

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

**MARK SCHEME for the October/November 2011 question paper
for the guidance of teachers**

9696 GEOGRAPHY

9696/13

Paper 1 (Core Geography), maximum raw mark 100

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Section A

Hydrology and fluvial geomorphology

1 Fig. 1 shows the Hjulstrom Curve.

(a) Which size of particle (mm) is eroded at 10cm/sec velocity?

0.5mm [1]

(b) Which size of particle (mm) is deposited at 100cm/sec velocity?

10mm [1]

(c) Briefly explain the erosion of different types of material.

High velocities are required to move the heavier particles of gravel. Clay particles require a high velocity because they are very cohesive – high velocities are needed to separate and entrain individual clay particles. Sand is less cohesive than clay and lighter than gravel and so is easier to erode. [4]

(d) Describe how deposition can vary along a river channel.

During times of flood, river velocities are higher and there is more erosion and transport. As flood waters recede, deposition increases. In the upper course of a river, mean velocity is low (due to high amounts of friction) so there is limited erosion apart from times of flood. Deposition might occur behind large boulders in slack water lower down the river, the river is generally wider and deeper, so there is less friction. Consequently, average velocities increase as does the potential for erosion and transport. Deposition increases when the speed of the river is reduced – as for example when it enters a lake or behind a dam. Credit riffles and point bars and deposition in deltas etc. [4]

Atmosphere and weather

2 Fig. 2 shows major pressure and wind systems at the earth's surface in January and July.

(a) (i) Describe one similarity in the location of high pressure areas in January and July.

The similarity is the persistence of the sub-tropical highs around the Tropic of Capricorn. [2]

(ii) Describe one difference in the location of high pressure areas in January and July.

The differences are most noticeable in the northern hemisphere where January highs over Asia and N. America become low pressure, i.e. the high pressure is over the oceans in July. [2]

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- (b) Briefly explain the development of the high and low pressure areas and how they influence the pattern of winds.

The systems of pressure develop in response to heating of the earth's surface and atmosphere. Heating at the equator leads to surface warming of air which rises, giving rise to low pressure. The rising air ends in the tropics, giving rise to low pressure. The pattern is disturbed by the distribution of land and sea and the seasons. The land masses heat in summer and cool in winter, giving rise to low and high pressure. Winds blow from high to low, deflected by the earth's Coriolis force. Seasonal change in pressure can lead to wind reversal as in the monsoons. Some credit for local contrasts. [6]

Rocks and weathering

- 3 Fig. 3 shows a classification of types of mass movement according to water content and velocity.

- (a) Give the range of velocities and the water content that are associated with:

- (i) solifluction,

Velocity 0.1mm per year to 1mm per day, high water content. [2]

- (ii) rock slides.

1m per day to 10m per sec, low water content. [2]

- (b) Explain how the nature and conditions under which mud flow occurs is different from those of soil creep.

Mud flow is very fast (1cm per sec to 10 per sec) with high water content. Soil creep is slow: 0.1mm per year to between 1cm per year and 1mm per day. Soil creep also has much lower water content. Mud flows occur on slopes that have lost stability due to increased water content leading to higher pore pressure or a triggering event such as volcanic eruption. They are characterised by long distance flows with marked toes and scars and contortion of materials. Soil creep is due to gravity and heave (particles are lifted at right angles due to frost or water). [6]

Population

- 4 Table 1 shows the population structure of two countries.

- (a) Compare the population structures of the two countries in Table 1.

In both cases it is 48.3% in the working age group, but Ethiopia has a much higher % of under 16s (young population), while Hungary has a much higher % of over 60s (aging population). Figures must be quoted to support the description for maximum marks. Some detailed comparison is needed for maximum marks. [4]

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(b) Explain why the dependency ratio may be misleading in its implications for a LEDC.

The two ratios are identical, but are made up differently. Ethiopia has a young population and Hungary an ageing population.

LEDCs do not fit the MEDC model of not working until 16 and retiring at 60/65, so are not all dependent. Many young people work in LEDCs from an early age often in poorly paid or unpaid work, and few LEDCs can afford pensions so older people work on until they no longer can. (3)

Also there is a different make-up of the non-dependent population – not all work (there are fewer paid female workers in LEDCs) or they may work in the black economy that generates no tax revenue to support the dependents. [6]

Migration

5 Fig. 4 shows the origin of European migrants living in Switzerland in 2000.

(a) Name the country which was the origin of most migrants to Switzerland between 1970 and 2000.

Former Yugoslavia

[1]

(b) Describe the pattern of migration to Switzerland from within Europe.

Two main patterns are shown:

- large numbers of migrants from nearby countries: Italy, Germany
- also large numbers from southern Europe, particularly former Yugoslavia, Portugal, Turkey (and Italy).

