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GCE

Edexcel GCE

Geography B (6471)

January 2006

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Mark Scheme (Results)

Edexcel GCE
Geography B (6471)

Brief Explanation of Criteria Based Mark Schemes

These are used for the extended writing end parts of all questions, and for selected open-ended responses within questions.

Three criteria bands are used:

Highest criteria band answers:
Will show a good range, depth of detail, relevance, precision, answering the question in a logical structured way.
Medium criteria band answers:
Will show some of these characteristics but have limitations on a number of features, especially at the bottom of the band, whereas at the top of the band, they will have many features of the highest band material.
Lowest criteria band answers:
Will be limited in range, vague, using basic terminology and expression, lacking in detail, often of peripheral relevance with limited reference to rubric.

There is no restriction to the number of candidates achieving each band. It is possible that in some tasks, 40% of candidates may achieve highest band work, but because of a lack of consistency or performance, or particular strengths and weaknesses, the performance will not be sustained across a whole paper.

The **first** stage in marking therefore is to decide on the band, and **secondly** to decide on the position in the band. Note that not all points mentioned in the criteria description need to be met for an answer to be placed in the band.

Quality of Written Communication

Structure, clarity, the use of geographical terminology and the correct use of grammar, spelling and punctuation, will be assessed within the mark scheme for section (c) of each question.

6471 Mark Scheme - January 2006

1. (a) Study the hydrographs below which show the impact of two storms on the River Tay.

(i) State two differences between the two storm events. (2)

Rainfall event 1	①much less rainfall	① with a steady build of rain	① to 10mm in 5 hours	① lasts for 6 hours (shorter)
Rainfall event 2	larger amount of rainfall	faster build of rain	To 12.5mm in 1 hour ie more intense	lasts for 13 hours (longer)

Only credit differences related to storm i.e. not discharge

(ii) Compare the shapes of the two hydrographs. (3)

Storm hydrograph 1 has more equal rising and recession limbs compared to 2. ① Storm hydrograph 2 has a much steeper rising limb, longer recession limb. ①

Storm hydrograph 1 has a peak discharge of 53 cumecs, storm hydrograph 2 has a higher peak discharge of 80 cumecs. ①

Allow comments on lag time, appertaining to shape. ① 3 x 1

(iii) For how many hours was the river in flood? (1)

Allow 19-20 hours

(iv) Explain why the impacts of Storm 2 on the river's discharge were very different from those of Storm 1. (5)

Note this question builds on (a)(i) and a(iii)

A - The greater impacts can be linked to the amount and nature of the storm event which led to a lag time of 10 hours in contrast to lag time for Storm 2 is around 7 hours.

B – Storm flow was far greater in Storm 2, much higher base flow only 1½ days after Storm 1. Very high base flow level and antecedent moisture in soil leads to actual flooding.

L3	*5*	*Understands the linkage to rainfall and the impact of the storm sequence A & B. Well used terminology and good understanding.*
L2	*4-3*	*Has some explanation related to the storm sequence and its impact on discharge.*
L1	*2-1*	*Presents the basic idea of much greater storm flow but causal explanations lack evidence and depth.*

(b) Study Figure 1 on page 2 in the Resource Booklet. It shows the pattern of surface run-off during floods at Coombe Hill in Surrey.

(i) Suggest three reasons why the flood risk has increased over the last forty years. (6)

1 – removal of trees in the 1960s F① will have reduced lag time ① – loss of interception.

2 – The grassy area was lost for car parking F① – reduced infiltration ①, now an impermeable surface.

3 – The amount of housing has increased by a factor of 2-3 F①– higher density housing, urbanised surface gutters/drains and lead ① to a much more flashy discharge across impermeable surfaces, less gardens etc.

3 x 2 – 1 for factor, 2 for explanation of it in hydrological terms - extension.

(ii) Suggest three ways in which the flood risk could be reduced in places such as Coombe Hill. (3)

Suggestions include (credit any feasible)

- Underground stream could be culverted
- Extension storm drains could be built to dispose of surface water after mapping its course.
- Planning regulations could ban further infill long term
- Replanting, and change of garden land use could perhaps lengthen the lag time to make storm run off less flashy but this would require residents co-operation
- For badly affected houses, some localised earth works and flood skirt provision may need to be looked at. 3 x 1

Don't allow suggestions related to river management.

(c) With reference to one named drainage basin, examine the view that it is human pressures which create the need for management schemes. (10)

Note

This is an open ended question which looks at how changing land use, or demands on the river system for multiple use. Can create the need for damming, channelisation, flood control, so that the river flow management is effective. There is scope for also discussing holistic river management in response to differing needs. Expect details of rivers such as the Colorado or Mississippi. Reward answers which are well linked to the **one** river basin and do link the discussion on the need for management to human pressures. Could be linked to pollution or extraction pressures.

