



MARKSCHEME

November 2011

GEOGRAPHY

Higher Level and Standard Level

Paper 2

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Optional Theme A — Freshwater – issues and conflicts

1. (a) **Referring to the diagram, briefly describe *two* floodplain management strategies.** *[2+2 marks]*

The diagram provides evidence for several floodplain management strategies, including floodplain zoning; construction and maintenance of dykes; maintenance of a floodway to channel flood waters away from settlements or valuable land; deliberate “set-aside” of floodplain as an area where no development is permitted; flood-proofing of buildings. Award *[1 mark]* for each valid suggestion for a management strategy, and a further *[1 mark]* in each case for further description or development. Some reference to the diagram is essential for the awarding of the full *[4 marks]*.

- (b) **Explain how human activities on a floodplain can increase the probability of flooding.** *[6 marks]*

Answers could refer to two human activities in detail or several in less detail. Human activities might include: urbanization, mechanized farming causing soil compaction, deforestation, removal of pastureland for arable farming, construction of artificial levees, straightening of the channel, removal of wetlands. A simple list 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.

- (c) **“Eutrophication is the most damaging agricultural impact on water quality.” Discuss this statement.** *[10 marks]*

Answers should describe how eutrophication can be caused by farming and how it impacts on water quality. It is expected that answers will examine other impacts of agriculture on water quality and compare these with the impact of eutrophication. This might include the effects of irrigation such as salinization, or the accumulation of toxins/pesticides in water bodies as well as increased water sediment content due to soil erosion following intense precipitation or exposure to wind.

To access bands E and F, answers should include a clear evaluation of one or more agricultural impacts compared to eutrophication.

Marks should be allocated according to the markbands.

2. (a) **Draw a labelled diagram of a hydrograph.** **[4 marks]**

The hydrograph must include:

- Labelled axes showing time and discharge **[1 mark]**.
- Line graph showing discharge **[1 mark]**.

Any additional features or labels are worth **[1 mark]** each, up to a maximum of **[2 marks]**:

- Labelled rainfall
- Peak discharge
- Base flow
- Lag time
- Rising or falling limb.

(b) **Explain how hydrographs are used to forecast floods.** **[6 marks]**

There are many ways in which hydrographs are useful in forecasting floods.

Answers could mention prediction of flood height and arrival time downstream using a study of lag times and stream response records.

Hydrographs are also used to predict the return period of floods of different sizes through the use of hydrograph records over a long period of time.

They may also be used to predict the extent of flooding and how long it will last.

At least two of these should be explained to gain **[6 marks]**.

A strong account of one may compensate for a weaker account of another.

(c) **“Dams and reservoirs create as many problems as they solve.” Discuss this statement with reference to multi-purpose schemes.** **[10 marks]**

At least one example of a multi-purpose scheme should be named and located.

Solutions might include: the benefits of power generation, water supply, irrigation, transport, flood control, recreation and tourism.

These should be balanced against potential problems that could include: loss of land, displacement of population, loss of water through evaporation, silting, seismic problems, cost, diseases such as bilharzia, loss of nutrients due to flood control, salinization.

To access bands E and F, candidates should discuss both solutions and problems using at least one actual scheme.

Marks should be allocated according to the markbands.

Optional Theme B — Oceans and their coastal margins

3. (a) **Describe the vertical variations in the salinity shown on the graph.** [4 marks]

Rapid decrease down to around 500–800 metres [1 mark]. Increases steadily to around 2000 metres [1 mark]. Then stays the same/increases very slightly from 2000–4500 metres [1 mark].

Award [1 mark] for quantification *e.g.* uses the salinity figures, or qualification of trends *e.g.* recognizes changes in the rate of decline.

- (b) (i) **Explain what is meant by “oceanic conveyor belts”.** [2 marks]

Oceanic conveyor belts, or thermohaline circulations (THCs), refer to part of the large-scale ocean circulation [1 mark].

Award [1 mark] for mention of either a cause or a pattern *e.g.* density gradients or the process of wind driven surface currents.

- (ii) **Suggest two reasons why oceanic conveyor belts are important.** [2+2 marks]

Candidates may approach this question from the perspective of human importance and/or system importance.

