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MARKSCHEME

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GEOGRAPHY

Higher Level and Standard Level

Paper 2

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Optional Theme A — Freshwater – issues and conflicts

1. (a) Describe *two* conditions at point A which may make infiltration rates higher than at point B. ***[2×2 marks]***

Possible answers could include interception by vegetation, slope angle, snow melt, non-frozen ground, soil characteristics (soil porosity, soil infiltration capacity), water content of the soil, antecedent precipitation, intensity of the precipitation or any other logical answer.

Award ***[1 mark]*** for identifying each factor and a further ***[1 mark]*** for how it influences infiltration.

(b) Explain the consequences of a decrease in the amount of water stored in ice in the hydrological cycle at any stage. ***[6 marks]***

Possible consequences may be human and/or physical. The human consequences are likely to be negative: water insecurity, changes in tourism, coastal inundation, environmental refugees. There may be short-term benefits *e.g.* increased river flow, accessibility to more grazing lands.
Responses may mention arctic ice melt, new shipping routes, new sea floor exploitation, retreating land ice can increase agricultural land area.
Physical consequences could include: rising sea levels caused by ice melt, retreat of glaciers and ice shelves / ice caps caused by global warming, flooding in low lying areas, drowned features on coastlines (resulting from eustatic changes in sea level) or emergent features (resulting from isostatic rebound).
At least two different consequences must be explained for the award of full marks. Candidates may choose to explain two consequences in depth or more than two in less depth.

(c) "Strategies adopted to meet the competing demands for water are not always effective." Discuss this statement with reference to *one* named river basin. ***[10 marks]***

Responses will depend on the river basin chosen.
The basin should be named and located (if more than one basin is used, credit should be given to the example which answers the question most effectively).
The competing demands should be outlined depending on which basin is named.
The strategies (such as dams, reservoirs, water rationing, water pricing) adopted in the basin to meet the competing demands should be outlined.
The successes and, if relevant, failures of the management strategies should be discussed. Discussion on whether the strategies are effective depends on the view of the stakeholder. The best responses may reflect this.
Answers that do not refer to a named river basin, or which focus on one side of the argument, should not move above band D.
To access markbands E and F, the strategies should be effectively evaluated.

Marks should be allocated according to the markbands.

2. (a) Draw a labelled diagram to show the main features of an artesian basin. ***[4 marks]***

A diagram of a basin ***[1 mark]***, labelled aquifer ***[1 mark]***.

Two other labels (***[1 mark]*** each up to a maximum of ***[2 marks]***) could include:
- impermeable strata
- source area
- artesian well
- water table
- any other relevant feature.

Alternative diagrams to conventional cross-sections are equally acceptable.

(b) Explain the environmental impacts caused by groundwater abstraction. ***[6 marks]***

Answers could include: explanations of falling water tables, ground subsidence, river discharge reduction, drying up of springs and wells, effects on wetlands, changes in groundwater quality, increased toxicity (*e.g.* arsenic), effects on natural vegetation, intrusion of sea water.

A simple list of impacts with no explanation should not be awarded more than ***[2 marks]***.

A list with some explanation should be credited more than ***[2 marks]*** where appropriate.

At least two impacts could be explained in detail; more impacts in less detail are acceptable.

(c) Evaluate the success of the management strategies used in *one* named wetland area. ***[10 marks]***

Responses will depend upon the wetland area chosen.
The wetland area should be named, located and described.

The reasons why management strategies are necessary in the named wetland should be clearly outlined.

The actual management strategies employed in the named wetland should be described. Possible strategies could include: creating national parks or sites of special scientific interest, habitat conservation, wetland extension, controlling or legislating against agricultural run-off, drainage, water management schemes, tourism.

To access markbands E and F, the success or failure of the strategies should be evaluated in terms of the benefits and problems that have resulted in named wetland areas.

Marks should be allocated according to the markbands.

Optional Theme B — Oceans and their coastal margins

3. (a) (i) Describe the pattern of loss of coral reefs. ***[2 marks]***

The greatest loss is in the Indian ocean and the least is in the Pacific ***[1 mark]***.
There is more loss in Eastern hemisphere than Western hemisphere ***[1 mark]***.
For a simple list with quantification award only ***[1 mark]***.