L3	*10-9*	*Structured examination which links the need for management to a range of human pressures. Well linked to one river basin.*
L2	*8-5*	*Some structure in an examination which does explore the reasons for management with some links to a chosen river basin.*
L1	*4-1*	*One or two ideas such as the increased risk of flooding, or the need to build dams – rather generalised and not well linked to a chosen basin.*

2. (a) Study Figure 2 on page 3 in the Resource Booklet. It shows the Carding Mill catchment area and the results of a stream study carried about by a GCSE group during the very dry summer of 2003.

(i) Define the following terms: (2)

watershed

Dividing line/high area between 2 drainage basins/boundary around the edge of catchment. 1

catchment area

Drainage basin/area drained by a river system. 1

(ii) Comment on the choice of sampling method used in Figure 2. (2)

Seemed to be systematic (but not completely regular intervals).
1 for observation + 1 for evaluation of strengths/weaknesses. eg usefulness of doing 10 results (R^S)

(iii) Describe and suggest reasons for the variations in channel size shown by the fieldwork results. (4)

D – variable depth ① but river generally gets wider ① which leads to several increases in wetted perimeter ① and CSA. Some anomalies ①.
E – largely as a result of development of tributaries increased size of river → downstream. Anomalies of depth may be riffles and pools.

L3	*4*	*Sound description, recognises W/D anomalies, offers the correct explanation.*
L2	*3-2*	*Some ideas of general trends – with explanation based on tributaries. eg Misses details of W & D.*
L1	*1*	*One or two basic ideas likely to be gets wider, more water.*

(iv) The group were very concerned about the inaccuracy of their velocity results. Suggest possible reasons for this inaccuracy. (2)

No real pattern of results – issues of reliability of float system ①. Lots of anomalies such as station 3 and 8 ①. May be surface velocity only ① also need reliable velocity to get discharge calculated.① Low flow condns. ①
1 for any valid point, 2 for an extended point.

(v) The group wished to calculate the hydraulic radius (a measure of the river's efficiency). Explain how this could be done. (2)

Hydraulic radius is A/P. Measure CSA (graphical method). Calculate or measure wetted perimeter. 1 for basic, 2 for an extended explanation.

(b) (i) Study the field sketch below of Lightspout Waterfall located in Figure 2 in the Resource Booklet.

Using the boxes below, match the numbers to the correct features. (2)

Plunge pool	2	Pothole	4
Rapids	3	Interlocking spurs	1

2 marks for all correct, 1 mark for 2 correct

(ii) Explain how the large boulders of rock shown in the field sketch could be transported by the river. (3)

Likely to be moved by traction, ① saltation ① needs a very high volume of water/velocity to do this. For example during floods ①. Details of Hjulstrom pick-up ①.

(iii) Describe the erosive processes which contribute to the formation of waterfalls. (3)

Differential erosion (hard rock ledge), hydraulic action drilling out pool, corrasion by pebbles, impact of splash back, headward erosion.

L3	*3*	*Sound well developed explanation. Multiple reasoning.*
L2	*2*	*Tentative and valid single cause explanation or may recognise two possible ideas very superficially.*
L1	*1*	*Limited idea e.g. hard rock ledge.*

(c) With reference to examples, examine the factors that can lead to variations in either valley cross profiles or river long profiles. (10)

Cross profiles expect to see rock type and structure, climate (influencing valley side processes) and work of river (down cutting lateral erosion deposition). Reward well exemplified scripts.
Long profiles expect details of reasons for smooth concave upward curve, plus issues such as rock type, faulting etc as well as an explanation of rejuvenation and fall of base level leading to renewed down cutting. Reward exemplification and quality diagrams. Dams acceptable.
If do both mark the better.

L3	*10-9*	*Structured explanation linked to several factors. Showing understanding of the variations. Well exemplified. Two or three factors done well could yield a top band mark.*
L2	*8-5*	*Has some ideas about factors, which are used to explain variations. Likely to be less precise on process with more intermittent examples.*
L1	*4-1*	*One or two basic ideas which do relate to chosen profile, such as details of a steep narrow valley in descriptive terms.*

3. (a) Study Figure 3 on page 4 in the Resource Booklet. It shows a satellite image of the Danube Delta.