Award [1 mark] for identifying a valid reason and a further [1 mark] for extension or exemplification, up to a maximum of [4 marks].

Likely responses include:

- Moderation of climates [1 mark], so the thermal growing season for agriculture is extended [1 mark].
- Importance because they transfer global heat energy and matter (solids, dissolved substances and gases) from latitude to latitude [1 mark]; if the circulation stopped it would cause significant climate change [1 mark].
- Currently the conveyor belts reduce temperature differences between basins [1 mark], therefore linking the earth’s oceans as a single global system [1 mark].

(c) Discuss the effects of El Niño on some coastal margins.

[10 marks]

Candidates would be expected to briefly explain what is meant by El Niño and outline its characteristics. Reference should also be made to specific coastal margins.

Answers which provide support by using examples are likely to access the higher markbands. The effects may be physical, causing drought, flooding, coral bleaching, depletion of fish stocks or impacts on the food chain. These effects may be exacerbated by human activities such as the overfishing of anchovies in Peru. Drought may also cause people to take advantage of an opportunity to burn forests causing the smoke haze that affected south east Asia in 1997 or resulted in the decimation of game animals in coastal southern Africa in 1992. It is possible that candidates may suggest an increase in frequency and/or severity of El Niño events due to global warming. El Niño may be connected to increased tropical storm damage and the damage to sea kelp in California, for example.

Strong answers will additionally look at positive impacts – the desert bloom in Peru, increased rainfall in arid areas and germination of plants, for example, in the Panamanian rainforests. It is acceptable to use one case study, which can be at any scale. Varied approaches are acceptable.

To access bands E and F, the discussion should explore different perspectives *e.g.* human/physical, positive/negative, short term/long term.

Marks should be allocated according to the markbands.

4. (a) Using map evidence, describe the effects of deposition in Area A. [4 marks]

The most obvious signs of deposition in Area A are the two beaches [1 mark], one on either side of the airport. Each beach is about 1.5 km long [1 mark] and about 0.25–0.5 km wide [1 mark]. The beach to the east is wider than the beach to the west [1 mark]. It is possible that the entire neck of the peninsula (where the airport is built) is the depositional feature known as a tombolo [1 mark], joining a former island to the mainland. There are also small areas of deposition in square 77/23.

Award [1 mark] for using the term “beach” and an additional [1 mark] for each additional point made about them, or for further development of an idea.

Accept any other valid suggestion about deposition in Area A, provided that there is some map evidence to support it.

(b) Using map evidence, explain one likely conflict between types of human activity in:

Most conflicts are likely to concern competition for land use.

(i) Area A,

- Airport/local residents
- Airport/agriculture.

(ii) Area B.

[2×3 marks]

- Ferry traffic/fishing/recreational boaters (ferry vehicle route shown)
- Tourism/local interests/land uses
- Lifeboat station/prevention of other developments in the area.

Award up to [3 marks] for each conflict that uses map evidence (names or grid references), is well explained and shows how two land uses are incompatible.

(c) Examine the sources and impacts of waste disposal in oceans.

[10 marks]

Sources may include:

- Agriculture in the form of pesticides and fertilizers
- Industrial waste, especially heavy metals (*e.g.* Minimata mercury poisoning in Japan)
- Raw sewage from urban/residential developments
- Radioactive waste from power stations or the impacts of warm water as a by-product
- Disposal of oil waste from tankers
- Ship wastes including plastics.

Impacts may include:

- Eutrophication and algal blooms from fertilizers
- Bleaching of reefs from increased temperatures
- Damage to marine life from heavy metals or radioactive waste
- Changes to water clarity and turbidity from shipping and industry
- The impacts of oil waste on marine life and the littoral zone may also be considered.

To access bands E and F, answers should examine at least two sources and impacts, though do not always expect a balance.

Marks should be allocated according to the markbands.

Optional Theme C — Extreme environments

5. (a) (i) **Name the landform in the background of the photograph.** [1 mark]

Barchan dune or sand dunes or erg (also accept sand sea) [1 mark].

- (ii) **State two processes of wind transport found in areas such as this.** [2 marks]

Responses should identify two of the following processes: suspension, saltation, rolling/traction of sediments.

