



ASSESSMENT and
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ALLIANCE

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GCE

Geography B

Unit GGB4

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Unit 4: Global Change

General guidance

It is important that every examiner marks the scripts to the same standard as the rest of the panel. All Examiners must operate the marking scheme in a similar and consistent manner, and hence they must all participate in the application of that scheme at the Standardisation Meeting. In particular they should take careful note of all decisions taken or changes made at that meeting. Examiners are allocated to a Team Leader for the period of examining, and any difficulties that arise should be discussed with that person.

The marking scheme

The marking scheme consists of two sections for each question or sub-question – the Notes for Answers and the Mark Scheme itself.

Notes for Answers (NFA)

These indicate the possible content for the various sections of the question paper. In some cases (for example short answer questions) the NFA might indicate the only response that is acceptable, but in many cases they indicate either a range of suitable responses, or an exemplar of the type of response required. Therefore in most cases, the NFA do not provide model answers, and should be regarded as such. More NFA may be added at the standardisation meeting if it is felt by the Principal Examiner that details of appropriate ways of answering the question have been omitted.

The Mark Scheme

This is provided in italics and provides the instructions to Examiners as to how they are to assess the work of candidates. The number of marks allocated within the mark scheme to a question should correspond to the number of marks for that question on the question paper.

There are two ways in which the Mark Scheme operates:

- (a) It indicates how the marks to short answer questions are to be allocated – usually to a maximum of 4 marks.
- (b) It indicates how examiners should move through the levels in a level response mark scheme – usually to all questions of 5 marks or more. Each level has a levels descriptor, with clear statements of the “triggers” to move candidates from one level to another. Each Level contains a range of marks as shown on the Mark Scheme.

A number of features have been used to distinguish between levels, for example:

- a number of characteristics, reasons, attitudes etc.
- the degree of specification, for example the use of specification case studies, or accurate detail
- responses to more than one command word, for example, describe and suggest reasons
- the degree of linkage between two aspects of the question
- the depth of understanding of a concept.

The marking process

A sample of the examiner's marked scripts will be marked again by a senior examiner according to the procedures set out by AQA. Also the scripts may be re-examined at the Awards Meetings and the subsequent Grade Review. Therefore, it is most important that examiners mark clearly according to the procedures set out below.

- All marking should be done in red.
- the right-hand margin should be used for marks only.
- The overall mark for a question must be ringed at the end of the answer.
- The total mark for the question must be transferred to the front of the script.
- The left hand margin is where an indication of the level achieved is written. Comments and codes (see below) may also be written on the left.
- Indications of the level achieved may also occur in the body of the answer if this is easier for the examiner to apply (e.g. in the marking of diagrams).
- Ticks should be used for short answer responses and Level I responses only, with one tick representing one mark (to the maximum allowed in a Levels scheme).
- Levels II, III, and IV should be indicated with a roman II, III or IV on the script, and this symbol should be used each time this Level is achieved. Examiners may wish to bracket an area of text where this level of response has been achieved.
- Once a candidate has reached Level II, additional Level I credit should be indicated using a + symbol. If these points are sufficient quality one additional mark can be awarded (assuming no further Level II points are made).
- Examiners may indicate strong Level II or III material by writing "Level II (or III) – good" in the left hand margin of the script. The examiner should ensure that this is reflected in the awarding of an appropriate number of marks at the end of the answer.
- Level III is to be used only for questions of 9 marks or more, and Level IV is to be used only for questions of 25 marks in total.

Other mechanics of marking

- Underline all errors and contradictions.
- Cross out irrelevant sections using a line from top-left to bottom right. (However be careful to check that there is no valid material, however brief, in the mass of irrelevance.)
- Indicate repeated material with "rep".
- Other useful marking codes can be used, for example, "va" for vague, "NQ" or "Not Qu." for failure to answer the question, "Irrel" for irrelevant material, and "SIF" for self-penalising material.
- Put a wavy line in the left-hand margin to indicate weak dubious material.
- If the rubric is contravened, mark all answers but count only the best mark towards the candidate's total mark for the script. Put the mark for the question on the front of the script in the usual way, but also write "RAM Rubric" on the front of the script.
- Large areas of text must not be left blank – use the wavy line or write "seen" alongside the text. All pages must have indication that they have been read, especially supplementary sheets.
- Unless indicated otherwise always mark text before marking maps and diagrams – do not give double credit for the same point made in the text and a diagram.

