definition of the process or a simple effect of the process.*

(0-3 marks)

Level II *Detailed description of either process and a link made between the process and an effect. Both processes must be at level II to gain maximum marks.* **(4-6 marks)**

(ii) Notes for answers
The answer will depend on the chosen landform. The question simply asks for description of one landform. Any explanation is irrelevant here. Thus e.g. a stack is an isolated column of rock separated from the rest of the coastline by a wave cut platform. The shape of the stack depends upon the geology, but usually they are steep sided. In stacks that have recently been formed the top of the stack is at the same height of the nearby cliffs but as the stack gets older it reduces until it is only just above the wcp. Appropriate examples of features are acceptable with correct dimensions etc

Mark scheme:
Level I *Simple description of a relevant landform. Name of a landform or example.* **(0-3 marks)**

Level II *Detailed description of a relevant landform. Shape, scale (2X LIIQ max). Detailed description of an example.* **(4-7 marks)**

(c) Notes for answers

Depends on the example. Candidates could choose the Isle of Purbeck for example and give the full range of features from headlands and bays to caves and arches. On the other hand, they could decide to concentrate on just one aspect, e.g. Lulworth Cove. Both are allowed to get to full marks. Any length of coastline is acceptable. Candidates could also choose to look at the effect that bedding/faulting/rock type etc have on the cliff profile. Thus horizontal bedding generally gives steep cliffs, many cliffs are fault lined, clays lead to slumped cliffs etc.

Mark scheme:

Level I *Simple links between any aspect of geology to a shape of a coastline. Only vague use of named example.* **(0-3 marks)**

Level II *Accurate description of the geology of a named coastline. Link between the geology of a named length of coastline and the nature of that coastline.* **(4-8 marks)**

(d) (i) Notes for answers

The photo need not be described but in this case:
the spit appears to lie parallel to the coast and has diverted a river. It has a long sandy beach backed by sand dunes. The end of the spit curves towards the land. There are at least 3 recurves. At the back of the landform there is a saltmarsh.

Mark scheme:

Level I *Simple description of the spit with little use of specialised terminology.* **(0-3 marks)**

Level II *Detailed description of the feature. It need not relate to the photograph. 2 X LII Q max.* **(4-6 marks)**

(ii) Notes for answers

Spits occur at river mouths and where the coastline changes direction. If the LSD brings material along the coast, as soon as the water deepens and the waves no longer break (resulting in inability to move material), then deposition occurs. There is a shallowing of the water and so waves can break and so LSD can occur.

Mark Scheme

Level I *Simple links made between the LSD and other factors and the development of a spit* **(0-3 marks)**

Level II *Detailed links between the LSD and the development of a spit.* **(4-6 marks)**

Question 3

(a) (i) **Notes for Answers**
Annual mean is 20% to 30% lower; extreme gusts are 10% to 20% lower; calms are 5% to 20% higher.

Mark Scheme:
1 mark for each correct change identified. **(0-2 marks)**

(ii) **Notes for Answers**
There is a greater frequency of cloud and a greater frequency of cloud amount (between 5 and 10%). There is also an increase in the frequency of fog (100% in Winter and 30% in Summer).

Mark Scheme:
1 mark for each correct change identified. **(0-2 marks)**

(iii) **Notes for Answers**
N.B. Beware 'reasons for reasons'.
The increase in precipitation is due to a combination of the following:

- there is an increase in the particulate matter that can act as condensation nuclei;
- the urban area is warmer and this leads to localised uplift, which can give rise to convectional rain;
- the effect that buildings have on wind can lead to localised uplift and turbulence;
- large urban areas can slow down the passage of depressions by frictional drag, this means that rain cloud can stay over the urban area longer.

Mark Scheme:
Level 1 *Simple explanation of the effect or urban surfaces on the rain-forming processes, with no specialised vocabulary.* **(0-3 marks)**

Level 2 *Detailed explanation of the effects of urban surfaces on the rain-forming processes and link these to the amount of rain that can fall.* **(4-6 marks)**

(b) (i) **Notes for Answers**
From 21.00 to almost 06.00 the HII is increasing from one of the minima of 0.5°C to a max of 7°C. It then falls to another minimum of 0.5°C at 12.00. The most rapid fall is from 07.48 to 09.00. There is a rise during the afternoon to a peak of 2.2°C at 16.00 hours from when it falls back to 0.5°C in the middle of the evening.

Mark Scheme:
Level 1 *Simple description of the change in UHI intensity with little reference to rates of change or times of the day.* **(0-3 marks)**

Level 2 *Detailed analysis of the graph, showing where the max and mins, and relating these to the rate of rise or fall in intensity.* **(4-6 marks)**

(ii) **Notes for Answers**

Both an increase in cloud cover and an increase in wind speed cause the UHII to decrease. For cloud, the decrease in from 4°C to 3°C as cloud cover rises from 2 to 7 oktas. Low wind speeds give a higher UHII, e.g. 1.3m/s gives a UHII of 4°C and 5m/s is almost 3°C. Where the two combine, e.g. an increase of cloud from 2 to 4 and a wind speed increase of 1.3 to 3, also give a 1°C change in the UHII.