- (iii) **State the direction from which the wind normally blows.** [1 mark]

East.

- (b) **Explain the occurrence of flash floods in areas like the one shown in the photograph.** [6 marks]

Rainfall intensity [1 mark] exceeds infiltration capacity [1 mark] generating surface runoff/overland flow/flooding [1 mark].

Award additional marks for extra detail of the processes and/or the factors promoting them in an arid environment *e.g.* summer convection rainfall; unvegetated desert surfaces thus less interception and infiltration; concentrations of water in wadis, gullies or channels; presence of desert crusts and other barriers to infiltration.

- (c) **“The opportunities for tourism outweigh the challenges.” Discuss this statement with reference to one extreme environment.** [10 marks]

Answers should examine both opportunities and challenges for tourism in either “cold and high altitude environments” or “hot, arid environments”.

In desert regions the opportunities may focus on scenery (dunes, salt flats, canyon lands), indigenous culture and outdoor pursuits, for example.

Challenges may include extremes of temperature, accessibility, water shortages and a lack of resources to sustain tourism.

In cold or high altitude regions opportunities may focus on skiing and other outdoor activities, scenery and the indigenous people who inhabit such regions. The challenges may include remoteness, power supply, access and the mitigation of natural hazards such as landslides and avalanches.

While examples are not a specific requirement of the question, those answers that provide supporting examples are likely to access the higher markbands. At least two opportunities and challenges should be given for the chosen environment but the marks need not be allocated equally. For band E and above a clear conclusion is expected.

Marks should be allocated according to the markbands.

6. (a) (i) Define *glacial environment*. [2 marks]

Definitions may include any two of the following, [1 mark] each:

- Area covered with snow and ice
- Permanent/long term basis
- Area where glacial processes are operating
- Different scales include ice sheet, ice caps, glaciers.

(ii) Define *periglacial environment*. [2 marks]

Definitions may include any of the following, up to a maximum of [2 marks]:

- A region with widespread permafrost (permanently frozen) [1 mark].
- Without ice cover or an area on the edge of areas permanently covered by ice/glaciers [1 mark].
- Distinctive periglacial processes and/or landforms [1 mark].
- May have categories – continuous, discontinuous, sporadic [1 mark].

(b) Explain how and why glaciers retreat. [3+3 marks]

Glaciers retreat when the ablation of ice [1 mark] exceeds [1 mark] the accumulation of snow and ice [1 mark].

Possible reasons include: climate change, which may be attributed to natural or human causes; volcanic activity; changes in the tilt or orbit of the earth; sunspot activity; cosmic rays and changes in the position of the land masses (tectonics).

Award [1 mark] for each point made up to a maximum of [3 marks].

A list of points with no elaboration should only receive [1 mark].

Other valid reasons may be cited.

- (c) **“Periglacial areas offer more opportunities for human activity than glacial areas.” Discuss this statement.** *[10 marks]*

Periglacial areas, due to the lack of permanent ice, may offer opportunities for the extraction of minerals, and this is arguably being accelerated by climate change. They also offer opportunities for indigenous people (Inuit) who may herd reindeer in response to the seasonal climatic regime of freezing and thawing. Glacial areas also have opportunities. The opportunities may include tourism, outdoor pursuits, areas of outstanding natural beauty which are designated as parks, reserves of water and the generation of HEP.

Some candidates may choose to explore the net opportunities of each environment (looking at how opportunities outweigh challenges). This approach is equally valid.

Challenges may include the possibility of glacial surges, avalanches, landslides, road instability and flooding from glacial melt. While examples are not a specific requirement of the question, those answers that provide supporting examples are likely to access the higher markbands. Responses including explicit discussion of the statement are likely to be credited at bands E/F. It is likely that most responses will conclude by disagreeing with the statement but this is by no means the only possible conclusion. All responses should be judged strictly on their own merits.

Marks should be allocated according to the markbands.

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

7. (a) **Identify *two* of the hazards shown and explain your choice.** **[2+2 marks]**

A – earthquake – quakes last for seconds/minutes and affect a small area.

