

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Advanced Subsidiary and Advanced Level

MARK SCHEME for the November 2004 question paper

9696 GEOGRAPHY

9696/01

Paper 1 (Core Geography), maximum raw mark 100

This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which Examiners were initially instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began. Any substantial changes to the mark scheme that arose from these discussions will be recorded in the published *Report on the Examination*.

All Examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes must be read in conjunction with the question papers and the *Report on the Examination*.

- CIE will not enter into discussion or correspondence in connection with these mark schemes.

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Grade thresholds taken for Syllabus 9696 (Geography) in the November 2004 examination.

	maximum mark available	minimum mark required for grade:		
		A	B	E
Component 1	100	60	55	38

The thresholds (minimum marks) for Grades C and D are normally set by dividing the mark range between the B and the E thresholds into three. For example, if the difference between the B and the E threshold is 24 marks, the C threshold is set 8 marks below the B threshold and the D threshold is set another 8 marks down. If dividing the interval by three results in a fraction of a mark, then the threshold is normally rounded down.

November 2004

GCE AS/A LEVEL

MARK SCHEME

MAXIMUM MARK: 100

SYLLABUS/COMPONENT: 9696/01

GEOGRAPHY

Core Geography

Page 1	Mark Scheme	Syllabus	Paper
	AS/A LEVEL – NOVEMBER 2004	9696	1

Section A

Hydrology and Geomorphology

1. Fig. 1 shows the Hjulstrom curve (water velocities at which sediment is eroded, transported and deposited).
- (a) (i) Name the type of sediment that requires the lowest velocity to be eroded. (1)
Sand
- (ii) Name the type of sediment that is likely to be transported at all velocities. (1)
Clay
- (b) (i) Describe and explain the relationship between water velocity and the erosion of clay and sand particles. (4)
- Clay requires larger velocities to be eroded than sand. Velocities are c4 times larger or can be compared in terms of the figures taken from the diagram. Explanation can be given in terms of the greater cohesiveness of clay as compared to sand.
- (ii) Explain the variation in water velocity that is required to transport and to deposit sediments of different particle diameter. (4)

Velocity that is required to entrain is always higher than that to transport material. This is the same for all particle sizes. Boulders have the highest transportation velocities whilst clay and silts have the largest "window" of transportation as they can remain in suspension at very low velocities. Larger sediment is deposited at higher velocities. Reward mentions of competence and suspension.

Atmosphere and weather

2. Fig. 2 shows the mean (average) temperatures (°C) in July.
- (a) Describe two differences in the pattern of the isotherms between the northern and southern hemispheres shown in Fig. 2. (4)

Higher temperatures (30°C) established over Africa-Asia in the northern hemisphere
Northward shift of isotherms of northern summer
Greater latitudinal distortion of isotherms over land and sea in the northern hemisphere.
Colder temperatures in Antarctic (-20°C) in Antarctica

Any two for the marks

Page 2	Mark Scheme	Syllabus	Paper
	AS/A LEVEL – NOVEMBER 2004	9696	1

- (b) Describe and explain the differences between the temperatures of land masses and sea areas. (6)

In the southern hemisphere (winter) isotherms displaced to N over seas, whereas in the northern hemisphere (summer) they are displaced northward over land areas. This is due to the different thermal capacities of land and sea. Sea heats up more slowly in summer (in N) and cools more slowly in southern hemisphere (winter) as more heat is retained in oceans. Conversely land heats up and loses its heat at a faster rate

Rocks and Weathering

3. Fig. 3 shows the average rates of physical (mechanical) weathering in relation to average annual temperatures and precipitation.

- (a) State the maximum range of temperatures and precipitation under which

- (i) rapid physical weathering occurs and
(ii) slow physical weathering occurs. (4)

- (i) 0 - 8°C and 0 - 400 mm ppt (2 marks)
(ii) 16 - 30°C and 1 000 mm - 1 800 mm ppt (2marks)

- (b) Briefly describe one physical weathering process that is characteristic of areas of rapid weathering and one physical weathering process that is characteristic of areas of slow weathering. (6)

Freeze thaw in rapid areas where water entering joints/pores etc. freezes and thaws with temperature change thus weakening the rock.

Salt crystallisation in interstices of rock or thermal fracture (heating/cooling) leading to exfoliation. Appropriately annotated diagrams are acceptable.

4. Fig. 4 gives information for countries in South America about total fertility rate and the percentage of women in the work force in 1998 and the decrease in average number of births per woman, 1963-1993.

- (a) (i) Which countries experienced the smallest decrease in the average number of births per woman between 1963 and 1993?

less than 1 fewer birth: Argentina 1, Uruguay 1 (2)

- (ii) State the range of total fertility rates in 1998. (1)

2.4 - 4.8 or 2.4

- (iii) Name two factors, other than women's employment, which may decrease fertility rates significantly.

