

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
GCE Advanced Subsidiary Level and GCE Advanced Level

MARK SCHEME for the May/June 2009 question paper
for the guidance of teachers

9696/01	9696 GEOGRAPHY Paper 1 (Core Geography), maximum raw mark 100
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This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes must be read in conjunction with the question papers and the report on the examination.

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Section A

Hydrology and fluvial geomorphology

1 Fig.1 shows the transportation of sediment within a river channel.

(a) Identify the processes of transportation shown in Fig.1 as:

(i) A

suspension

(ii) B

traction

(iii) C

saltation

[3]

(b) Describe the operation of *one* of the processes you have identified in (a).

[2]

Suspension is the transport of particles light enough to be carried in the flow of the river.

Traction is the rolling of pebbles along the stream bed by the current.

Saltation is the jumping/hopping along the bed of small particles light enough to be entrained for only a short distance. Any one.

(c) Explain *two* ways shown in Fig. 1 by which the river obtains its sediment load from outside the channel.

[5]

The diagram shows three sources of material to form sediment load from outside of the channel. One is wind-borne, comprising dust and other airborne particles that could be blown into the channel from the neighbouring banks in dry and windy conditions.

More significant is the stream undercutting river banks through the process of lateral erosion. This causes the banks to cave in and material deposited in the channel. This would be evident for instance on the outside of meander bends.

Slope failure, induced by either undercutting by the stream or downwash could also yield sediment for the channel. Any two are acceptable for the marks.

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Atmosphere and weather

- 2 Fig. 2 shows the average annual distribution of incoming solar radiation (insolation) at the earth's surface.

Insolation values are measured on a horizontal surface at ground level in watts/m²

- (a) What is the highest insolation value recorded:

- (i) at the equator (0°);

200 watts/m²

- (ii) at 23½° N?

[2]

275 watts/m²

- (b) Explain *one* reason why the solar radiation received at the equator is lower than that at the tropics. [3]

Because of equatorial cloud cover produced by uplift (low pressure) or high pressure over tropics giving clearer skies.

- (c) Briefly explain *one* method by which heat is transferred around the earth. [5]

Either by:

Ocean currents whereby sea water is heated at the equator and hence is less dense and moves northward in the northern hemisphere. These warm currents travel along the eastern coastal margins such as the north Atlantic drift. Returning cold currents move on the western continental margins. In the southern hemisphere the pattern is reversed giving a figure of eight movement through the Atlantic ocean. (Brazil current warm and the cold Benguela current off Africa).

Or by:

Wind systems that can best be represented by the tri-cellular model. Uplift of heated air occurs in Equatorial areas and air travels polewards before descending in the sub tropics. The Hadley cell, the Ferrel and Polar cells can also be represented, although it is acceptable for candidates to discuss this in terms of surface winds e.g. trades, westerlies, polar easterlies etc. A good labelled diagram should be sufficient for all the marks.

[Total: 10]

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Population change

3 Fig. 3 shows the demographic transition model. Fill in your details at the top of the page and attach it to your Answer Booklet or Paper.

(a) On Fig. 3:

(i) write in the name for Stage 4; [1]

Low stationary or low fluctuating

(ii) draw and label a line to show when the highest natural increase rate occurs; [2]

The line is classically and ideally a vertical arrow between BR and DR, positioned on the broken line at the point of transition between Stages 2 and 3.

For a somewhat inaccurate position or an unlabelled line **1 mark**

(iii) shade in a period of natural decrease (a negative natural increase rate). [1]

Credit shading or colouring in either one of the brief periods in Stages 1 and 4 where death rate > birth rate

(b) Explain the fall in the death rate during Stages 2 and 3. [6]

Death rate falls for a combination of reasons, for example,

- improved health, such as immunisation, primary health care
- greater access to healthcare, such as doctors or rural clinics
- public health measures, such as sanitation or clean water supply
- eradication of killer diseases
- improved diet
- agricultural change, such as greater quantity and quality of food supply, or the shift to semi-subsistence systems
- famine risk decreases, food security increases
- improved awareness amongst, or education of, mothers
- transfer of technology or aid from MEDCs
- government spending on development
- improved living conditions
- other

Better accounts may demonstrate how the death rate, once falling, continues to fall and make some reference to age-specific death rates, e.g. through the reduction in infant mortality and child mortality or increase in life expectancy.