B – accept: **either** volcano – lasts for days to months; ash can affect a wide area
or hurricane/typhoon/cyclone – lasts for days – affects a wide area.

C – drought – lasts for months/years – affects a very large area.

Accept any other valid examples and explanations. The selection of a hazard not specifically named in the syllabus is likely to be self-limiting and requires no special action on the part of the examiner.

Allow **[1+1 marks]** for identification of the hazards and **[1+1 marks]** for justifications.

- (b) **Analyse the global distribution of *one* of the hazards you identified in part (a).** **[6 marks]**

The chosen hazard should be clearly stated. A global scale must be used in the analysis. Award **[2 marks]** for the description of the global pattern of the hazard and **[4 marks]** for the explanation of the distribution, with reasons for any variations in the pattern.

- (c) **Using examples, evaluate the success of adjustment and response strategies for a named hazard type.** **[10 marks]**

The named hazard should be clearly stated. Relevant adjustment strategies may include modifying the hazard or changing the loss potential through building design, warning systems or land-use planning. In addition, adjustments to the loss may be included in terms of spreading losses, planning for loss or simply bearing the loss. Not all of these need be included in a good answer. Response strategies could include short-term rescue, shelter and aid, medium-term restoration of infrastructure and long-term reconstruction and rehabilitation.

The strongest answers will refer to examples of strategies used before and after actual hazard events. Answers that do not use examples or that simply describe relevant strategies should not move above band D. To access bands E and F, at least one adjustment and one response strategy should be evaluated.

Marks should be allocated according to the markbands.

8. (a) **Outline the methods used to describe the magnitude (strength) of two hazard types.** *[2+2 marks]*

The most likely types selected will be earthquakes (Richter or Mercalli scale), volcanoes (VEI scale) and hurricanes/cyclones/typhoons (Saffir-Simpson scale). In each case allow *[1 mark]* for naming the relevant scale and *[1 mark]* for a brief description. Responses that refer to hazards not in the syllabus, such as tornadoes, but that outline the relevant scale, should be credited.

- (b) **Suggest three reasons why some people continue to live in places with a known hazard risk.** *[3×2 marks]*

Award *[1 mark]* for each reason stated (*e.g.* soil quality, poverty, lack of knowledge, historical inertia) and *[1 mark]* for an extended explanation or detail of the hazard risk.

- (c) **“Economic factors and not physical factors determine the severity of the impacts of hurricanes (typhoons, cyclones).” Discuss this statement using examples.** *[10 marks]*

A number of approaches are possible but most answers will refer to the contrasting effects of hurricanes on countries with contrasting levels of development. It is important that the answer refers to physical factors such as the strength of the hurricane, the size of the storm surge or the landscape of the area affected, as well as economic factors that may determine levels of preparation and protection, warning systems, evacuation, aid and recovery responses.

The strongest answers that access bands E and F should focus on at least two hurricane events and balance the relative importance of these factors in assessing the severity of the impact in terms of loss of life, environmental damage and loss of property (economic cost).

Answers that simply describe the impacts, or just describe physical and economic factors without discussing their relative importance, should not move above band D.

Similarly, answers that do not refer to examples should not be able to access bands E and F.

Marks should be allocated according to the markbands.

Optional Theme E — Leisure, sport and tourism

9. (a) Describe the pattern of birth places in 1990 and how it has changed by 2010. [2+2 marks]

In 1990, the focus is UK and Europe [1 mark] with an additional [1 mark] for quantification, clarification or elaboration.

There is a wider geographical distribution in 2010 than in 1990 [1 mark].

Award [1 mark] for quantification, clarification or elaboration *e.g.* North America had no players in 1990 but now has several.

Answers that attempt to list specific changes rather than describing patterns should be limited to [2 marks].

(b) Suggest *three* possible reasons why the sphere of influence of this league's supporters has grown in size since 1990. [3×2 marks]

The answer requires three separate, valid reasons. Possible answers include:

- Growth in popularity
- Increased advertising and marketing in new areas
- Increased exposure in different media
- Increased wealth and development allow for growth of new markets
- Impact of globalization
- Impact of global competitions sparking interest
- Greater population mobility.