There are remarkably few from near neighbour Austria or from northern Europe.

Quote approximate figures in support. If simply going round from high to low – maximum 2 marks. The argument that there is no pattern can be credited. [4]

(c) More than 20% of the people living in Switzerland are migrants. What benefits and problems might a large migrant population have for countries such as Switzerland?

Needs both benefits and problems to be covered for maximum marks, so 3:2 or 2:3.

Possible benefits:

- labour force
- increased output from 'young' labour force
- cultural benefits: food, music
- tax revenue

Possible problems:

- perceived loss of jobs to foreign labour
- pressures on schools/health service
- outflow of currency from migrants to family back home
- racial tensions

[5]

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Settlement dynamics

6 Fig. 5 shows the urban and rural populations of LEDCs and MEDCs between 1970 and 2030.

(a) State the urban population in LEDCs in 2010.

2.4/2.5 billion [1]

(b) Compare the predicted trends in the rural populations in LEDCs and MEDCs after 2005. Support your response with data from Fig. 5.

Comparisons should comprise both trend and level/numbers.

In LEDCs the trend is gently curved; rural population increases slightly to 2015 and then begins to decrease slightly, whereas in MEDCs it is predicted to fall steadily throughout the period.

In LEDCs the rural population is much higher than in MEDCs: starts at 3 billion, rises to approx. 3.1 billion in 2015 and then falls back to 2.8 billion by 2030. In MEDCs, by contrast, it decreases from approx. 0.3 to 0.2 billion.

Maximum 2 if no data. [3]

(c) Explain the rapid growth in urban population in LEDCs.

Marks are for explanation; there are none for description.

Candidates should integrate their knowledge and understanding of the Human Core, combining the following elements:

- urban growth, the progressive concentration of population into urban settlements, linked to economic development, with rural-urban migration the main element.
- population growth due to high or comparatively high rates of natural increase. High NIR is accentuated by the population structure of urban areas which is dominated by adults of reproductive age and their children (creating population momentum).

Suggest credit either element to **max. 4**, so that both are needed for a full answer but candidates can develop the explanation in the way they choose. [6]

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Section B

The Physical Core

Hydrology and fluvial geomorphology

7 (a) (i) Define the fluvial terms *abrasion* and *hydraulic action*.

Abrasion is the erosion of the channel banks and bottom by coarse and angular fragments of hard rock. This may produce pot holes.

Hydraulic action is the sheer hydraulic power exerted by rapid river flow which may lead to the fragmentation of bedrock where joints or bedding planes are exploited. The creation of air pressure in joints etc. is acceptable. [4]

(ii) Briefly describe how attrition can affect the load carried by a river.

Particles carried by the river are gradually reduced in size, and become rounder, as they impact upon one another leading to a progressive comminution of load. [3]

(b) Using diagrams, describe and explain the formation of the landforms found in a meandering river channel. [8]

Landforms within the meandering channel would include the asymmetrical shape of the channel, point bars and river cliffs as well as pool and riffle sequences. The actual meander bend may be included but is not necessary for all of the marks. Oxbow lakes can be given a little credit but the answers need the other features. Descriptions could be accomplished by well annotated diagrams, i.e. the undercut river cliff on the outside meander bend, the sand and gravel deposit of the point bar, shallow gravel areas of riffles and deeper areas of pools. Explanation should be in terms of the swinging of the thalweg induced by pool and riffle sequences and the development of helicoidal flow.

(c) To what extent can human activities influence the causes and effects of floods and low flows in river channels? [10]

The causes of both high and low levels of flow are essentially due to variations in precipitation, although they can be exacerbated by human activities such as abstraction in the case of low flow or catchment changes leading to quick flow in the case of flooding. The effects can most readily be ameliorated by controlling discharge through the construction of dams, whereby water is released from reservoirs in periods of low flow and stored in periods of high flow. No doubt other flood reduction methods will be described (artificial levees, diversion, channel straightening, etc). No higher than Level 2 if no mention of low flows. [10]

Level 3

Answers will provide some balance between high and low flow, with some indication of the limited impact upon causes. There needs to be assessment of 'to what extent'. [8–10]

Level 2

Will mainly concentrate upon limiting the effects of flooding but will have some material on causes. To what extent will probably be limited. Causes will mainly be about human activities. There should be some mention of high precipitation amounts. [5–7]

Level 1

Floods and their effects produced solely by human activities. There will probably be no mention of precipitation input or low flows. [0–4]

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Atmosphere and weather

8 (a) (i) Describe two factors that influence the rate of evaporation from a water surface.

The main factors are wind speed, temperature and relative humidity. Two factors, well described, are needed for full marks. [4]

(ii) How does dew form?

Radiation cooling of surfaces at night leads to condensation on receptive surfaces. [3]

(b) With the aid of a diagram, explain the day-time energy budget.