(ii) State *two* physical factors which are needed for the development of coral reefs. ***[2 marks]***

Award ***[1 mark]*** each, for two of the following:

- availability of sunlight
- warm salt water
- clear, shallow water
- the accumulation of skeletal material, broken and piled up by wave action
- availability of calcium
- wave action providing oxygen and/or nutrients.

Other valid factors may be accepted.

(b) Explain *three* benefits that coral reefs bring to people. ***[3×2 marks]***

The benefits may include: building materials, tourism, absorption of CO_2, natural coastal protection, maintenance of biodiversity and fish stocks, and the biological links to mangroves. Award ***[2 marks]*** for each relevant explanation – ***[1 mark]*** for identification of a valid benefit, and ***[1 mark]*** for explanation/elaboration/exemplification.

(c) Examine the conflicts which arise from competing land uses in coastal margins. ***[10 marks]***

Competing land uses which may lead to conflicts include the following: agriculture, tourist developments, fishing villages, coastal erosion mitigation projects, ports, industry, urban settlements, protected areas, aquaculture.

The conflict may also be between different places (*e.g.* longshore drift interrupted by groyne/breakwaters leading to erosion elsewhere), or may change over time (*e.g.* measures to protect an actively eroding cliff are abandoned as they are too costly to maintain).

Answers should examine land uses which are in conflict with each other, and while examples are not a specific requirement of the question, those answers that provide supporting examples are likely to access higher markbands.

To access bands E and F, expect at least two conflicts, one of which is well explained.

Marks should be allocated according to the markbands.

4. (a) Referring to the diagram, identify feature A and feature B – B[1]. *[1+1 marks]*

A: Rift valley or ridge system or ocean ridge. *Diverging or constructive plate boundary is also acceptable.*

B – B[1]: Transform or transcurrent faults. *Slipping fault/tear fault or a fault may also be acceptable.*

(b) Explain why the ocean floor becomes increasingly older with distance from A. *[2 marks]*

As a result of sea floor spreading and the creation of newly "constructed" ocean floor at the constructive boundary ***[1 mark]***, the age of the floor increases with distance and the oldest floor is found, therefore, furthest away from the ridge and rift systems ***[1 mark]***.

(c) Using an annotated diagram *only*, explain the formation of an ocean trench. *[6 marks]*

The features of the trench should be clearly illustrated and explained on a diagram. The diagram should include:

- a trench where two plates are converging ***[1 mark]***
- direction of plate movement ***[1 mark]***
- the concept of subduction ***[1 mark]***.

Further ***[3 marks]*** for explanatory annotations that identify:

- plate density
- convection cell
- sedimentation
- earthquakes along the Benioff zone
- or labeling that shows relevant located examples.

Award a maximum of ***[4 marks]*** for a labeled diagram with an explanation which is separate from the diagram.

Award a maximum of ***[2 marks]*** for an explanation without a diagram.

(d) Examine why oceans are areas of geopolitical conflict. ***[10 marks]***

Likely sources of geopolitical conflict include: disputed islands, extended fishing zones, oil exploration, the possibility of gas extraction in the Arctic or hydrogen reserves in the Atlantic, use of Arctic and Antarctic areas.

As technology advances and exploration techniques improve, the potential of oceans as a source of biotic and abiotic resources has been realized. The need for these resources has resulted in nations extending, or wanting to extend, their boundaries, laying claim to substantial portions of continental shelves or areas which are now accessible due to ice melt. This may lead to altercations between nations who lay claim to the same areas of ocean floor or islands. The emphasis must be placed on conflict and this may be the potential for armed conflict or political dialogue/negotiation.
Answers which examine a conflict in detail are likely to be credited at bands E and F.

Marks should be allocated according to the markbands.

Optional Theme C — Extreme environments

5. (a) Name and describe *two* landforms shown on the photograph. ***[2+2 marks]***

Patterned ground/ice wedge polygons/netting ***[1 mark]*** described as large irregular polygons with darker areas at edges ***[1 mark]***.
The pond/hollow/kettle hole lake/collapsed pingo ***[1 mark]*** with a further ***[1 mark]*** for an accurate descriptive statement *e.g.* size, vegetated edges.
Credit other valid suggestions.