Mark on overall quality, suggest that a full answer develops both health and food supply as factors, to **max. 5**, and that there is more to an explanation.

[Total: 10]

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Population change

4 Fig. 4 is a newspaper cutting about migrants to the United Kingdom (UK) who were granted citizenship in 2004. The UK is an MEDC and a member of the European Union (EU).

(a) Analyse the nationalities of the migrants who became British citizens, supporting your response with information from Fig. 4. [4]

Suggest that a full answer recognises that nationality is mixed and the pattern uneven and mentions the majority, 'some' and the relatively few in percentage terms.

For example, the pie chart shows that over half (56%) came from Africa and the Indian sub-continent combined.

Three areas contributed around 10% of the new citizens (Rest of Asia 12%, Europe outside EU 11%, the Americas 9%), totalling to about one third.

Several areas contributed <6%, such as the EU and the Middle East. Together the six smallest sectors contributed the same percentage as Africa (32%).

Beware the rewriting of the data in words without some analysis or interpretation. For a response only dealing with the majority, **max. 2**.

(b) Describe and give reasons for the relationship between age and international migration suggested in Fig. 4. [6]

International migration is age-specific when voluntary. In Fig. 4, young adults dominate. Over 80% of the new citizens are under 45. Very few (4%) are 60 and over. There is a high proportion (19% or approx. one fifth) under 16, some of whom will have been born within the UK.

Possible **reasons** include,

- the vigour, enterprise, risk-taking and hopefulness of youth
- preference of the old and older for stability, familiarity, tradition
- the role of perception
- the role of education e.g. young professionals
- the role of the media and other sources of information
- the influence of ties e.g. to spouse, family, land, business
- family structure e.g. dependents <16 who migrate with parents
- role of economic migrants in providing remittances
- entry restrictions and visa regulations
- other

Suggest mark flexibly **describe/give reasons for**, 2/4 to 4/2 depending on emphasis and quality. Credit well responses which shown sound conceptual understanding of international migration and an appreciation of the data provided and its limitations. Comprehensive explanations are not required for the modest mark allocation.

[Total: 10]

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Settlement dynamics

5 Fig. 5 shows the planned layout of the central area of Portland, Oregon, USA. In 2006 the city's total population was 563 000.

(a) Compare the character of land-use on the two sides of the Willamette River. [5]

The **land-use** in the west is more mixed than the east. Both areas are compact, but there is a spine extending further south on the west bank.

W	E
mainly commercial, CBD, retail and some residential	industrial and commercial
several major open spaces e.g. parks	open space mainly along river
many public attractions (12)	only 4 public attractions
services e.g. station	
specialist areas e.g. University district	

A full answer involves 'an element of comparison' often through simple vocabulary used such as 'but', 'whereas', 'however' and/or in the structure of the account.

(b) New residential development is occurring at the location marked X on Fig. 5, with the conversion of a disused warehouse into high quality apartments.

Outline the possible advantages and disadvantages of living at X, using the information in the figure and your knowledge of urban areas. [5]

Possible **advantages** include,

- centrality
- convenience/access to shops and services
- a walk to work?
- overlooking/close to linear open space
- prestige
- other

Possible **disadvantages** include,

- high cost (bid-rent, spatial competition for central land)
- negative externalities e.g. noise, pollution, congestion, crime
- a small living space, without garden cf. suburbs
- lack of 'a community'
- other

Suggest credit **advantages** and **disadvantages** 2/3 or 3/2.