Quality of Language descriptors

The following descriptors concerning the quality of language must be applied to **all** questions in which candidates are required to produce extended writing. To attain full marks available at a level of response, the appropriate Quality of Language descriptor must be achieved. Use the same quality of language levels as are used in the geographical element of the mark scheme under consideration.

Three-level descriptors

- Level I**
- Style of writing is suitable for only simple subject matter.
 - Expression of only simple ideas, using a limited range of specialist terms.
 - Reasonable accuracy in the use of English.
- Level II**
- Manner of dealing with subject matter is acceptable, but could be improved.
 - Reasonable clarity and fluency of expression of ideas, using a good range of specialist terms, when appropriate.
 - Considerable accuracy in the use of English.
- Level III**
- Style of writing is appropriate to subject matter.
 - Organises relevant information and ideas clearly and coherently, using a wide range of specialist vocabulary, when appropriate.
 - Accurate in the use of English.

Two-level descriptors

- Level I**
- Manner of dealing with subject matter is acceptable, but could be improved.
 - Reasonable clarity and fluency of expression of ideas, using a good range of specialist terms, when appropriate.
 - Considerable accuracy in the use of English.
- Level II**
- Style of writing is appropriate to subject matter.
 - Organises relevant information and ideas clearly and coherently, using a wide range of specialist vocabulary, when appropriate.
 - Accurate in the use of English.

Question 1

- (a) Sub-tropical anticyclones – areas high pressure often located at latitudes 30N and 30S. They are characterised by subsiding air, which leads to dry conditions and high temperatures. They are found on the poleward side of the Hadley Cells, and represent the source area for the Trade winds which blow in an equatorward direction.

(3 marks)

Inter-tropical convergence zone – an area of low pressure caused by the convergence of the trade winds and their subsequent rise, linked to intense heating by the overhead sun. It is found on the equatorward side on the Hadley Cells. It is associated with an area of precipitation that moves north and south of the equator through the year following the apparent movement of the overhead sun.

*3 marks per term.**(3 marks)***6 marks**

- (b) (i) N.B. Only descriptions of the climate are to be credited. Such a climate is essentially transitional between Equatorial rain forests and hot deserts. Therefore, variations occur with increasing latitude, but within any location, relief and altitude produce local variations.

Rain forest margins –

ppt. Over 1000mm, one dry month, temperature ranges from 22C to 28C.

Semi-arid margin –

ppt. Under 500mm, 9/10 dry months, temperature ranges from 18C to 34C.

Seasonality and unreliability of ppt. Increases polewards.

Level I *generalised statements, simple identification of warm/hot, and wet/dry, seasons.*

(0-2 marks)

Level II *more precise detail of the characteristics, such as accurate figures. A number of different characteristics, say with latitude, are described.*

*(3-5 marks)***5 marks**

- (ii) The climate is related to the seasonal movement of the ITCZ and the descending limb of the Hadley Cell which creates the Sub-Tropical High pressure areas.

Dry Season – Sub-Tropical High moves over the desert margins of the area. The ITCZ is on the equatorial side – area affected by trade winds offshore or descending from high coastal ranges e.g. Drakensburg and high pressures (sub-tropical highs). Subsiding air gives clear skies and high day-time temperatures (sub-tropical highs). Subsiding air gives clear skies and high day-time temperature, convection is suppressed. Dry Tc air often from hot deserts (Harmattan) – very low moisture content.

Wet Season – the migration polewards of the descending limb of the Hadley Cell results in the poleward movement of the ITCZ. As it moves it brings rainfall. Uplift and convection are fed by moist unstable Tm air. Areas of the poleward limit of ITCZ are only briefly affected, thus they have only a brief wet season and low annual rainfall totals. Nearer the equator the wet season lasts whilst the ITCZ is poleward, and the area is under the influence of the Tm air mass. Maximum ppt. occurs with the passage polewards of the ITCZ and on its return, thus giving a double maximum in some areas.

Level I *only one reason/season provided, explanation is simplistic, and concentrates on one variation in the climate.* **(0-3 marks)**

Level II *a more thorough account of the climate, with a good explanation of the changes in more than one of: wind direction ppt., temperature. An examination of both seasons = level II.* **(4-8 marks)**
8 marks

- (iii) A soil moisture graph illustrates the relationship between precipitation and potential evapotranspiration for a location over the period of a year. The diagram should show (for a northern hemisphere location):

Precipitation is greater than potential evapotranspiration between June and September, whereas potential evapotranspiration is greater than precipitation between October and May.

When precipitation is greater than potential evapotranspiration, at first there is some refilling of water into the pores within the dry soil. This is soil moisture recharge. When the soil is saturated, excess water will have difficulty infiltrating into the ground, and may flow over the surface. This is soil moisture surplus.