Each valid reason should be credited [1 mark] with an additional [1 mark] for saying how the factor has altered the sphere of influence.

- (c) **“Local people do not benefit from hosting an international sporting event.”**
Discuss this statement. *[10 marks]*

Reasons to agree with the statement include:

- Organization of events is usually done at national or international level therefore some leakage can occur. Multinational investment and sponsorship prevents the needs of local people being met.
- Likely increase in local problems – traffic, house prices *etc.*
- Effects are short term and interest in local issues wanes after event.

Reasons to disagree with the statement include:

- Legacy of investment in infrastructure and amenities for use by the community
- Employment provided
- Inward investment
- Requirements for sustainable development are more likely to be met.

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

To access bands E and F, responses should present a balanced discussion that consider both reasons to agree and disagree with the statement and may realize that some benefits are not always clear cut and have a temporal aspect – short term/long term.

Marks should be allocated according to the markbands.

10. (a) Describe the changes in international tourist arrivals shown in the graph. [4 marks]

Overall, the numbers have fallen over time [1 mark].

There is some growth until July 2008, [1 mark] then figures decline sharply [1 mark].

Award additional marks for any of the following:

- Some attempt at quantification
- Noting that highest growth is in February 2008
- Noting that April 2008 is an anomaly with greatly reduced growth
- Biggest decrease is in March 2009, or other valid points.

(b) Explain *three* reasons why international tourist arrivals can change in *one* named rural or urban location. [3×2 marks]

Possible reasons for a decrease include:

- Security concerns
- Rise of alternative attractions
- Stagnation or decline phase of Butler's model
- Decline in investment
- Environmental decline or hazard
- Pandemics
- Adverse exchange rates.

Possible reasons for an increase include:

- Media
- New facilities
- New investment
- Government policies
- Loss of alternate destinations
- Favourable exchange rates.

[1 mark] should be awarded for each basic reason stated and [1 mark] for additional explanation, clarification or elaboration.

- (c) **“Most recreational and sports facilities in urban areas are located near the city centre.” Discuss this statement.** *[10 marks]*

There are many possible approaches to this question and the candidate’s argument and conclusion are likely to depend on the examples chosen for discussion.

In many cities, facilities for recreational activities (such as swimming pools and gyms for fitness training, for example) tend to be well developed in the city centre.

Facilities for spectator sports may depend on the age of the stadium. Older stadiums tend to be nearer the city centre (and therefore often experience traffic problems) than newer stadiums, which tend to be built on larger, less expensive sites, situated near the edge of the city, and close to inter-city or international communication links.

Participatory sports facilities such as tennis courts, golf courses and sports fields tend to reflect the distribution of residential areas, and are often absent from industrial or commercial zones.

It is not necessary to discuss the complete range of recreational and sports facilities, provided that enough variety is considered for some realistic conclusions to be reached.

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 F — The geography of food and health

11. (a) (i) **State *one* other indicator besides infection rates which could be used to map the health of people in this city.** **[1 mark]**

Award **[1 mark]** for any valid indicator that might produce a spatial pattern. Possible answers include the number of people per doctor (or per clinic/hospital) in each zone; life expectancy or infant mortality rate in different districts. Accept other valid responses.

- (ii) **Referring to the map, describe the pattern of this disease in the city.** **[3 marks]**

This disease is concentrated in the north-eastern sector of the city (Gajrawadi, Fatepura, City and Panigate) **[1 mark]**. Rates are low in the west of the city (Belbaug, Subhanpura and Sayajigunj) **[1 mark]**. Some responses may also identify the mid-range concentration forming a north-south belt (Raopura, Shiyabaug and Sindhvaimata Road). Award up to **[2 marks]** for the recognition of the general pattern with **[1 mark]** reserved for specific reference to the map.

- (b) **Explain *three* possible reasons, *one* environmental, *one* social and *one* economic, for this pattern.** **[3×2 marks]**

Examples of possible reasons include:

Environmental: high rate areas may be at lower altitude, where water collects, or may be on unstable ground where water pipes frequently rupture, contaminating the water supply.

Social: people living in overcrowded conditions may be more likely to share contaminated water sources and catch the disease; different ethnic groups may have differing views about drinking untreated water.