(b) (i) Explain the process of solifluction. ***[3 marks]***

The movement downwards / on a slope / under gravity ***[1 mark]*** of thawed soil/material over frozen ground ***[1 mark]***.
Additional explanatory points include: liquid limit in the soil is exceeded causing flow, seasonal variability, speed of movement will depend on the slope angle, ***[1 mark]***.

(ii) Explain the formation of pingos. ***[3 marks]***

A pingo, also called a hydrolaccolith, is a mound of earth-covered ice ***[1 mark]***.
The ice lens / ice core is formed by the accumulation of water ***[1 mark]***.
Award a third mark for any elaboration (*e.g.* distinction between open/closed pingos, segregation/injection).

(c) Examine the impacts of permafrost on human activities. ***[10 marks]***

Human activities are fundamentally affected by the presence of permafrost. The ever present threat of thawing and melting requires a range of adaptations in order to avoid harm to subsistence livelihoods, and damage to buildings, roads, and other infrastructure. Normal activities and techniques must often be modified at additional costs in construction and maintenance of railroads, buildings, water and sewer lines, oil and gas pipelines, dams, roads, bridges, and airfields, because of permafrost.

Future improvements in scientific and engineering approaches, plus careful geological site selection and further study of the permafrost problem, will allow successful expansion into polar areas. Not all of the above points are required for an answer to reach band F, but good answers are expected to examine negative impacts and also consider that the challenges of permafrost on activities can be overcome.

To access bands E and F, candidates may offer some analysis of spatial or temporal variability in the level of impacts *e.g.* greater challenges in areas of discontinuous permafrost / areas with more active layer activity or climate change associated issues.

While examples are not a specific requirement of the question, those answers that provide supporting examples are likely to access the higher markbands.

Marks should be allocated according to the markbands.

6. (a) Describe the changes that have taken place in the Greenland ice sheet since 1985. ***[4 marks]***

While the image shows an area where ablation exceeds accumulation, candidates can gain full marks even if they interpret this as ice retreat.
The ice has melted/retreated around the coasts ***[1 mark]***.
The greatest melt is in the South ***[1 mark]***. There is greater melting in the west than the east ***[1 mark]***.
Attempts to quantify or relate to the 2000 metre contour or to consider change over time may gain the additional ***[1 mark]***.

(b) Explain how and why glaciers and ice masses have sometimes advanced. ***[3+3 marks]***

Glaciers and ice masses advance when the accumulation of ice and snow ***[1 mark]*** exceeds ***[1 mark]*** the ablation of ice ***[1 mark]***.

Generally, this occurs when the climate is becoming cooler ***[1 mark]***, most likely due to natural causes, such as changes in the tilt or orbit of the Earth, sunspot activity, cosmic rays and changes in the position of land masses. Award ***[1 mark]*** for each of two causes if they are explained only briefly, or ***[2 marks]*** for one cause explained in depth.

(c) "Agriculture in hot, arid areas inevitably results in desertification." Discuss this statement. ***[10 marks]***

Candidates are expected to consider points on both sides of this question. The strongest responses may choose to challenge the statement, and may well conclude that while agriculture in such areas **may** result in desertification, such an impact is by no means inevitable but depends, in part, on the nature of the agriculture involved. Careful choice of crops, cultivation techniques and continuous monitoring may enable successful small-scale or commercial agriculture in hot arid areas. It is likely to be easier to avoid desertification in areas where irrigation is possible than in areas where, for financial, technological, or other reasons, irrigation is not possible.

Desertification is often the result of unsustainable farming, in which more minerals and nutrients are taken out of the soil than are replenished, or where the density of grazing animals exceeds the normal carrying capacity. Some experts also attribute desertification in some areas to on-going climatic change.

Answers that consider only one side of the question should not be credited above band D.

It is expected that answers reaching bands E and F will offer supporting evidence and/or exemplification before arriving at a clear conclusion to the question.

Marks should be allocated according to the markbands.