When potential evapotranspiration is greater than precipitation, water is at first evaporated from the ground surface and transpired from plants. Water may also be brought up to the surface through capillary action and then evaporated. This is soil moisture utilisation. However, eventually the soil will dry out completely, creating a soil moisture deficit.

Level I *a basic diagram illustrating the patterns of ppt and evt., with no references to soil moisture terminology. Axes are labelled, and basic diagram is correct.* **(0-3 marks)**

Level II *additional annotations of soil moisture terminology in correct location on diagram.* **(4-6 marks)**

6 marks

Question 2

Clearly the assessment of this question will be influenced by the material offered by the candidates. What follows is some specific detail of the Los Angeles area, and general instructions for marking.

(a) Effects of hazards in LA:

- earthquake activity – destruction of buildings and roads, risk of fire, water shortages, insurance losses; linked to possibility of tsunamis and coastal flooding.
- Vegetation fires – burning of property, farmland
- Land slips – destruction of property
- Flooding, giving rise to damage to property, and possibility of mudslides
- Human hazards – crime, race riots, traffic problems, sexually transmitted disease.

Level I *identification of hazards with a description of effects of one only.* **(0-3 marks)**

Level II *a range of hazards (at least two) is described in terms of their effects. Depth and detail should receive additional credit.* **(4-6 marks)**

6 marks

(b) Inter-relationships in LA:

- Summer drought and hot dry Santa Ana wind combining to produce dry vegetation cover with a consequent high fire risk. Also linked to over-use of water in sprinkler systems (gardens and golf courses), and use of water for irrigation of intensive market garden areas.
- High production of atmospheric particulates by motor vehicles, combine with temperature inversion over the urban area which trap pollutants as photochemical smog.
- Reduction in vegetation cover reduces interception and soil protection which leads to increased instability of slopes, especially after heavy rain, causing risk of land slips. Further exacerbated by expansion of city in building terms.
- Earthquake activity may activate land slips, and encourage fire risks with rupturing of electric and gas systems.

Level I *one inter-relationship described simply e.g. A → B.* **(0-2 marks)**

Level II *at least one inter-relationship described fully with a clear sequence identified in detail.* **(3-5 marks)**

5 marks

(c) We are in the hands of the candidate as to which hazard(s) are examined in terms of responses. Responses range from fatalism to reaction, and may be individual or collective.

Level I *only one response identified and discussed.* **(0-3 marks)**

Level II *more than one response identified with some discussion covering more than one hazard.* **(4-6 marks)**

6 marks

- (d) Again we are in the hands of the candidate as to which hazard(s) are examined in terms of prediction and /or prevention. For example: LA and earthquakes – a great deal of research goes into prediction with the use of seismographs and other scientific monitoring equipment. Earthquake proof buildings are being constructed – steel framed skyscrapers and deep piled foundations. Emergency services have regular training and evacuation drills, and public education schemes exist.

Level I *simple statements of prediction and prevention, such as insurance, monitoring, fire-proofing, emergency procedures, education. Generalised statements, which could apply to any location.* **(0-3 marks)**

Level II *specific statements which relate to the area identified by the candidate. To access the higher level of marks, candidates must refer to more than one hazard, with some assessment of effectiveness.* **(4-8 marks)**
8 marks

Question 3

The Core – Periphery relationship

Friedmann produced a model of the economic development of a country, with particular reference to the changing economic relationships within that country. The model progresses through four stages of development for a country:

Stage 1 – a number of relatively independent local centres existing, each of which serves a small region, with no settlement hierarchy.

Stage 2 – the development of a single strong **core** during the initial phases of industrialisation, with an underdeveloped **periphery** in the remainder of the country. Economic development occurs in the core region, which has a specific advantage over the rest of the country, for example a natural resource, or dense population. The initial advantage is maintained by cumulative causation as more capital, entrepreneurs and labour move to the core.

Stage 3 – the **core-periphery** structure becomes transformed into a multi-nuclear structure with the national core and a number of peripheral sub-cores. These may develop due to large regional markets, or important natural resources.

Stage 4 – a functional interdependent system of cities resulting in national integration and maximum growth potential.

From this model four types of areas can be designated:

- the **core region** – the focus of the national market, and seedbed of new industry and innovations. It has a concentration of economic development.
- upward transitional areas – regions with some form of natural endowment characterised by inward migration of people and investment
- the **periphery** or downward transitional areas – regions with unfavourable locations and resource bases, characterised by outward migration of people and investment. Unemployment is high, and there are low living standards.
- Resource-frontiers** – areas where new resources are discovered and exploited.