Credit 1 any two different valid factors e.g. literacy/education; access to/availability of contraception/family planning; government policy; religious beliefs; culture/tradition; catastrophe (2)

Page 3	Mark Scheme	Syllabus	Paper
	AS/A LEVEL – NOVEMBER 2004	9696	1

- (b) Describe and explain the relationship suggested in Fig. 4 between fertility and the percentage of women in the work force.

Simply as the percentage of women in the work force increases, fertility decreases (an inverse relationship) (1)

Recognition of some complexity or of an anomaly (1)

e.g. 35% in workforce in 1998 for Brazil (TFR 2.5) but 37% Bolivia (4.8)

e.g. TRF 2.4 in 1998 for both Chile (32%) and Uruguay (41%) (2)

For the explanation of the relationship (3) as incomes rise, ideals and aspirations change, children are viewed more as a burden than an asset, etc. Full marks can be achieved without seeking to explain the complexity/anomaly (5)

Total 10

Settlement dynamics

- 5 Fig. 5 shows Harris and Ullman's (1945) multiple nuclei model of urban structure.

- (a) Describe the main features of the model's residential pattern.

There are two elements: credit division by income (1) and location (4)

Credit location: low income (1) three areas N, S, W of CBD and light manufacture

medium (1) and high (1) to the east/peripheral

residential suburb (1) separate to SE

- (b) Suggest reasons why businesses today might choose to locate in the outlying business district of a town or city rather than in its central business district.

This relates to the growing negatives of central locations and the perceived positive of peripheral locations e.g. accessibility; working environment; parking; space for expansion; bid rent; localised incentives, etc.

Credit the reasons for choosing the OBD (3) and rejecting the CBD (2)

but beware of a simplistic "opposites" approach (5)

Total 10

Page 4	Mark Scheme	Syllabus	Paper
	AS/A LEVEL – NOVEMBER 2004	9696	1

Section B

Hydrology and fluvial geomorphology

6. (a) (i) Describe how precipitation intensity can affect discharge in a river channel. (4)

Precipitation intensity can lead to infiltration capacity being exceeded. This leads to rapid run off and hence rapid rises in channel discharge, even to flooding. This could be shown as a storm hydrograph with short lag time and steep rising curve. Low intensity gives rise to greater infiltration and longer lag times.

- (ii) Define the term *water balance*.

An attempt to quantify water within the main routes of the hydrological cycle. Usually represented by the equation:-

$$P \text{ (ppt)} = E \text{ (evapotranspiration)} + R \text{ (run off)} \pm S \text{ (changes in storage)} \quad (3)$$

- (b) With the aid of diagrams, describe and explain the landforms that are found in meandering river channels. (8)

Meandering channels are characterised by a sinuous channel form with asymmetrical cross profile. Landforms include slip off slopes on the inside bend where deposition occurs as the current slackens. On the outside bends undercutting of the banks by the faster current (thalweg) produces river cliffs. The meandering channel can be explained in terms of helicoidal flow and pool and riffle sequences. Cut offs (ox bow lakes) are not technically part of the channel but can be employed to demonstrate process.

Well annotated diagrams will suffice.

- (c) Describe and explain the effects upon a catchment system of the building of dams for water storage. (10)

Dams provide an interruption to the flow of water through the system. Surface storage is thus increased at the expense of channel flow. Channel flow below dams becomes both diminished and regulated. This can have the effect of reducing fluctuations in discharge hence controlling flooding (e.g. Aswan on Nile or dams on the Colorado). Water supplies in lower catchment areas can be affected (e.g. Colorado) as abstraction can take place higher in the catchment. This can have knock on effects in terms of groundwater flows as well as losses (outputs) from evaporation.

Best answers will be able to express this in catchment system terms. (8 - 10)

Moderate answers should still realise that changes in storage at one point do have implications for other parts of the system. (5 - 7)

Weaker answers will get little further than the pounding of water behind a barrier with some hint of flood protection. (1 - 4)

Page 5	Mark Scheme	Syllabus	Paper
	AS/A LEVEL – NOVEMBER 2004	9696	1

Atmosphere and Weather

7. (a) (i) Define the term *urban heat island*. (4)

An area (island shaped) of higher temperatures (more prominent at night) around urban areas produced by the greater heat absorption of concrete, tarmac etc. and its slow release as well as heat derived from human activities.

- (ii) Describe one effect of the urban heat island on urban weather. (3)

Production of higher temperatures as above, could lead to more convection hence ppt. or to reduction in snow. Higher temperatures could also lead to less fog, lower humidity.

Only one weather phenomenon need be explained but must be linked to heat island.