[Total: 10]

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Section B: The Physical Core

Hydrology and fluvial geomorphology

6 (a) (i) Define the terms *throughfall* and *throughflow*. [4]

Throughfall is the water that falls through vegetation to the surface (i.e. is slowed but not entirely intercepted).

Throughflow is the sub surface flow of infiltrated water down hill to the stream channel.

(ii) Describe *one way* in which overland flow occurs. [3]

Most commonly due to the intensity of rainfall exceeding infiltration capacity.

Also accept surface impermeability due to antecedent conditions or urban settings.

Or Saturation overland flow where saturated soil at the foot of a slope receives additional moisture from the slope above.

Only one required.

(b) With the use of diagrams, describe and explain the landforms produced by river floods. [8]

As floods represent an over-bank-full condition, the landforms are located outside of the normal channel. They are represented by levees, successive accumulations of silt along the channel edges deposited where the current slows due to friction. The flood plain itself is a relatively flat area where silt from the flooded river accumulates. They are usually found in the lower courses of rivers and delimited by bluffs. Much of this can be illustrated by good labelled diagrams.

(c) How can hydrographs help the study of flows in a catchment area? [10]

There are two sorts of hydrographs - storm and annual. Many, I suspect, will limit themselves to storm hydrographs, which is acceptable, if well done for all of the marks. Hydrographs show river discharge over time and hence give an indication of the general period of response of a stream to rainfall events. Lag time indicates how quickly the precipitation is reaching the river channel. They also allow an estimate to be made of the balance between quickflow (mainly derived from run off) as against base flow. The steepness of the rising and recession limbs also indicates the speed at which precipitation is reaching the river and being discharged by it. Annual hydrographs give an overall indication of the river regime throughout the year.

Candidates will probably

L3 8–10 identify component parts of the hydrograph and indicate their significance. They may realise that the hydrograph offers no explanation as to why these flows are occurring.

L2 5–7 show a good appreciation of the hydrograph but be less well developed on what the different elements indicate.

L1 0–4 get little further than discharge curves and lag time.

[Total: 25]

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Atmosphere and weather

7 (a) (i) Define the terms *evaporation* and *condensation*. [4]

Evaporation is the process by which liquid is changed into a gas by molecular transfer e.g. water into water vapour.

Condensation is the process by which vapour (gas) changes into a liquid or solid form e.g. water vapour into water.

(ii) Give *three* conditions help the operation of evaporation. [3]

High insolation, dry air, high wind speed, bare ground or large water source.
Any three.

(b) With the help of diagrams, explain how clouds and rainfall are produced. [8]

Air rises due to convection heating or orographic uplift and cools adiabatically (at DALR) until dew point is reached when condensation takes place. Condensation around hygroscopic nuclei produces cloud. Continued rise at the SALR can give some depth of cloud such that collision of particles takes place in updraughts giving rise to raindrops which fall when they become too heavy to be supported within the cloud.

(c) Why do urban areas often experience warmer, wetter conditions and more fog than surrounding rural areas? [10]

Urban areas are warmer due to the urban heat island effect. That is, buildings, concrete, tarmac etc. absorb radiation more readily than vegetation and store it such that heat is released at night, giving rise to higher temperatures. The addition of anthropogenic derived heat in urban areas also adds to the temperature differences. The higher urban temperatures leads to more convection which when added to the greater incidence of hygroscopic nuclei allows for more cloud cover and rainfall. Fogs (or more accurately smogs) are more common due to the increased amount of atmospheric pollution.

Candidates will probably

- L3 8–10** demonstrate a good understanding of the urban heat island and its subsequent impact upon cloud and rain development. Contrasts made with rural areas.
- L2 5–7** see urban heat island more as the result of industrial activity and pollution. Rainfall also seen as an element of pollution (i.e. hygroscopic nuclei), as will fogs. Little appreciation of rural contrast.
- L1 0–4** have a very hazy grasp of the causes of urban heat islands and largely seen as due to atmospheric pollution (e.g. car exhausts etc).