Case Study – China

The people's Republic of China is the world's most populous country (1.26 billion) and the second largest economy measured on a purchasing power parity basis (after the United States). In 1978 the Chinese leadership began moving the economy from a centrally planned economy to a more market orientated system. The system operates within a political framework of strict Communist control, but with an increasing influence on non-state managers and enterprises. The authorities have increased the decision-making powers of local officials and plant managers in industry, permitted a wide variety of small-scale enterprise in services and light manufacturing (such as electrical goods and small machines), and opened the economy to increased foreign trade and investment. The results have been massive – the GDP has quadrupled to \$3600 per capita since 1978. Agricultural output doubled in the 1980s as farmers were encouraged to make profits for themselves.

In the mid 1990s these ideas were taken a stage further with the creation of Special Economic Zones (SEZs) and "open cities". These are areas of the country which are allowed to attract foreign companies to set up factories there. Foreign investors receive preferable tax, tariff and investment treatment. This also means that foreign companies now have access to Chinese markets, in an area where wages and production costs were particularly low. China benefits from this arrangement by earning money from abroad, and increasing the skills of its workforce. Both of these types of area were initially concentrated on the East coast – facing the Pacific and Taiwan. For example in the vicinity of Hong Kong four SEZs – Zhuhai, Shenzhen, Shantou and Xiamen were established, in addition to the acquisition of the commercial hub of Hong Kong itself. "Open Cities" also stretched down this coast from Tianjin in the north to Shanghai to Zhanjiang in the south. There are now over 2000 SEZs, heavily concentrated along the Pacific coast. This area is rapidly developing into the economic core of the country. There are large numbers of foreign invested factories, which

assemble imported components into consumer goods for export. Clothing manufacturers are also investing in large number. Another indication of this is that in 1991, China authorised some foreign banks to open branches in Shanghai and allowed foreign investors to purchase shares in Chinese stocks. In 2001, over \$41 billion was received as Foreign Direct Investment (FDI), of which the main sources are the USA, Japan, Taiwan and TNC investment through Hong Kong.

FDI has not only taken place on the Pacific coast, there has also been investment in key locations within the body of the country. Perhaps one of the most contentious aspects of this concerns the Three Gorges Dam on the Yangtze River. The main aims of this project are:

- To control flooding and reduce the incidence of associated death and destruction
- To generate HEP. It is hoped that the scheme could generate 18% of the country's present energy needs
- To provide water for irrigation for more cash crop production (cereals and flowers)
- To improve river transport by eradicating the large numbers of rapids on that section of the river.

However the dam has attracted a great deal of criticism from outside the country. The main aspects of criticism concern the facts that over 2 million people will have to move from their homes, many architectural and cultural sites will be flooded and destroyed for ever, thousands of hectares of valuable farmland will be submerged, sedimentation of the reservoir will be extensive, and there will be major operating difficulties. Some also suggest that the demand for electricity in this part of the country is not as great as predicted.

Other **Resource Frontiers** exist where there is potential for mineral development, particularly fuels. They include:

- The major oil fields at Daqing and Liaohe in NE China which produce two thirds of the country's oil.
- Offshore oilfields on the east coast in the Bohai Sea (east of Tianjin), the Pearl River Mouth and the Gulf of Tonkin
- Gas fields to the west in Xinjiang Province
- HEP on the upper sections of the Yellow River

China's recent economic growth has not been without problems:

- The economic poverty of the **periphery** – the rural interior and mountainous areas to the west and south. The latter are characterised by subsistence farming and pastoral activities, with low living standards even by Chinese standards
- The large state owned industries that still exist (steel, armaments, textiles) have had difficulty keeping pace with the new private companies in competitive terms
- There is massive migration of people from the rural areas to the rapidly growing urban areas
- The control that the government had over its population policy is declining as people move away from authoritarian communities to the more liberal coastal areas
- The environment is deteriorating rapidly, with large losses of arable land to soil erosion and economic development, and extensive air pollution. The World Health Organisation stated in 2000 that seven of the world's ten most polluted cities are in China. The country is expected to experience the largest absolute growth of carbon dioxide emissions between 2000 and 2020.