The main components are incoming short wave solar radiation, reflected solar radiation, energy absorbed into the surface and subsurface, sensible heat transfer, long wave earth radiation, and latent heat transfer – evaporation. There is a need to be flexible in allocating marks. A well annotated diagram can obtain good marks. Maximum 5 if no diagram. [8]

(c) Describe and explain possible climatic changes as a result of global warming.

A wide range of answers are possible here. Increased temperature might lead to increased evaporation and precipitation. Increased storminess in some areas and drought in others as global circulation is affected. None of this is certain, so mark according to logic of the argument. Sea-level rise is not acceptable. [10]

Level 3

Clear recognition of the complexity of possible climatic changes. Rather more is needed than just temperature increases. Some recognition of the possible changes in global atmospheric circulation and the effects in different parts of the world. [8–10]

Level 2

Only a partial analysis perhaps spatially limited. Some difficulty in advancing coherent arguments. [5–7]

Level 1

Little idea of the nature and scale of possible changes. Will probably feel obliged to mention sea level rise without any reference to climate. [0–4]

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Rocks and weathering

9 (a) (i) Define the terms *spheroidal weathering* and *humic acid*.

Spheroidal weathering is the rounding of rocks by chemical weathering at depth (hydrolysis).

Humic acids are produced by plant decay particularly in tropical environments where they attack rock minerals through chelation. [4]

(ii) Describe how crystal growth (salt) weathering occurs.

The presence of salt solutions within rocks allows the growth of salt crystals beneath the rock surface due to evaporation caused by high temperatures. It generally results in surface scaling. [3]

(b) Explain the operation of hydrolysis and carbonation and describe how climate affects these processes.

Hydrolysis is the chemical reaction between water and a mineral (the H and OH ions of water with ions of the mineral leading to decomposition, e.g. the breakdown of feldspar in granite. Carbonation is the attack of acidulated water (CO₂) upon rocks containing calcium carbonate leading to solution of calcium bicarbonate. Both processes are accelerated in hot and wet conditions with abundant vegetation to supply humic acids. Carbonation may be increased in cold climates due to increased solubility of CO₂. [8]

(c) Explain the tectonic processes that operate at divergent and convergent plate boundaries. Describe two landforms that develop at either of these plate boundaries.

Convection currents in the mantle allow the divergence of plates. These are usually oceanic plates, thus divergent boundaries are found in mid ocean locations. The upwelling of magma leads to the formation of prominent ridges and to sea floor spreading, characterised by magnetic striping. The ridges are characterised by transform faults and are associated with volcanicity either underwater or on land in cases such as Iceland. The boundaries represent the creation of new material at the earth's surface. Rifting is acceptable but not necessary.

Convergent plate boundaries involve subduction of the oceanic crust creating deep sea trenches, fold mountains, volcanoes and island arcs. Much can be achieved by the use of appropriately annotated diagrams. [10]

Level 3

Clear explanation of the tectonic processes linked to the landforms. Processes should include the role of convection currents. Fold mountains should be linked to the folding of sediments and not simply the folding of the plates. [8–10]

Level 2

An awareness of the nature of divergent and convergent margins but unclear as to both process and the production of landforms. [5–7]

Level 1

Only a basic outline of divergence and convergence with little explanation or illustration of landforms. Types of plates and which subducts may be confused. [0–4]

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Section C

The Human Core

Population

10 (a) (i) Give the meaning of the term *life expectancy*.

The average number of years from birth that an individual is expected to live. [3]

(ii) Describe two factors that can affect life expectancy.

Large number of possible factors such as diet, health care, sanitation/water supply, income, level of education, etc. [4]

(b) Describe and explain the relationship between population growth and development in the demographic transition.

Candidates should *describe* and *explain* the relationship.

Many candidates will refer to the DTM, which attempts to relate population change to economic development. Modernisation of the economy leads to less need/desire for children, change from agricultural based economies to industrial, changing role of women, etc. The link to development is needed for full marks. Maximum 6 marks if solely the DTM. [8]

(c) Assess the extent to which a country's attempt to control its population can create problems as well as solve them.

