

MARK SCHEME for the October/November 2006 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 instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began.

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.

The grade thresholds for various grades are published in the report on the examination for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level syllabuses.

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Section A

Hydrology and fluvial geomorphology

1. Fig. 1 shows the hydrological cycle of a small river basin.

(a) Define the term hydrological cycle as it applies to a small river basin. (2)

The cycle of water movement through the earth – atmosphere system in a river basin that is input by precipitation throughput via flows and stores and output by evapotranspiration etc.

(b) Identify and briefly describe two stores shown on Fig. 1. (4)

Stores could be: interception store i.e. water that is retained by vegetation on leaves, stems trunks etc.; surface store – water held on the surface in the form of puddles, lakes etc. above impermeable surface; soil store – water retained within the interstices of the soil; groundwater store – water that has percolated and is held in rocks below top of water table. Any two.

(c) Explain how throughflow and groundwater flow (base flow) occur. (4)

Throughflow is water that has infiltrated the surface and is retained in the soil. It flows laterally through the soil via percolines.

Groundwater flow is water that has infiltrated and percolated into bed rock that then moves laterally under gravity or hydrostatic pressure to river channels.

Total 10

Atmosphere and weather

2. Fig. 2 shows, for various weather elements, the differences between a large urban area and a nearby rural area. The differences are shown as positive and negative percentage variations.

(a) Identify the weather elements that show (i) the largest percentage difference and (ii) the lowest percentage difference. (2)

- (i) Winter fog
- (ii) Winter mean relative humidity

(b) Describe and explain the differences in precipitation shown between urban and rural areas. (4)

Annual ppt shows a small increase due to heat island effects allowing more convection hence rainfall. The addition of more hygroscopic nuclei can also contribute to the production of more rain days which show a greater percentage increase than annual ppt. Snow is far less common in percentage terms due to the higher temperatures which may result in rainfall instead (hence rain days).

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- (c) Describe and explain the differences in temperature shown between urban and rural areas. (4)

Percentage temperature increase is greatest in winter but also impacts upon the annual mean. This is due to the urban heat island effect, whereby urban surfaces absorb radiation more readily than vegetation and re-radiate it at night, raising temperatures. Limited credit for industrial/human heat generation.

Total 10

Rocks and weathering

- 3 Fig. 3 shows the relationship between annual temperatures and annual precipitation with rates of chemical and physical weathering.**

- (a) Name the weathering that is shown on Fig. 3 where:
(i) mean annual temperature is 0 °C and annual rainfall is 50 cms. (1)

Slight physical

- (ii) mean annual temperature is 20 °C and annual rainfall is 100 cms. (1)

Moderate chemical

- (b) Name and describe one of the weathering processes that occurs in areas of strong physical weathering. (4)

As strong physical weathering is shown as occurring where average annual temperatures are below freezing the obvious process is that of freeze thaw. This does require the fluctuation of temperatures above freezing to allow for the freezing and thawing to occur in joints and cracks. Precipitation is also required to supply water.

- (c) Explain how temperature and rainfall conditions can result in strong chemical weathering. (4)

Strong chemical weathering occurs where temperatures are high (28 °C) and there is plentiful rainfall (over 150 cms) Rates of chemical weathering are enhanced by higher temperatures and water is required for the operation of chemical processes (Van't Hoff's rule). Many may use a chemical weathering process to illustrate this i.e. carbonation, oxidation, hydrolysis, chelation, solution

Total 10

Population change

- 4 Fig. 4 shows variations in life expectancy for different world regions in 2000. Life expectancy is the average number of years from birth that a person is expected to live.**

- (a) Name the region which had the greatest variation in life expectancy among its countries, supporting your answer with information from Fig. 4. (2)

Sub-Saharan Africa 1

longest line or LE varies from 33/34 to 76 years approx. 1

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- (b) Compare the variation in life expectancy in Central America with the variation in life expectancy in Western Europe shown in Fig. 4. (3)

The same overall variation (length of line, approx. 12 years) (reserve 1)

credit a difference or differences 2,
e.g. CA median 70 but W Europe 78
accept W Europe consists of MEDCs, CA of LEDCs
other

- (c) Using located examples, explain two different ways to increase life expectancy in LEDCs. (5)

Any **two** ways acceptable, as long as they are different, and may be government, NGO or other-organised. Strategies relate to issues which include,

- quantity and quality of water supply
- shelter
- sanitation
- personal hygiene
- eradication of killer diseases
- immunisation
- HIV/AIDS strategies
- provision of clinics/hospitals, healthcare workers
- maternity and neo-natal care
- improvements in quantity, quality and nutritional value of food supply
- literacy and education (if applied to longevity)
- tackling poverty or similar holistic view, if applied
- other

Credit the ways **2/3** and **3/2**. Indicators of quality may be the level of detail of both the attempt or project and the location of 'e.g. Africa'.