- (b) (i) Briefly explain why temperatures usually decrease with height above the earth's surface. (5)

Solar radiation entering the earth's atmosphere is shortwave which cannot be absorbed by the atmosphere through which it passes. The earth converts this to longwave radiation that is reradiated to the atmosphere where some of it is absorbed by carbon dioxide, water vapour and cloud droplets and thus reflected back to the surface. Hence the source of heat for the atmosphere is the surface of the earth and it progressively cools with distance from the earth's surface.

- (ii) Describe one circumstance when temperature does not decrease with height. (3)

Temperature inversion produced by radiation cooling at the earth's surface. Upper atmosphere inversions are possible but unlikely to be cited.

Both parts of answer could be illustrated by environmental lapse rate diagrams.

Page 6	Mark Scheme	Syllabus	Paper
	AS/A LEVEL – NOVEMBER 2004	9696	1

(c) Explain how clouds and raindrops are formed. (10)

Air cools as it rises, triggered by convection/convergence or orographic ascent. As it cools it can hold less water vapour, which condenses at dew point temperature around hygroscopic nuclei to form clouds. Continued ascent at the SALR produces clouds of great vertical extent. Updraughts and currents within the clouds produce coalescence and collision of water droplets that eventually become heavy enough to fall as rain.

This could be shown diagrammatically.

Best answers will be able to use lapse rates, dew point, condensation and Bergeron-Findeissen methods of raindrop production. **(8 - 10)**

Moderate responses will recognise cooling leading to condensation and water droplet formation inside clouds. **(5 - 7)**

Weaker answers will get little further than condensation around hygroscopic nuclei after uplift of air. **(1 - 4)**

Rocks and Weathering

8. (a) (i) Define the terms continental plate and oceanic plate. (4)

Plates are lithospheric blocks consisting of part of the crust and mantle. They can migrate across the asthenosphere. Continental plates (crust) carry the continents and are generally thicker (33 km upwards). Oceanic plates are those underlying ocean basins, comprising younger sediments overlying basaltic lavas. They are thinner (10 - 16 km).

(ii) Describe one landform that may develop at a convergent plate boundary. (3)

Choice from ocean trenches, island arcs or fold mountains. Ocean trench is a deep trench produced by the subduction of two plates. Island arcs are volcanoes produced by the upwelling of magma from the melted plate margin. Fold mountains are sediments that are compressed between the convergent plates with attendant volcanic activity. Annotated diagram would suffice.

(b) With the aid of diagrams describe the principal features of a divergent plate boundary. (8)

Diagram should show sea floor spreading, mid ocean ridge, upwelling of magma, and, possibly, magnetic striping. Explanation should appear in terms of plate boundaries, and convection currents in the asthenosphere as a driving mechanism.

Page 7	Mark Scheme	Syllabus	Paper
	AS/A LEVEL – NOVEMBER 2004	9696	1

- (c) **How does an understanding of plate tectonics help to explain the development of the earth's crustal features?** (10)

Plate tectonics should be addressed rather than continental drift (although it could be used for comparative purposes). The rigid nature of plates that are capable of substantial lateral movement allows an explanation of both the creation and destruction of crustal material. It explains the pattern of the continents and the evolution of landforms such as ocean trenches, island arcs and fold mountains. Thus the global pattern of mountain ranges, the distribution of zones of volcanic activities as well as the incidence of earthquakes reflect the position of plate boundaries and the nature, direction and intensity of plate movements.

Good answers will have organised material and use the crustal features as triggers for the explanation (8 - 10)

Moderate answers will launch into a general plate tectonics exposition of varying accuracy (5 - 7)

Weaker responses will merely repeat (a) and (b) i.e. convergent and divergent plate margins or indulge in Wegenerian continental drift. (1-4)

Population change

- 9 **Fig. 6 shows the demographic transition model.**

- (a) **Describe the characteristics of Stage 1.** (7)

known as high fluctuating or high stationary (1)
 birth rate and death rate are both high/around 25 per 1000 on Fig. 1
 NIR is low or negligible/the rates self-cancel (1)
 associated with the past, rare, ?remote tribes (often quoted), lasted centuries (1)
 simple reason(s) for high BR and high DR 3

- (b) **Draw a line on Fig. 6 to show the changes in total population over time. Add labels to your line to explain these changes. Attach Fig. 6 to your answer paper/booklet.** (8)

Please show credit on Fig. 6.

For the line (3)
 For the labels (5).

Indications of quality may be one or more of the following:

- a clear distinction between population growth rates and total population e.g. "high"
- understanding of accelerating and decelerating trends in growth
- suitable curvature of line in Stages 2 and 3
- recognition of brief periods of negative NIR on Fig. where DR > BR
- accurately placed labels/arrows

Page 8	Mark Scheme	Syllabus	Paper
	AS/A LEVEL – NOVEMBER 2004	9696	1

- (c) To what extent can the demographic transition model help us to understand future population trends in MEDCs? (10)

Most likely to a limited extent as it presents on the figure, as most MEDCs are already in Stage 4. Maybe more helpful if a "Stage 5" is included where DR>BR e.g. UN prediction by 2050 that the populations of 39 MEDCs will be smaller.