(i) Identify the physical features at X, Y and Z. (3)

X = spit, Y = Oxbow lake, Z = braiding/eyot/river island 3 x 1

(ii) Explain how features X and Y have been formed. (6)

X **Spit** formed by long shore drift (N/S) ① Details of swash/backwash. ① Change of angle of coast ① Laterals ① Low energy situation → deposition. ① 3 x 1

Y **Oxbow lake** meander migration erosion of swans neck ① new channel usually in flood time → cut off ① sealed off by deposition ① 3 x 1

3 x 1 point mark for a sequential development as shown above.

(iii) W shows where the river has been channelised. Suggest possible reasons for this. (3)

- Navigation use of boats is generally quicker route to sea – ie canalised
- Flood control disposal of surplus water
- To manage migration of distributaries – concrete them in.

1 for basic idea, 2 for an extended developed idea up to 3 max

(b) Use Figure 3 in the Resource Booklet to describe two general characteristics of the delta.(2)

(i) Numerous distributaries ① vary obvious deposited features (foreset beds) ① not farmed ① numerous small lakes ① wetlands ① etc 2 x 1

(ii) Deltas are said to form when there is a positive sediment budget. Annotate the diagram below to explain how a positive sediment budget may occur. (6)

Inputs come form river carrying a lot of sediment (loose unconsolidated sands, silts (Hwang Ho etc). Lack of dams and lakes to trap silt.

Outputs are **less.** Shallow seas encourage building above sea level, lack of strong tides and currents prevent sediment being transported away sea. Forms in low energy situation. Salt helps to coagulate the particles. Result is that the store increases (positive balance).

L3	*6-5*	*Sound understanding of concept of positive sediment budget. Good knowledge of input and output relationship at delta shown.*
L2	*4-3*	*Some understanding of delta formation and the role of rivers/seas.*
L1	*2-1*	*Limited conceptual understanding – may show some knowledge of silt in a river.*

(c) Examine the importance of wetlands in either a river or a coastal environment. Support your answer with located examples. (10)

Note – the question requests river or coast – allow estuaries and delta for either, otherwise mark best. Coastal wetlands (saltmarsh)

Environment – aesthetic, tourism potential. Use of natural defence against floods, wash lands etc. Coast – managed natural retreat

Economic importance for tourism and also for reeds, salt pans etc.

Ecological importance, high primary productivity supports numerous birds, rare plants etc.

L3	*10-9*	*Structured examination which looks at a range of reasons for importance. Well exemplified with rivers or coastal wetlands*
L2	*8-5*	*Some ideas for the importance of wetlands. May lack detailed exemplification and may not be fully focused on rivers or coastal wetlands.*
L1	*4-1*	*One or two general ideas. Like important for birds. Likely to be unrelated to specific wetlands.*

4. (a) Study Figure 4(a) on page 5 in the Resource Booklet. It shows a barrier island in its natural state.

(i) State two factors which encourage the formation of sand dunes. (2)

2 from:- onshore/strong winds ① wide exposure of sand ① 'objects' to provide friction leading to deposition of sand ①. 2 x 1

(ii) Suggest reasons why there is only limited colonisation of the sand dunes by vegetation. (5)

The dunes are not '**fixed**'. Constant dune migration westwards by prevailing **winds**, also impact of **overwash** by sea, also may mention harshness of environment. Saline, pH8, very dry. Restricted to pioneer species.

L3	*5*	*Recognises that the mobility of the dune environment and its harshness for colonisation. Well reasoned. Understanding of a psammosere.*
L2	*4-3*	*Some understanding across a range or in depth explanation of one aspect.*
L1	*2-1*	*Basic statement such as sand always moving lacks terminology.*

(iii) Study Figure 4(b) on page 5 in the Resource Booklet. It shows a barrier island after development. Suggest why environmentalists might be concerned about the impact of development. (4)

▪Destruction of wide variety (biodiverse) ecosystem such as at saltmarsh area. ▪ Artificial raising of dunes to protect leaves foreshore zone vulnerable to marine erosion (rising sea level an issue). ▪ Fixing of dunes using alien non nature species (shrubs). ▪ Road and other concrete surfaces add to impermeability (drainage issues). ▪ Visual intrusion of buildings. ▪ Potential pollution from boat fuel, ▪Trampling 1 for basic 2 for extended point. 2x2

(b) Study Figure 4(c) on page 5 in the Resource Booklet. It shows three options for the coastal management of barrier islands to cope with the threat from rising sea levels.

Suggest reasons why both options A and B led to a huge amount of local opposition. (4)

(i) A – huge loss potentially of peoples houses (dream holiday homes) and also installations. 1 for basic 2 for extended.

B – red lining controls further development and restricts building plans, also engineered retreat actually involves very costly movement of individual homes. 1 for basic, 2 for extended.