Optional Theme D — Hazards and disasters – risk assessment and response

7. (a) Describe the pattern of *either* the earthquake hazard risk *or* the volcanic hazard risk shown on the map. ***[4 marks]***

The volcanic hazard risk occurs close to the coast. Responses should mention areas where volcanoes have mainly not erupted recently (West coast of USA and Canada); more recently (Alaskan archipelago); and the location of the particularly hazardous volcano north of Portland. The lack of volcanic hazard between Juneau and Anchorage may be noted.
The earthquake hazard risk is highest in South Alaska; medium risk occurs in the remaining coastal zones; areas of low risk occur inland from the Portland-Juneau axis and in north and west Alaska.
If both earthquake and volcano risk pattern are described, credit the better response.
Four valid statements are required for ***[4 marks]***.

(b) Explain the relationship between the magnitude of a hazard event and the frequency of its occurrence. ***[6 marks]***

Responses should explain what is meant by hazard frequency or recurrence interval ***[1 mark]*** and magnitude or size of the event (but not the level of impact) ***[1 mark]***. The remaining ***[4 marks]*** should be given for a reasoned explanation as to why hazard events of high magnitude generally occur infrequently while those of low frequency generally occur more often. The strongest responses will refer to named hazard types to illustrate this relationship or to anomalies. Accept climate change causing increases in hazard frequency if it refers to drought and hurricanes/cyclones/typhoons.

(c) Examine the impacts of one named disaster and possible strategies for preventing its recurrence. ***[10 marks]***

The disaster should be named and located. It is important that the chosen event is a disaster and not just a low impact hazard event. It should be an event that has caused widespread disruption to an area, major population loss, significant damage to the environment and considerable economic consequences. The impacts should be described in these terms and should reflect how the people affected were not able to deal with the event without help from outside agencies. The remainder of the answer should examine at least two possible prevention strategies and, to access bands E and F, discuss their potential effectiveness for disaster prevention in the future. Such strategies will probably refer to adjustment and long-term response strategies appropriate to the hazard that caused the disaster. Though most answers will probably refer to disasters caused by earthquakes, volcanoes or strong winds, allow coastal floods that result from hurricane/cyclone/typhoon storm surges and strategies such as levee construction, flood walls, dykes, raised shelters, warning systems and evacuation measures.

Answers that do not refer to a named disaster should not move above band D.

Marks should be allocated according to the markbands.

8. (a) Describe the difference between a hazard and a disaster. ***[2+2 marks]***

A hazard constitutes a threat to people, property and/or the environment ***[1 mark]***. It can be natural or human in origin ***[1 mark]***.
A disaster results from a hazard event that has major impacts on people, economic and/or environmental impacts ***[1 mark]*** and which the area or country cannot deal with unless there is outside aid ***[1 mark]***.

(b) Explain why some sections of a community are more vulnerable to hazards than others. ***[6 marks]***

Award up to ***[3 marks]*** for each section of a community whose vulnerability is well explained or for a single factor which is well explained.
Vulnerable sections could include: different age categories, income groups, people with disabilities, location, gender, and ethnicity. (Do not accept MEDC/LEDC differences.) Not all of these are needed for ***[6 marks]***.

[6 marks] may also be awarded for a brief explanation of six valid factors.
Factors might include: knowledge of the hazard, education level, warning systems, insurance, communications, population density, income level, building types and construction codes.

(c) Compare the effectiveness of the methods used to predict the occurrence of *two* different natural hazard types. ***[10 marks]***

Answers depend on the hazard types chosen.
The two hazard types should be clearly identified and must be natural hazards. (It is expected that these will be chosen from volcanic hazards, earthquakes, hurricanes or drought, but other natural hazard types such as tsunamis may be credited.) Answers should clearly outline the methods used to try to predict the named hazard types and make comparisons as to their reliability in forecasting hazard events. Responses that compare the effectiveness of methods used to predict one of the hazard types should be credited, but comparisons between the methods used for different types of hazard should form the bulk of the argument to essentially determine which hazard is the more predictable.

To access bands E and F, answers should effectively compare the methods used.

Marks should be allocated according to the markbands.