Total 10

Settlement dynamics

- 5 Fig. 5 shows a model of counterurbanisation in which population is picked up from the city and set down in the surrounding area.

- (a) According to Fig. 5, from which zone is pick up the weakest and in which zone is set down the strongest? (2)

the urban fringe (zone 3) 1 the rural area (zone 6) 1

- (b) Why might set down and new settlement in zone 4 be limited? (3)

For the recognition that it's a greenbelt 1

A greenbelt is land encircling a town or city which is designated by planners, in which building is restricted and where land is conserved for agriculture and recreation. 2

If the concept is not known and other factors are appealed to e.g. land may not be as attractive or as cheap as further away from the city **max. 2**

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- (c) With reference to a city which is experiencing counterurbanisation, suggest reasons why many residents wish to leave the urban area. (5)

Suggest credit **reasons** relating to the city **3-5** and to the surrounding area **2-0**, as an answer focussing on the city's negative externalities, economic decentralisation etc. would be fully sufficient.

Good marks **4-5** should be kept for answers with good city detail.
Allow unusual and country-specific reasons e.g. relating to LEDC security.

Total: 10

Section B

Hydrology and fluvial geomorphology

- 6 (a) (i) Define the terms *traction* and *saltation* as they apply to transportation within a river channel. (4)

Traction is the action of a current in a river moving heavier sediments (e.g. pebbles) by rolling or pushing along the bed of the stream.

Saltation moves lighter material by bouncing along the stream bed i.e. material is partially entrained and then dropped by the current disturbing other sediment

Both could be effectively shown by annotated diagrams.

- (ii) Describe helicoidal flow within a river channel. (3)

Helicoidal flow is the corkscrew-like flow that occurs in meandering channels. The flow moves across the surface from the inside bank to the outside where it descends and returns. Could be effectively shown by a diagram.

- (b) With the use of a diagram or diagrams, explain the development of a braided channel. (8)

A braided channel is one characterised by shingle bars and alluvial islands giving rise to diverging channels. The rivers are generally shallow and broad. Some alluvial bars are temporary and others more established with vegetation. They are produced in circumstances where there are large changes in discharge and the sediment lacks coherence.

- (c) Describe the main features of river flood plains and explain why flood plains may present problems for human settlements. (10)

Flood plains are low lying areas of sediment developed on either side of the channel. They are often circumscribed by bluffs and levees. They are areas characterised by frequent flooding as excess discharge debouches into the flood plain. This gives rise to the rich sediments and the development of levees. They are both attractive and dangerous for human settlement because of their proneness to flooding (e.g. Bangladesh). The settlements themselves can contribute to the problem by disturbing ground and surface flows within the flood plains.

For good marks there must be some appreciation of the nature of flood plains (best illustrated by a diagram (8-10). Moderate answers will make some attempt to detail the features as well as the problems of flooding (4-7). Poor answers will merely deal with flooding (0-3).

Total 25

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Atmosphere and weather

- 7 (a) (i) Define the terms *incoming solar radiation* and *terrestrial (earth) radiation*.** (4)

Incoming radiation is radiation derived from the sun that enters the earth's atmosphere in the form of short wave radiation.

Terrestrial radiation is the long wave radiation that is transmitted from the earth's surface after the heating by solar radiation.

- (ii) Describe the formation of dew.** (3)

Dew is the condensation of water vapour on the earth's surface due to radiant cooling at night.

- (b) Explain why some parts of the earth receive more solar radiation than others.** (8)

The amount of solar radiation received on the outer edge of the atmosphere is dependent upon the tilt of the earth and its orbit around the sun. Hence the overhead sun produces more solar radiation at the solstices over the tropics of Capricorn and Cancer (This could be shown diagrammatically). The receipt at the earth's surface is further affected by the angle of tilt giving a greater surface area to heat at the poles than the equator and by the existence of clouds in equatorial and other areas.