(ii) Suggest arguments for and against option C. (4)

For – sea walls buy guaranteed protection for home owners for a definite length of time. **Secure** futures etc cf other means.

Against – visual impact, disruption to shore line activities. Very high cost initially. May need to be replaced in future.

2 for full answer for each, 1 for basic idea (could be 2 x 1).

(iii) Suggest one other alternative option which might be a short-term solution. (1)

Expect a range of possibilities. Could accept beach nourishment ① possible introduction of mangroves ① even revetment ① or rip-rap ① or groynes ①

(c) Examine the reasons why opinion is very divided about whether there is a need for more coastal management. Support your answer with examples. (10)

Note the response could follow a number of lines.

Coastal management could include coastal ecosystems.

For – people living at coast, increasing numbers of high value installations, and properties, which may need further protection because of the rising sea levels and increasingly stormy weather associated with global warming.

Against – the sheer cost for tax payers many of whom live inland, and also the environmental impact of hard engineering on coastlines, littoral cells etc also unsuccessful examples and knock on effects. More movement towards sustainable coastal management defending essentials (cost benefit ratios). Also some discussion how far sea levels will rise.

L3	*10-9*	*Structured, supported examination as to the pros and cons of the need for more coastal management well supported with examples.*
L2	*8-5*	*Some ideas as to the reasons for divided opinion. Sustains arguments with some exemplar support. Maybe unbalanced at lower end.*
L1	*4-1*	*One or two basic generalised ideas of the basic eg do not always work.*

5. (a) Study Figure 5 on page 6 in the Resource Booklet. It is a photograph of Old Harry Rocks near Swanage in Dorset.

(i) Identify the physical features labelled A, B and C (3)

A = (sea) stack, B = (natural) arch, C = wave cut platform. 3 x 1

(ii) Explain how rock type and structure have contributed to the formation of features A and B. Space is provided should you wish to draw a diagram. (4)

Rock type – Resistant rock to form arches (support) and vertical cliffs ① massive rock① permeable rock increases resistance ① near horizontal bedding leads to vertical cliffs ①
Structure – Caves, arches, stacks all formed by exploitation of joints/faults ① idea of sequence ① details of how joints exploited ① impact of talus → corrasion ①
1 mark for basic 2 for extended explanation. Credit marks on text **or** on diagram 2 x 2

(b) The diagram below shows the cycle of cliff erosion.

(i) Fill in the missing words in the empty boxes to complete the diagram. (2)

Transported by long shore drift etc Attrition, sediment transport	Cliff fall, collapse etc, landsliding etc mass movement, wave cut notch

2 x 1

(ii) Outline the main processes involved in undercutting at the cliff base. (3)

The main processes are hydraulic action ① (air trapped in fissures) combined with corrasion/abrasion ① of waves containing load, concentrated at tidal range (notch) possible mention of corrosion/solution ① of limestone.
3 x 1 for processes or 2 for extended explanation of one process. Max 2 for list

(iii) Explain, with examples, what is meant by subaerial weathering (3)

Weathering is the break up of rocks in situ. Sub aerial processes include **frost** weathering, raindrop/hill wash, and chemical weathering (solution) or root wedging.
For explanation of weathering - 1
For examples of subaerial processes – may be up to 3

(iv) Explain how a severe storm can lead to dramatic changes along a coast. (5)

Note
Severe storm (dominant winds) can lead to increased (storm surge).
Wave height → storm beach size material, destruction of beaches, breaches of spits, destruction of micro features. Severe storms are usually accompanied by **heavy rainstorms** → increase lubrication and land slipping.
Credit impact of destruction.

L3	*5*	*Explains a range of dramatic changes related to most aspects of a severe storm*
L2	*4-3*	*Has some sound ideas on some changes e.g as a result of increased erosion, storm beach or cliff collapse*
L1	*2-1*	*One or two basic ideas e.g. lots of erosion*

(c) With reference to a named stretch of coastline, examine the reasons why rapid coastal erosion is more of a problem in some areas than others. (10)

Notes
The problem can be linked to structure and lithology and other **physical** features eg Boulder Clay v Chalk Coast of Yorkshire. It can also be related to nature of land use – where there are high value installations towns (Hornsea) or Easington gas works, coastal erosion has to be dealt with. Could be exacerbated by knock-on effects (Mappleton Groyne).
Credit the best stretch of coast where more than one chosen.

L3	*10-9*	*Structured examination which looks at a range of reasons, well linked to chosen coast.*
L2	*8-5*	*Some structure in an account which looks at some reasons eg for the variation in erosion rates. Is linked to a named coastline.*
L1	*4-1*	*One or two basic statements. Largely descriptive. Limited linkage to a named coastline.*

Total = 30 marks