Economic: people living in high-rate areas may be less affluent, and therefore unable to afford preventative measures such as water purification or vaccination, and may have to work even during an epidemic, increasing their chances of catching the disease.

Award **[1 mark]** for each valid reason, and a further **[1 mark]** in each case for any valid development or detail.

- (c) **“Poverty is the main cause of food insecurity.” Discuss this statement.** *[10 marks]*

Answers are expected to consider both sides of this question. Poverty may cause or exacerbate food insecurity because families in poverty may be unable to afford food even though supplies are (physically) available. Poverty makes it unlikely that families can retain a reserve of food to tide them over bad times, or guarantee them seeds for planting the following year. On the other hand, food insecurity may also be caused by natural hazards, such as droughts, reducing food availability, or by earthquakes and hurricanes disrupting food supply chains and normal distribution channels. Food insecurity may also result from wars, conflicts, and from external forces such as the actions of NGOs and effects of government subsidies.

While it is likely that most responses will conclude by agreeing with the statement, this is by no means the only possible conclusion. All responses should be judged strictly on their own merits.

Responses that discuss both sides of the question and arrive at a conclusion in line with the evidence selected are likely to be credited at bands E/F.

Marks should be allocated according to the markbands.

12. (a) (i) **State the year when the index of total food production was greatest.** [1 mark]

Accept either 1996 or 1997 [1 mark].

- (ii) **State the value of the food index per person in 1970.** [1 mark]

Accept any answer in range 140–150 inclusive [1 mark].

- (b) **Describe the trend in total food production shown on the graph.** [2 marks]

Total food production is rising [1 mark] with another [1 mark] for quantification or recognition of any anomaly.

- (c) **Suggest reasons for the trends in total food production and in food production per person from 1962 to 2010.** [6 marks]

Award [1 mark] for a brief description of each valid reason, and a further [1 mark] for developing it by means of example, explanation or detail. Both total food production and food production per person must be covered, though not necessarily in equal depth for the awarding of the full [6 marks].

Possible reasons for the increase in total food production include: a greater area of land under cultivation due to land improvement (drainage, irrigation) or land clearance; higher crop yields due to better agricultural techniques; the application of fertilizers, biotechnology or improved seeds; higher productivity due to effective pest control measures or application of improved technology.

The main reason for the decline in food production per person is an increase in population, which in turn may be due to either natural increase or in-migration.

Some answers may refer to the anomalies. This is also acceptable, but reasons for anomalies such as natural hazards, wars and plagues, should not receive more than [2 marks] out of the total [6 marks] available.

(d) Examine the geographic connections between food availability and health. [10 marks]

There are many links between food availability and health. Health is generally better in areas of higher food availability: vitamin and calorie-deficiency diseases would be less likely; immune systems would be more robust; recovery from disease faster. On the other hand, too much food being available can lead to other health issues related to being overweight or obese. Greater food availability is often linked to economic development. Assuming this link is made explicit, responses may legitimately include reference to related aspects such as improved medical care, vaccinations and preventative measures.

Some responses may subdivide food availability into different categories, such as economic food availability and physical food availability. However, this is not necessary for the awarding of full marks.

To reach bands E and F, responses should look at health issues in relation to shortage and excess food availability.

Marks should be allocated according to the markbands.

Optional Theme G — Urban environments**13. (a) Describe the pattern of deprivation shown on the map. [3 marks]**

Points made for [1 mark] each could include:

The two largest areas of “most deprived” (category 5) is south of Eastside and Grandview, stretching as far as the north arm of the Fraser River. The northern part of this area (Eastside) borders the CBD. The largest areas of “least deprived” (category 1) are Westend, Kitsilano and Shaughnessey. Parts of North Vancouver, Edmonds and Richmond also stand out as having relatively little deprivation (category 2). In general, despite exceptions, areas towards the edge of the city tend to be less deprived than areas in the centre of the map.

Award [1 mark] for each valid point. Some place names must be included for the awarding of the full [3 marks].

(b) Explain how and why the pattern of deprivation might differ for a city in a low income country. [2+5 marks]

Responses are expected to compare patterns of deprivation found in a city that is less developed than Vancouver, Canada. Accept any reasonable interpretation, including NICs.