- (c) Explain what is meant by stability and instability within the atmosphere. Briefly describe the weather experienced under each of these conditions.** (10)

A sensible approach would be to use temperature height diagrams to show the lapse rates (elr, dalr, salr) appropriate for the conditions. Thus instability is where a rising parcel of air is warmer than surrounding air (dalr) and rises and cools to dew point temperature at which point it can continue to rise at salr. Thus air forced to rise (e.g. orographically) will continue to rise once saturation occurs. Stability is where elr is greater than dalr and salr. Weather conditions are clear and dry with stability cloud and possibly rain with instability. Good answers will show a developed grasp of lapse rates (8-10). Moderate answers will show an understanding of the cooling of air parcels relative to surrounding air (4-7). Poor answers will lack explanation and merely speculate upon weather conditions (0-3).

Total 25

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Rocks and weathering

- 8 (a) (i) Define the terms *heave* and *flow* as they apply to mass movements.**

(4)

Heave will generally be described in terms of insolation creep or freeze thaw where particles expand or are raised before falling back slightly down slope. **2**

Flow occurs where there is sufficient water content to make the individual particles fluid. **2**

- (ii) Describe the conditions under which rock fall may occur.**

(3)

Rock falls occur where cohesion is overcome and shear strength of the material is exceeded. Movement can then take place along a shear plane as slopes are steepened, or earthquakes occur.

- (b) Describe two physical factors that can affect the development of slopes. Indicate how these factors might affect the form (shape) of slopes.**

(8)

Plenty to choose from here.

- Rock type – shear strength, coherence, hardness etc.
- Structure – dip and bedding planes etc.
- Earth movements – fault scarps, earth quakes, relative levels of structural stability
- Climate – influences type and rates of weathering and transportation processes;
- Vegetation – forest will stabilise slopes through root system, its removal or replacement can destabilise slopes

Development of any two is required.

- (c) How can the theory of plate tectonics be used to explain the formation and distribution of volcanoes, ocean trenches and island arcs?**

(10)

The theory of plate tectonics should be briefly explained (i.e. tectonic plates and their margins). Volcanoes will be associated largely with convergent boundaries and subduction. The subsequent melting of crustal material will penetrate through faults etc. in the crust to form volcanoes, and in the case of oceanic plates – island arcs. Ocean trenches are also associated with the subduction of one plate beneath another. Volcanic islands can also be associated with constructive margins and the development of mid oceanic ridges. Annotated diagrams would be the obvious way of illustrating these features. Good answers will show an appreciation of plate tectonics and the nature of plate margins (8-10). Moderate answers will show some knowledge of plate margins and resultant landforms but will be less developed on process (4-7). Weak answers will merely describe volcanoes, with some reference to Pacific Ring of Fire etc. (0-3).

Total 25

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Section C: The Human Core

Population change

- 9 (a) Give the meaning of the terms *birth rate* and *fertility rate*. (7)

birth rate is the number of children/babies born (live) 1
per 1000 people *or* as a % of the total population 1
per year *or* in a given year 1

whereas - the more demanding - fertility rate is

the average 1 number of children 1
each woman 1
of child bearing age (usually 15-50) 1 will bear

- (b) Using examples, identify and explain the links between fertility rate and education. (8)

The main observed relationship is the inverse one that as education increases (years of schooling, level of schooling and educational attainment) fertility decreases. Most candidates will associate this with women but the astute may observe the link to men's education.

education seems to affect fertility in a number of ways, including,

- raising the status of and empowering women
- challenging traditional views of family size
- raising social and economic aspirations
- bringing understanding of the need for and means of birth control
- other

The examples may be generic or located.

Suggest credit **links** up to 3 marks each, such that a full answer consists of at least three developed points (comprehensiveness not needed for this modest mark allocation).

- (c) To what extent have attempts to reduce the birth rate been successful in one country you have studied? (10)

A minor classic and straightforward. China is likely but any country valid. For good reward, success should be seen both in terms of a drop in birth rate (with data support, ideally) and in some other effect (e.g. overpopulation avoided? food supply adequate? standards of living rising?).

Good assessment may bring out differentials e.g. spatial (rural/urban, regional), socio-economic (income groups, minorities) and not treat the country as uniform.

Relative success/failure is important, what didn't work well and perhaps suggesting reasons why this was the case.