[Total: 25]

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Rocks and weathering

8 (a) (i) Define the terms *hydration* and *solution* as they apply to weathering. [4]

Hydration is a mechanical weathering process whereby water is added to a mineral causing it to expand and swell.

Solution is a chemical process whereby minerals are dissolved in water- could be expressed as the final stages of carbonation where calcium bicarbonate is dissolved in acidulated water.

(ii) Explain the process of chelation. [3]

Chelation occurs when water passing through organic matter can become an organic or humic acid which can combine with metallic elements in rocks or soil to form a chelate.

(b) With the aid of diagrams, show how the processes of flow and slide can affect slopes. [8]

Flows are the movement downhill of earth or other materials that have a high water content and are subject to internal deformation. They can be represented by earth or mud flows and should be seen diagrammatically as slopes with triangular shapes slippages with large toes. Slides are movements along well defined planes such as bedding planes or geological unconformities. They are not characterized by internal deformation. Diagrammatically they can very be represented by land slides or rock slides.

(c) How can a Peltier diagram help in understanding the relationship between weathering and climate? [10]

A Peltier diagram shows the ranges of different weathering types as plotted against temperature and rainfall. Thus it gives a broad picture of the climatic range of mechanical (physical) and chemical weathering. This is expressed as strong, moderate or weak chemical or mechanical weathering. Thus strong chemical weathering will exist in areas with abundant rainfall and high temperatures strong mechanical weathering will exist where there are diurnal fluctuations across zero degrees and sufficient moisture to allow freeze thaw. Where there is little moisture and very low temperatures little weathering takes place. Although the diagram gives an indication of the chemical or mechanical nature of the weathering it does not indicate the particular processes taking place, as no account is taken of factors other than temperature and precipitation (e.g. rock type and structure, vegetation etc).

Candidates will probably

- L3 8–10** be able to produce some outline of a Peltier diagram and express good grasp of its parameters.
- L2 5–7** show a grasp of the principles of a Peltier diagram, although probably only able to identify extremes (i.e. strong chemical and strong physical)
- L1 0–4** show some awareness of a relationship between climate and weathering but may not extend beyond freeze thaw.

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Section C: The Human Core

Population change

9 (a) Fig. 6 shows projections for China's population based on different fertility rates.

(i) Give the meaning of the term *fertility rate*. [3]

This may be expressed as an individual rate,

the average (1) number of children (1) each woman in a population bears (1)

or as a general rate,

the number of births in a year (1) per 1000 women **or** as a % (1) of childbearing age, 15–49 (or similar) (1)

(ii) Describe how the different fertility rates shown in Fig. 6 might affect the size of China's population. [4]

The key is to recognise different outcomes, ranging from strong growth (2.4), past stability at 2.2 (replacement level) to eventual significant population decline. Candidates may characterise these into three groups: growth (2.4 and 2.3); stability or equilibrium (2.2); and decrease (2.1 and 2.0).

(b) How do *economic* factors help to explain why many *MEDCs* experience low fertility rates? [8]

Candidates may recognise that **economic** factors work at different scales: e.g. individuals; families and households; communities; nationally. The main elements of a response are likely to be the recognition of high costs of living and the effects of female employment and career structures in **MEDCs**. For example, many women of childbearing age work full-time and delay motherhood. Costs of child-raising are high and so couples limit their family size to afford it or to give the child/ren a 'better' upbringing. Higher quality responses may recognise explicitly that **economic** factors do only **help to explain** and that there is more to low fertility, e.g. societal norms, values, widespread use of contraception, reported decline in male fertility etc.

(c) Assess the success of *one* country's attempts to reduce the birth rate. [10]

Candidates will probably

- L3 8–10** provide an effective assessment, offer detailed exemplar support from the chosen country and structure the response well.
- L2 5–7** make a reasonable attempt which may contain good points, but lack the country knowledge to make a fuller response. The assessment is valid but may be brief and limited after a description of attempts made.
- L1 0–4** offer only a few basic ideas, struggle to deal with the issue, make little or no assessment. Notes and fragmentary responses remain in this level.