Mark Scheme:

1 mark for each valid statement taken from the graph. **(0-4 marks)**

(iii) **Notes for Answers**

Cloud cover acts as an insulator for a region and so reduces the heat loss from the local countryside at night. During the day, the cloud stops the incoming radiation from being absorbed as much as it would on a clear day. Wind acts as a flushing agent. As it increase, it will blow away stagnant areas of warm air and replace it with air of the same or similar temperature as the local rural land.

Mark Scheme:

1 mark for each valid statement made. Needs at least one from each influence to gain max. **(0-4 marks)**

(iv) **Notes for Answers**

Urban atmospheres are characterised by an urban canopy (below the level of the rooftops, and an urban boundary layer, which reaches up well above the urban surface. The urban canopy is almost uniformly constant, but above this in the plume, there is a slow decrease in temperature until the boundary. Here there is a rapid change of temperature characterised by clouds.

Mark Scheme:

Level 1 *Simple description of at least one characteristic of the change in urban/rural temperatures with altitude.* **(0-2 marks)**

Level 2 *Detailed analysis of the differences between urban and rural temperatures with altitude* **(3-5 marks)**

(c) (i) **Notes for Answers**

Depends on the examples chosen. Many candidates will use examples local to their centre. Niches created by this can include walls (sun and shade); tunnels, large and small; bare tarmac or concrete, etc.

Mark Scheme:

Level 1 *Simple description of niches that attract/repel flora and/or fauna. Must have both at L1 to gain the top of the level.* **(0-3 marks)**

Level 2 *Detailed description of both types of niche. There must be a link between the niche and the type or name of species that is attracted/repelled. Must have both attraction and repulsion at L2 to gain full marks. 2X L2Sp max* **(4-7 marks)**

(ii) **Notes for Answers**

The succession in a neglected area depends on the nature of the area studied, but would expect some kind of lithosere succession. For example, on an abandoned factory site, mosses and lichens can begin to develop on the bare concrete. They are able to exist in areas where there is little water. They extract nutrients from the sun and from the bare concrete below. When they die, they provide a thin mat of organic matter and some weathered mineral material, which mixes to provide a proto-soil that other plant species, can use to root into. Cracks in the surface provide a sheltered place for seeds to germinate. They also retain moisture and dust, etc., which again, help plants to root. The most common invaders are plants with windblown seeds, e.g. Oxford Ragwort. This has a long flowering season, enabling it to produce millions of seeds. As these higher plants die off, they produce thicker and more nutrient rich soil. Taller plants that are more nutrient demanding, then can establish. These could be for example, Rosebay Willow Herb. These shade out the smaller plants, stopping them photosynthesising so easily. In turn, the taller herbaceous plants are replaced by shrubs, and eventually tress, the most common being the Sycamore. All the while, the processes of soil enrichment and competition continue.

On the other hand, established ecological areas are those that have had some form of management. The nature of the difference will depend on the example chosen. The answer should focus on the difference between the managed and neglected aspects of chosen areas. Management techniques include the reduction in acidity of old industrial and coal spoil sites by addition of lime, etc., also, the deliberate clearing of areas to create a variety of habitats for smaller, light demanding species. Some areas have a system whereby mowing is only done once meadow wildflowers have flowered.

Mark Scheme:

Level 1	*Simple differences between neglect and management. Example of either, or both.*	**(0-3 marks)**
Level 2	*One L2 scene-setter. Detailed differences between the neglect and management. Detailed example of either type of area. Both types must be at Level 2 to gain full marks. No L2 sp.*	**(4-7 marks)**

(iii) **Notes for Answers**

The nature of the answer will depend upon the organisations used by the candidate. It is expected that candidates will use local and central government whose motives may be political, in as much as they are trying to fulfil the wishes of their constituents. There may also be some altruistic motives, where green areas provide amenity space within the city. They may also hide an eyesore. Other organisations could include the urban forestry unit, the nature conservancy council. Schools may be involved, as well as individuals such as birdwatchers, etc., who may wish for a diverse environment for study, or to attract new species. Each of the organisations

has a part to play in the planned introduction of new species, e.g. Local Authorities may introduce new species of trees to provide the public with an arboretum. Local businesses are beginning to see the effects of having green spaces that make areas attractive, and so will attract customers - this can be either shops or factories. Sometimes there is the accidental spread of new species, e.g. Japanese Knotweed from gardens.

Destruction of species can be caused by all manner of groups, including Local Authorities and gardeners who may use pesticides and herbicides to control 'weeds'. Sports bodies often wish to reduce the diversity of plant species by simply planting grass for football fields, etc., where once there were meadows.

Mark Scheme:

Level 1	*Simple description of at least one organisation/individual involved, and their attitude to conservation.*	**(0-3 marks)**
Level 2	*Detailed description of at least two organisations/individuals (specified) with differing attitudes.*	**(4-7 marks)**