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Candidates will probably:

- L3 Structure the whole answer as an assessment, cover two or more attempts in some detail, show good understanding of the issues involve and a perceptive overall perspective. **[8-10]**
- L2 Make a sound response which remains limited either because it covers only one attempt, the understanding is moderate or because the assessment is partial and perhaps "tacked on" to a descriptive core. **[5-7]**
- L1 Produce an answer which is descriptive in character and which may have little or no assessment. Show some knowledge of attempts to reduce birth rates but with little detail or produce a general response of the "e.g. Africa" sort. Fragmentary and note-form answers remain in this level. **[0-4]**

Total 25

Population change

10 Study Fig. 6 which shows possible immigration pathways.

- (a) (i) Give the meaning of the term *refugee*.** **(5)**

A person who is outside his/her country through fear of persecution and who is unable or unwilling to return **2** (from diagram an asylum-seeker granted leave to stay)

The UN definition is of a person driven out of a country by 'a well-founded fear of persecution for reasons of race, religion, nationality, membership of a particular social group or political opinion'. Natural disasters are technically excluded, suggest mark the definition tightly but allow movements caused by them in **(ii)**.

- (ii) Describe briefly one example of refugee migration you have studied.** **(2)**

Suggest who, when, where (source/destination), scale, how, why etc. Mark on impression. **5**

- (b) Using Fig. 6, describe the immigration pathways which may result in deportation by the authorities.** **(8)**

The asylum-seeker refused leave to stay. **2**

Those who are or who become illegal immigrants, who are discovered and deported (four pathways shown). Needs some detail/development. **6**

Candidates are welcome to supply examples or comment but neither is necessary if the response is careful in use of Fig. 6 and explained well. **8**

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- (c) **With the help of examples, evaluate the ways in which culture may be a barrier to the acceptance and integration of immigrants.** (10)

Assumes cultural distance (which may not exist) e.g. language, religion, food, dress, tribe, family and community life. More proximate cultures may have less problem e.g. within Europe, Francophone Africa, the Caribbean etc.

Candidates are likely to focus on the negatives e.g. intolerance and prejudice in host populations, fear, misunderstanding, invasion and succession, the development of social segregation e.g. within cities or in camps. There are however legitimate positives in countries which are already culturally diverse and where immigrants are wanted (e.g. to fill niches in labour market).

Culture may be weakened over time (in the second and third generations), by education, by marriage, upward mobility etc so integration of immigrant groups may increase.

Candidates will probably:

- L3 Develop an effective evaluation of culture, maybe recognising both its positive and negative attributes with the good use of specific examples. [8-10]
- L2 Make a useful but limited attempt, showing some knowledge of examples, some understanding of culture and offering some evaluation but without much development and/or balance. [5-7]
- L1 Show a little knowledge of immigrants and simple understanding of how culture may be a barrier. Make a response which is essentially descriptive rather than evaluative. Offer fragments or notes only. [0-4]

Total 25

Settlement dynamics

11 Choose a named rural settlement or rural area which you have studied in detail.

Permissive, straight from the syllabus, should allow use of home area, be flexible

- (a) **Describe its location and size.** (7)

A sketch map would be welcome and effective.

Ideally **location** would be where in the country it is; where in relation to other settlement; where in relation to features such as mountains, coasts, in what type of countryside or vegetation zone etc.

Scale for a single settlement may be population size, extent (spread, number of houses/huts) and for a rural area population, distance or area.

Suggest credit location **5/4** and scale **2/3**.

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- (b) Explain how two issues of its development have affected the people who live there. (8)

Again 'some of the issues of its development' is a syllabus term. Last time this was set we saw both MEDC and LEDC examples and issues of growth and decline so interpret **development** flexibly to allow candidate to use their case study.

Reward well the application of the **issues to the people who live there** which may not be how the material was taught or learned.

Credit **3/5**, **4/4** or **5/3** depending on relative strength and development.

- (c) Assess the effectiveness of the authorities' responses to the issues you identified in (b). (10)

Heavily dependent on the direction of response already, the authorities may be local, regional, national or functional e.g. water, education, Chamber of Commerce, agricultural marketing board.

A 'do nothing' response may have validity in some contexts if explained suitably. Assessment should cover what has and has not been achieved.

Candidates will probably:

- L3 Provide a perceptive assessment of both issues, which may not be fully balanced but which demonstrates detailed case knowledge and good conceptual understanding. [8-10]
- L2 Offer a sound but limited response, either covering one issue reasonably or both partially. Show understanding of some aspects of what are clearly larger issues, make a moderate assessment of effectiveness. [5-7]
- L1 Lack the knowledge, skills – or time – to make more than a few simple descriptive points. Run into difficulty by not having read the whole question first? [0-4]

Total 25