Responses should clearly include an explanation of how the pattern would differ for a maximum of [2 marks]. The most likely responses include:

- Least deprived areas are more likely to be found in central areas, and more deprived areas nearer the urban fringe (reversal) [1 mark].
- Transport lines could lead to the formation of linear belts of deprivation [1 mark].
- It may be less easy to identify a pattern – more likely to respond to local factors than comply to a pattern *e.g.* slums also in / around CBD [1 mark].

Candidates are expected to offer at least two developed explanations for the differences identified, up to a maximum of [3 marks] for any one idea, although a wider range of shorter explanations is also acceptable. Reasons why the pattern may differ include:

- Centripetal forces attract population to the city in contrast to the centrifugal forces in most cities in rich countries – levels of deprivation are therefore likely to be higher.
- Land available for housing development by growing population is found at urban fringe (where claims to ownership may not have been formally expressed).
- Poor transport infrastructure means land close to the commercial centre is valued highly by high-income groups meaning that less deprivation is found there.
- Lack of planning and governance leads to a more informal and pragmatic approach to development, making it harder to identify overall patterns.

An annotated sketch map may substitute for text.

- (c) **Evaluate *one or more* sustainable strategies designed to improve life in urban areas.** **[10 marks]**

The sustainable strategy chosen is likely to be one that addresses either a social issue (housing quality), environmental issue (air, water, land resources) or overall city growth (and in-migration) – in ways that seek to maintain and improve the quality of life for current and future urban dwellers.

Responses should go beyond mere description of a management strategy. Answers should provide effective evaluation, addressing both positive and negative aspects of the strategy, the problems encountered and some conclusion on the success of the scheme. Answers that do all of this will access bands E/F.

Answers that evaluate an urban management strategy that is not explicitly sustainable (does not mention future generations or ecological footprints *etc.*) should be limited to band D.

Marks should be allocated according to the markbands.

14. (a) **Identify *two* possible additional inputs and *two* possible additional outputs for the linear system.** **[4 marks]**

Inputs: water, land, timber, food. **[1 mark]** for each. Do not credit “resources”.

Outputs: sewage / water waste, water pollution, industrial waste. **[1 mark]** for each. Do not credit “waste”.

Accept other valid suggestions.

- (b) **Explain why the circular system has a reduced urban ecological footprint.** **[6 marks]**

Credit understanding of “urban ecological footprint”, defined as the amount of land required **[1 mark]** to provide the resources the city needs **[1 mark]** and to dispose of waste produced by residents and businesses of the urban area **[1 mark]**.

Specific ways of achieving this include:

- Circular system has reduced inputs and outputs, thus requiring less land to provide resources and to dispose of or mitigate waste products.
- Less energy is required to transport resources and waste materials.
- Increased recycling allows for reduction in both inputs and outputs.

There may be other valid responses.

- (c) **Examine the dominant population movements and their consequences for one or more urban areas.** [10 marks]

Dominant population movements are likely to be either centrifugal or centripetal. These have a range of impacts on land use patterns and social, economic and environmental conditions in cities.

Centrifugal (moving out): suburbanization and counter-urbanization may cause increased urban sprawl and consumption of surrounding fertile land, increased journey times and therefore traffic congestion and associated pollution. The associated spiral of decline in central urban areas may be discussed – lack of investment in the physical environment including housing stock, loss of retail activity to meet customer location, in-migration of minority groups, increased unemployment and crime.

Centripetal (movement into the city and re-urbanization): caused by the “gravity” of the city. Consequences include rapidly increasing population and therefore demands for housing, services and resources including water. Housing needs met by unplanned settlement and overcrowding of existing housing stock. Pressure on services such as water, health, refuse disposal and education increases, leading to significant unmet demand. Despite these factors, migrants may experience increased opportunity and standard of living leading to permanence.

Responses could either focus on only one movement and its consequences or could contrast movements in different locations. Answers should refer to at least one specific example.

Responses that describe the dominant movement(s) and discuss a range of associated consequences are likely to reach bands E/F.

Marks should be allocated according to the markbands.