Candidates will probably:

- L3 Structure the whole response as an assessment, recognising elements both of the DTM's usefulness and of its limitations and offering suitable data or exemplar support for some of these observations. [8-10]
- L2 Offer a sound but partial response, which whilst showing some knowledge and understanding is limited in assessment and/or exemplification. [5-7]
- L1 Make a basic or fragmentary response in which there is little or no understanding of the model's predictive value and/or of the demographic context in MEDCs. Descriptive rather than evaluative responses remain within L1. [1-4]

Total: 25

Population change

- 10 (a) Give the meaning of the terms *voluntary migration* and *involuntary (forced) migration*. Support your answer with an example of each. (7)

voluntary migration

people migrate by choice (1)
 making their own decision as a result of push and pull factors (1)
 an example (located or typological) (1)

involuntary (forced) migration

there is no alternative, people are made to move (1)
 by force of environmental circumstances/pressures (1)
 or social, economic or political imposition by others (1)
 an example (located or typological) e.g. refugees, resettlement (1)

- (b) Describe and explain one involuntary (forced) migration you have studied. (8)

For the description, who, where (from and to), how many, how, when etc. (4)
 For the explanation, principally why it happened, why there (source and destination) (and why it stopped?) (4)

Page 9	Mark Scheme	Syllabus	Paper
	AS/A LEVEL – NOVEMBER 2004	9696	1

- (c) **To what extent is it true that pull factors are more important than push factors in voluntary migration?** (10)

Some candidates seem to hold to the idea that voluntary migration is all about pull factors (and involuntary migration all about push factors). This is an opportunity to show a more balanced and sensitive grasp of migration decision-making in different circumstances.

Candidates will probably:

- L3 Provide a confident response with a clear assessment of extent, which considers both push and pull factors and which is supported by different examples of voluntary migration. A comprehensive answer is not needed for full credit. [8 - 10]
- L2 Offer an answer which goes only part way to satisfying the question because of limitations in knowledge of migration and/or in skills of assessment. For an answer which only deals with pull (or push) factors max.6. [5 - 7]
- L1 Make one or more simple points which may address the question weakly. Lack the understanding, skills - or time - to develop anything more than a rudimentary response. [1 - 4]

Total: 25

- 11 (a) **Explain the meaning of the term settlement *hierarchy*. Illustrate it using an area you have studied.** (7)

Accept any hierarchy except that of residential areas within a city. As it is *settlement hierarchy* rather than *urban hierarchy*, rural settlement should be included at, at least, one level.

A settlement hierarchy is an arrangement of settlements,

in order of importance, size or function (1)

with a number of levels (1)

e.g. hamlet, village, town, regional centre, capital city (1)

the further up the hierarchy, the fewer the number of settlements (1)

The above points can be credited on a diagram.

Credit (3) the application of the concept to any area of named settlements arranged in a size or functional hierarchy. A map or diagram is creditable.

Page 10	Mark Scheme	Syllabus	Paper
	AS/A LEVEL – NOVEMBER 2004	9696	1

- (b) Draw and label a diagram to show the relationships between any two settlements of different sizes. (8)

The interaction of any two settlements is diverse and dynamic and may be in physical, economic, social and political dimensions. The settlements may be generic e.g. a village and a market town, but candidates may do better to use real places they know or have studied.

Whilst some kind of flow diagram is probably the most suitable, any kind of diagram is acceptable.

Quality may be indicated by the detail of the labelling, an appreciation of flows/relationship in different dimensions and by the two-way nature of the relationships.

- (c) To what extent is the primate city associated with an early stage of a country's urban development? (10)

Candidates should be aware that many LEDCs are primate and that urbanisation, although occurring rapidly, is still at an early stage. Some countries with a long urban history do, however, remain primate e.g. Egypt.

However, primacy is also found in MEDCs associated with other situations, which include,

- centralised countries e.g. France
- countries/island nations of limited physical extent where one city is sufficient functionally e.g. Luxembourg
- centres of former empires e.g. England, Austria

Candidates will probably:

- L3 Show keen awareness of primacy, based in a good conceptual understanding and supported by examples. Assess well both the link between primacy and urban development and at least one other circumstance in which primacy occurs. [8 - 10]
- L2 Provide an answer which makes several useful points but which only goes part way to dealing with the question, being limited in assessment and/or exemplar support. May mention or allude to other circumstance(s) in which primacy occurs but not develop this. [5 - 7]
- L1 Have only a basic grasp of primacy and of urban development. Make a response which offers little or no assessment, which is fragmentary, incomplete or a list of points undeveloped through lack of time. [1 - 4]

Total: 25