G	Level I 0-6	Level II 7-12	Level III 13-17	Level IV 18-20
	Simple statements of the core – periphery relationship in the identified country.	More detailed description of the core – periphery relationship. Some use of named examples.	Well developed detail of the core – periphery relationship. Good use of case study material.	
	Simple statements of description.	More detailed description, with correct identification of areas of development or underdevelopment.	Well developed description of areas of development, and/or underdevelopment. Recognition of changes in time e.g. resource frontiers.	
		Simple statements of the policies that have been put in place by national government.	Detailed statements of the policies that have been put in place by national government. Recognition of issues/ changes through time as effects have come into place.	Discussion of the overall effectiveness of the policies – areas of success, comments on success or other wise. Problems/issues arisen.
S	Level I 0 – 1	Level II 2 – 3	Level III 4 – 5	
	Information is adequately organised, and presented with a reasonably accurate use of English.	Well-organised and presented with an accurate use of English. Limited examples.	Well-organised and presented in a clear and logical manner with a very accurate use of English. Range of examples.	

Question 4**Notes for answers**

A wide range of **characteristics/global structures** could be provided by candidates, and all or some of the following would be acceptable:

Shield areas (cratons) – oldest parts of continents, most stable sections. Rocks are at least 2.5 million years old, typically found well away from plate boundaries. E.g. Baltic, Canadian, African Shields.

Sedimentary basins – areas of the major land masses which are filling with sediment. E.g. Amazon, Mississippi basins.

Fold mountains – areas of tectonic convergence with intervening sediments of geosyncline being pushed upwards to form mountains. Some vulcanicity present. E.g. Himalayas, Alps. *Rift Valleys* – product of crustal tension (pulling apart). May be oceanic as in Atlantic, or continental as in East Africa. Again associated with vulcanicity.

Ocean plains (abyssal plains) – areas of ocean floor at 3/6000 m deep. Occasionally interrupted by sea mounts, volcanic submarine cones rising steeply from the sea bed. These are linked to hot spot volcanic activity, and some are planed off to form guyots.

Mid Oceanic ridges – lines of underwater mountains up to 60000 km in length and 1000 km wide. Central part may be up to 3km in height, but in some parts volcanoes may emerge from the sea. Central part consists of rift valley. Fracture zones at right angles to ridges spread out east and west. E.g. Mid Atlantic Ridge, and Mid Pacific Ridge.

Ocean trenches/island arcs – around edge of Pacific – 100 km wide and over 6000m deep. Trenches are located close to continental edge – e.g. Peru, Japan, Aleutian – with landward side marked by arc of narrow islands e.g. Japan, Kuril Islands. Volcanic activity also frequent.

Evidence*Geological:*

- the jigsaw fit of continents (S. America and Africa) although some areas of overlap
- the similarity of rock types/structures on opposite sides of Atlantic e.g. the orogenic belts of NW Europe and N. America
- the formation of coal, oil, sandstone in areas with inconsistent climates
- past glaciations in India and southern continents
- paleomagnetism – polar wandering as identified in basaltic lavas, and magnetic striping
- sea floor spreading – dating of ages of rocks on either side of Mid Atlantic Ridge

Biological:

- the fossil of mesosaurus (Permian reptile) only found in S. Africa and Brazil
- uniqueness of Australian animals (marsupials) – indicating early break away
- simian creatures in Africa and South America, yet latter evolved prehensile tail

Relationship between tectonic processes and global structures:

- (i) Constructive margins – divergence – ocean ridges, submarine volcanoes, transform faults, rift valleys.
- (ii) Destructive margins – convergence – fold mountains, trenches, island arcs, volcanic activity.
- (iii) Conservative margins – sliding – faulting, transform faults.

G	Level I 0–6	Level II 7-12	Level III 13-17	Level IV 18-20
	Simple statements of description.	More detailed description, with correct identification of characteristics e.g. continental or oceanic. Detail of features would access this level.	Well developed description of characteristics/features of plates. Good use made of located exemplars.	
	Simple statement of evidence. No depth of discussion.	Detailed statements of pieces of evidence. Some use of both forms of evidence – geological and biological – to access this level.	Well developed examples which recognise complexity of the evidence, and/or possible weaknesses. Discussion of the quality of the evidence.	
		Brief statements of the relationship between process and structures. Case studies are simply named.	Detailed statements of the relationship between process and structures. Good case study material is offered here.	Discussion of the relationship between a range (at least 3 detailed examples) of processes and their associated global structures.
S	Level I 0 – 1	Level II 2 – 3	Level III 4 –5	
	Information is adequately organised, and presented with a reasonably accurate use of English.	Well-organised and presented with an accurate use of English Limited examples.	Well-organised and presented in a clear and logical manner with a very accurate use of English Range of examples.	