This question looks at assessing the success of a population policy, in terms of the pros and cons, and in effect, was the policy worth it? The majority are most likely to use Chinese One Child Policy or Singapore's 'Stop at 2', etc. The key is not a comprehensive description of how the policy was carried out, but rather an evaluation of the impact of the policy. For example, the Chinese policy was seen as part of their drive to prosperity and to avoid famine, and was successful in that it halved the birth rate between 1970 and 1979, so it did solve problems as economic prosperity has followed (for some). The problems this policy created are well documented and must be discussed, e.g. female infanticide leading to imbalance of males/females, forced sterilisation, resentment, difference between rural and urban areas. Did the positives outweigh the negatives? [10]

Level 3

A well balanced assessment of a population policy, illustrating good knowledge of the detail, and possibly uses more than one example. Indications of quality would be a sound conclusion that evaluates the pros and cons of the policy. [8–10]

Level 2

A sound response that uses exemplar material. There will be some attempt to look at the pros and cons of the policy, possibly a little unbalanced in terms of description of the policy, rather than evaluation. May be limited by emphasis on either positives or negatives. [5–7]

Level 1

Basic/partial description of a population policy, little/no exemplar material. Probably no evaluation or reference to problems/solutions. [0–4]

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Migration

11 (a) (i) Explain the terms *voluntary* and *forced (involuntary)* migration.

Voluntary the personal choice of the migrant(s) to move 1

Forced the migrant has to move as a result of circumstances, with (little or) no choice. The circumstances may be social, e.g. tribal conflict; political, e.g. war; or environmental, e.g. evacuation from a natural hazard. 2 [3]

(ii) Describe briefly one example of forced migration.

Any example is acceptable. Please do not credit economic migration where the need for jobs or money 'forces' people to move, as this is not a robust interpretation of forced migration.

Descriptions may include who, why, where, when, how many, etc. [4]

(b) Explain the role of push factors and pull factors in migration decision-making.

Push factors operate in the source area (origin) and promote emigration, literally pushing people away. Pull factors operate in the receiving area (destination) promoting immigration, attracting people to move there. Factors may be social, economic, political and environmental; short term or longer term; perceived or actual. Migration decision-making is complex and depends on information, character type, risk-taking, individual/group behaviour, etc.

Credit understanding of migration decision-making and support. [8]

(c) 'Most migrants are young, male and jobless.' How far do you agree? [10]

The character of migrants varies with the character of migration. In international migration the 'young, male and jobless' label is valid, but all migration streams are diverse. Any examples can be used to support or refute the case; clearly much depends on those chosen and comprehensive responses are not expected. The contrast between LEDCs and MEDCs would indicate a better answer.

Candidates will probably:

Level 3

Examine a number of migrations to provide an assessment which is good quality, strong conceptually and well supported by examples. [8–10]

Level 2

Provide a sound response which may be good in parts, but which is limited as an assessment by lack of overall context or detail. [5–7]

Level 1

Offer a basic response, with little or no assessment, showing a little knowledge of migrants' characteristics. Fragmentary or note-form responses remain in this level. [0–4]

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Settlement dynamics

- 12 (a) With reference to one or more urban areas, describe changes in the Central Business District (CBD).**

The syllabus covers the changing CBD without detailing what changes should be studied. The syllabus also limits the time as from 1970. As such, any changes are creditable from transport, such as pedestrianisation; to retail, e.g. Birmingham's Bull Ring; from heritage conservation, e.g. the Singapore River, to iconic buildings, e.g. New York. Many answers will focus on retail changes as a result of competition from out of town shopping centres in MEDCs. Population changes with the reversal of the move away from central cities in MEDCs may also figure. Increased development in LEDCs in terms of high rise buildings replacing traditional, with increases in retail and service industries also likely. [7]

- (b) The UN estimates that one in three of the world's urban population lives in a slum, shanty town or squatter settlement.**

Suggest reasons why so many people in towns and cities do not live in permanent housing.

Credit any valid reason, social, economic, demographic, political, such as:

- as urban populations grow (by migration and natural increase) demand for housing outstrips supply of housing (public and private).
- many urban dwellers are poor and unemployed or work in the informal sector without regular income. Housing costs are greater than they can afford to rent or buy, or build for themselves.
- provision of public housing by national government or municipal authority is limited and may be corruptly administered.
- private housing and the property market operate to exclude some groups.
- many urban residents in LEDCs arrived as migrants escaping difficulty, so built their own shelters with materials that were easily available.
- communities develop in informal housing, attracting new arrivals and encouraging others to stay by what they offer, e.g. support.

Mark on range, breadth and depth.

[8]

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- (c) 'The location of manufacturing within urban areas changes as accessibility changes.'
How far do you agree?

The syllabus focus is on how locations for manufacturing change over time. Any position may be taken, developed and supported with example(s). The elements to look for are changes to source materials, workers and markets. The emphasis is on changes 'within urban areas'. Thus relocation to out of town locations is not relevant. The use of brownfield sites would indicate a clear understanding of the question. **[10]**

Candidates will probably:

Level 3

Develop a good assessment, giving exemplar detail of changing urban manufacturing. Show firm conceptual grasp of accessibility. **[8–10]**

Level 2

Make a satisfactory but limited response, which may be rather general. The assessment may be broad or lack support. **[5–7]**

Level 1

Make one or more basic points in a response which is more a description than an assessment. Will struggle with exemplars. **[0–4]**