Optional Theme E — Leisure, sport and tourism

9. (a) Identify *two* primary and *two* secondary tourism resources found in the area south of gridline 62. ***[2+2 marks]***

Award ***[1 mark]*** for any valid resource identified, up to a maximum of ***[2 marks]*** for primary tourism resources and ***[2 marks]*** for secondary tourism resources. Answers could include:

Primary tourism resources: mountainous scenery, rock carvings, temples, reservoir, beaches, commemorative garden, woodland.

Secondary tourism resources: barbecue sites, picnic sites, information boards, toilets, hiking trails, campsites.
If more than two primary or secondary resources are given, accept only the first two resources stated in each case.

(b) Referring to map evidence, explain *three* problems related to tourism that are likely to develop in Area B, around Ngong Ping. ***[3×2 marks]***

Award ***[1 mark]*** for each valid problem clearly linked to Area B, and a further ***[1 mark]*** for relevant explanation of the problem. Award ***[1 mark]*** only for a generic problem not supported by map evidence.

Problems could include:
- traffic and parking problems because Ngong Ping is a transport node
- disruption of cultural practices in monasteries by noise and commercial activities
- environmental damage, such as fire, litter, air pollution
- overcrowding due to concentration of attractions and accessibility.

There may be other valid problems.

(c) Discuss the strategies designed to manage tourism in *one* named urban area. ***[10 marks]***

There are a wide range of suitable answers which should be judged on a case by case basis. Answers are expected to examine the success or failure of attempts to manage urban tourism. Strategies to promote tourism should be considered as only a small part of the management spectrum.

Answers that simply describe management strategies rather than discussing elements of success or failure should be limited to band D. Those that describe tourism problems without discussing strategies should be limited to band C.

Answers that do not refer to an appropriate example (but discuss a rural location or strategies that relate to sport or leisure rather than tourism) should be limited to band D.

To access bands E and F, answers should refer to an appropriate example.

Marks should be allocated according to the markbands.

10. (a) Describe the main characteristics of sustainable tourism. ***[4 marks]***

Sustainable tourism allows for continuation of activity at the same level for future generations ***[1 mark]***.
It minimizes the impact of activity on the environment; supports the livelihoods and culture of local people; manages resources to prevent depletion; and reduces the ecological footprint of industry.
Award ***[1 mark]*** for each valid statement made up to a maximum of ***[3 marks]***.
If candidates define "tourism" they can receive a maximum of ***[1 mark]***.
Responses that define sustainable development and explain how it is promoted in relation to tourism should be credited.

(b) Explain *three* different impacts of tourist developments on the environment. ***[3×2 marks]***

There are a range of possible answers that include:
- increased water consumption
- increased traffic and associated pollution (water, noise, aesthetic)
- loss of habitat and biodiversity
- increased waste produced requiring disposal
- CO_2 emissions (especially long-haul flights)
- consumption of local natural capital.

There are possible positives *e.g.* conservation, marine reserves.
[1 mark] should be awarded for each basic impact stated, and ***[1 mark]*** for some development/explanation.

(c) Examine how tourism has had social and economic impacts on *one* country. ***[10 marks]***

There are a wide range of valid responses that could be credited. Likely themes include positive multipliers, employment (informal and formal), effects on crime, language, cultural homogenization.

Answers are expected to provide a balanced range of both positive and negative impacts in order to gain the higher markbands. Answers that focus only on either positive or negative impacts should be restricted to band D.

Answers that do not refer to a specific country should be restricted to band D.
Answers that refer to the impact of a major sporting event on a named city and not tourism in general on a country should be restricted to band C.
Answers that focus only on social or economic impacts should be restricted to band D.

To access bands E and F, answers should consider positive and negative impacts.

Marks should be allocated according to the markbands.

Optional Theme F — The geography of food and health

11. (a) (i) Describe the pattern of agricultural subsidies in 2006. ***[2 marks]***

Award ***[1 mark]*** for any valid general statement, such as agriculture subsidies are higher in the Northern hemisphere than the Southern hemisphere, or agricultural subsidies are higher in European nations than in North America or Australasia, with an additional ***[1 mark]*** for any supporting quantification. No credit should be given for a simple list.