[Total: 25]

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Population change / Settlement dynamics

10 (a) With the help of examples, explain why migration may occur from *urban* to *rural* areas. [7]

Candidates do well to build up a number of circumstances, these may be seen as positive (a choice for good reasons) and negative (because of trouble) or characterised by type e.g. return migration, step migration, retirement, government relocation, voluntary/involuntary, etc.

Suggest that a full answer develops at least two explanations or situations well, using examples, or deals with more in less detail. For a general account with no effective examples, **max. 5**.

(b) Describe and explain the social and economic links which *rural* migrants living in *urban* areas may have with the *rural* areas from which they came. [8]

A sense of the variety of **links** is highly creditable.

social e.g. 'home'; family ties; where spouse and children live; making visits; for holidays; attending events; receiving news; helping prospective migrants with information; escaping difficulties, etc.

economic e.g. paying off debts; small business links; remittances; buying land; building a house; meeting family expenses, e.g. the elderly.

Mark on merit, accepting any context and looking for a sense of contemporary reality. Suggest that description and explanation are taken together.

(c) To what extent do you agree that information about the destination has only a small role in decision-making about *rural* to *urban* migration? [10]

Studies have shown that few migrants try to find out much about destinations or prospects and that the media, friends, perception, etc. are more powerful in informing the decision-making process. Actual information e.g. about hardship or cost may be discounted or ignored if the heart and hopes are set on the 'streets paved with gold'.

Forced migration, e.g. to flee civil war or famine, may be included as a special case.

Candidates will probably

L3 8–10 make a good assessment of the role of information and other factors in decision-making about rural-urban migration. Impress by overall perspective, recognition of the process's complexity and/or exemplar support.

L2 5–7 provide a sound response, which may be good in parts, but which is limited through restricted understanding of what is involved in migration decision-making, generality and/or the quality of the assessment made.

L1 0–4 make an answer which is descriptive in character and which offers little or no assessment. Lack the knowledge (or time?) to make more than a basic or simplistic response.

[Total: 25]

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Settlement dynamics

11 Choose *one* case study of squatter settlement (a shanty town or towns) in an LEDC.

The question is phrased to allow candidates to use the case study they have.

(a) Describe briefly the environmental and social characteristics of your chosen example. [7]

For **environmental** anticipate quality of land, nature of housing, pollution, water supply, sanitation, etc. Accept locational information on merit. For **social** expect material touching **characteristics** such as the population, family, community, provision of services e.g. education and healthcare, crime, violence/gangs, etc.

Suggest **max. 5** for either one.

(b) Describe and explain recent attempts to improve the quality of life in the squatter settlement you have chosen. [8]

The phrase **quality of life** is permissive and allows candidates to cover anything from house materials and infrastructure improvements to community groups, education projects and healthcare initiatives. For the command **describe** credit well detail (what, where, when, by whom), **explain** covers why and how, including how the attempt was funded, if known.

(c) Assess the extent to which it is true that attempts such as you described in (b) might solve some problems whilst creating others. [10]

A little bit more than 'success'. If candidates have read the question carefully and planned their response and the selection of material, it should be possible to answer **(c)** without repeating material from **(b)**.

Most **attempts** are likely to have achieved something whilst being inadequate and/or problematic, even divisive. Candidates often point out that improvements to such areas stimulate further migration and thus work to increase needs and compromise the quality of life.

Candidates will probably

- L3 8–10** structure their response well, demonstrate good assessment skills and use the case study effectively. Show good understanding of outcomes, both planned and unforeseen.
- L2 5–7** provide a sound response of moderate to good quality. The assessment may be 'tacked on' to a piece descriptive of the problems solved and created. May take a narrow view, perhaps considering one dimension (social, economic, environmental or political).
- L1 0–4** struggle to respond, either through lack of knowledge (case study material), understanding of outcomes, or skills in, and the language of, assessment. May offer a few basic observations, fragments or notes.

[Total: 25]