(ii) State *two* reasons why agricultural subsidies have declined in most countries since 1990. ***[2 marks]***

Award ***[1 mark]*** each for any two valid reasons. These reasons include the reallocation of government resources since 1990 into other sectors of the economy; and the influence of the role of civil society or international trade organizations and their attempts to regulate subsidies.

(b) Explain how the actions of TNCs can reduce the availability of food. ***[6 marks]***

There are numerous possible ways in which TNCs can reduce food availability. They may encourage an emphasis on the growing of non-food cash crops rather than food crops. They may gain control of the supply of seed for one or more basic crops; this seed may then be priced beyond the means of the average farmer or the seed may require higher than affordable investments in infrastructure or equipment in order for high yields to be obtained.

At least two actions must be explained for the full ***[6 marks]***.

Award ***[1 mark]*** for each valid action, plus an additional ***[1 mark]*** for explaining it, and a final ***[1 mark]*** for an example, quantification or further detail.

(c) To what extent were human factors responsible for a recent famine? ***[10 marks]***

Candidates are expected to consider a range of human factors and other factors (such as physical/environmental, economic and political) in their responses. Answers should clarify how each factor affected the occurrence, severity and outcome of a particular famine.

Possible human factors include: age and education of agricultural workforce; extent to which population is concentrated in a few large cities, or dispersed across a wide area; migration flows.

Economic factors include: ability to purchase food supplies from outside the area or country; deficiencies in the transport system reducing the effectiveness of food distribution; lack of capital to replant or restock farms.

Political factors might include: war and refugee movements; refusal to accept international food aid.

Possible physical/environmental factors include: soil degradation; climate change; natural hazard events such as hurricanes or earthquakes.

While many responses are likely to conclude that human factors are not the main cause of famine, all conclusions should be judged strictly on the merits of the arguments presented and the example chosen.

Answers arriving at a clear conclusion about the relevance of human factors to a specific recent famine are likely to be credited at band D and above.

Where responses refer to more than one famine event in different countries, only the best one should be credited.

Marks should be allocated according to the markbands.

12. (a) (i) Describe the trend in diseases spread by diffusion between 1991 and 2001. ***[2 marks]***

Award ***[1 mark]*** for the recognition that the number of cases of diseases spread by diffusion fell between 1991 and 2001, and an additional ***[1 mark]*** for some quantification or recognition of anomaly.

(ii) Describe what is meant by "diffusion by relocation" with reference to a disease. ***[2 marks]***

Diffusion by relocation occurs when individuals infected with a disease move ***[1 mark]*** to a new, perhaps distant location and the disease spreads ***[1 mark]***.

(b) Explain the global distribution of diseases of poverty. ***[6 marks]***

Diseases of poverty include many infectious and parasitic diseases, as well as diseases related to vitamin and/or calorie deficiencies. The global distribution is related to economic and social development, though pockets of diseases of poverty can also exist in developed nations. Factors include lack of access to adequate medical care because of costs and/or poor availability; poor quality of water supply; high levels of environmental pollution; poor levels of sanitation. At least two distinct factors must be treated in detail for the award of the full ***[6 marks]***. Alternatively, a greater number of factors can be explained in less detail for the award of full marks. Answers that simply describe the distribution should be limited to a maximum of ***[3 marks]***.
Alternative approaches should be considered on their merits.

No credit may be given for any explanations that relate directly to diseases of affluence (degenerative diseases, cancers, heart disease).

(c) Referring to *one or more* diseases, discuss the factors that determine the relative importance of policies of disease prevention as opposed to policies of treatment. ***[10 marks]***

Numerous factors are relevant to this response, depending on the particular disease or diseases chosen. They include: relative costs per patient of treatment compared with prevention; cost, effectiveness and availability of disease-specific preventative measures such as vaccinations; whether or not the disease in question spreads by diffusion, and if so by which type of diffusion; potential long-term health or economic impacts of an outbreak of the disease in question; pressure from disease-specific non-governmental organizations.

Responses which show a good knowledge of one or more diseases and which discuss both prevention and treatment policies are likely to be credited at band D or above.

Marks should be allocated according to the markbands.

Optional Theme G — Urban environments

13. (a) Describe the trends shown in the graph. ***[4 marks]***

- the amount of sewage produced and treated both increase
- sewage produced has increased at a faster rate than sewage treated
- rate of growth has slowed since 2000
- biggest increase between 1990 and 2000 in sewage produced and sewage treated
- provides quantification.

Award ***[1 mark]*** for each valid point. Quantification is needed for the award of the full ***[4 marks]***.

(b) Explain *three* symptoms of urban stress. ***[3×2 marks]***

Urban stress is considered to be the inability of the urban system to cope with the demands of its population (either because of its size or its consumption). Possible symptoms of urban stress could be:

- pollution (air or water) beyond acceptable levels *e.g.* photochemical smog
- widespread poverty, beyond ability of city authorities to provide social care
- lack of adequate housing evidenced by high levels of homelessness or informal housing
- inability of health services to cope with demands
- possible outbreaks of epidemic disease
- high levels of civil unrest or crime levels
- widespread traffic congestion or poor transport infrastructure.

Answers referring to physiological stress symptoms should not be credited.

[1 mark] should be awarded for each valid symptom of actual stress with ***[1 mark]*** for a more developed explanation or elaboration. Maximum ***[2 marks]*** for a simple list of problems (*e.g.* unemployment, pollution, *etc.*).

(c) "Urban poverty and deprivation are widespread in all cities." Discuss this statement. ***[10 marks]***

Answers could approach the question in several valid ways.

A starting approach is to examine differences in poverty and deprivation within one urban area. This approach could argue that it is widespread in the chosen example and agree with the statement – this is sufficient for band D if well-exemplified. An answer that shows that it is not widespread in a single city, and therefore disagrees with the statement could reach bands E/F.

Another approach is to look at contrasting urban areas and examine differences in poverty and deprivation between cities. This approach would most likely show that poverty and deprivation are more widespread in some cities than others. Such responses are also likely to reach bands E/F if they are detailed.

Marks should be allocated according to the markbands.

14. (a) Describe what is meant by a "sustainable city". ***[4 marks]***

Answers could include the following elements:
A city that is designed to protect quality of life for its future generations ***[1 mark]***. Award ***[3 marks]*** for three of the following elements:

- city designed to minimize impact on environment
- inputs of energy, water, and other resources are minimized
- outputs (waste, air and water pollution) are minimized (possibly by recycling)
- effective transport infrastructure minimizes outputs
- smallest possible urban ecological footprint
- any other valid suggestion.

(b) Explain *three* ways in which human activities can modify the microclimate of an urban area. ***[3×2 marks]***

Microclimate can describe temperatures, wind speed, humidity, air quality and local rainfall regimes.

Answers could include the following;

- increased temperatures (including urban heat island effect) because of reduced albedo, direct heating by buildings, air conditioning *etc.*
- changes in wind speed and air flow because of buildings and street patterns
- changes in rainfall because of higher temperatures; increased amount of particulate pollution provide rainfall nuclei; greater convectional up draughts
- greater levels of air pollution (photochemical smog, particulates, NOX *etc.*); greater number of sources *e.g.* exhausts.

Award ***[1 mark]*** for each basic modification explained and ***[1 mark]*** for any extension or good example. Maximum ***[3 marks]*** if only one aspect of microclimate (*e.g.* urban heat island) is explained but with three causes given.

(c) Examine reasons why cities in some parts of the world have higher rates of population growth than others. ***[10 marks]***

Good answers are likely to focus on migration and natural increase also. Variations in the relative strength of urban pull factors and rural push factors should be discussed. Economic, cultural and political factors may feature in the discussion as influences of both migration and rates of increase.

Counter-urbanization and low birth rates are a cause of slower growth or even a decline in population in many cities in MEDCs.

Responses that focus simply on urban growth in one area should be limited to band D. Expect the inclusion of both migration and natural increase to access bands E/F.

While examples are not a specific requirement of the question, those answers that provide supporting examples are likely to access the higher markbands.

Marks should be allocated according to the markbands.