



Written Response Test

Marking scheme

9th International Geography Olympiad

Cologne, Germany

August 21 - August 27, 2012

Marking scheme - overview

section A	section B	section C	section D	section E	section F
1 - 2m	1 - 1m	1 - 3m	1 - 3m	1 - 4m	1 - 4m
2 - 1m	2 - 1m	2 - 3m	2 - 8m	2 - 1m	2 - 2m
3 - 4m	3 - 1m	3 - 3m	3 - 4m	3 - 3m	3 - 3m
4 - 1m	4 - 9m	4 - 2m		4 - 1m	4 - 6m
5 - 1m	5 - 3m	5 - 4m		5 - 1m	
6 - 2m				6 - 3m	
7 - 4m				7 - 2 m	
15 marks	15 marks	15 marks	15 marks	15 marks	15 marks

Marking

Q	Answers	Marks
---	---------	-------

Section A - Urbanisation and the Rise of Megacities

1 2 marks

1 mark for 'Urbanisation' is the increasing percentage or proportion of a given population (of a country / region / world) living in urban areas.

1 mark for 'Urban growth' is an increase in an urban population or could allow increase in an urban area or an increase in the number of urban centres.

2 1 mark

½ mark each for 2 correct reasons

- different boundaries defined for the urban area
- large numbers of people in informally settled areas (squatter settlements) make accurate census counts difficult.
- no official census, so figures may be using different estimates.
- Difficulty in counting homeless
- Not registered or enrolled but actually live there
- Errors in data
- Tourists or other temporary residents

3 4 marks

- mark for push factors 1
- mark for pull factors They don't necessarily need to use these terms as long as they use words/phrases that give the same meaning 1
- ½ mark each for 2 examples of a push factor - rural poverty; landlessness (transfer of land from subsistence to mono-cropping for export); lack of medical facilities; lack of educational opportunities; civil disorder; others ½ + ½
- ½ mark each for 2 examples of a pull factor - employment opportunities; medical facilities; educational opportunities; higher standard of living; others. Variations of the same thing (e.g. lack of educational opportunities as push, and educational opportunities as pull) should only count once. ½ + ½

4 1 mark

50%

5 1 mark

55% (54.9)

Q	Answers	Marks
---	---------	-------

6 2 marks

1/2 mark for each. At least one of the trends should identify a difference between megacities in more and less developed countries. If not, a student can get maximum of 1½ marks.

- Number of megacities grew steeply between 1975 and 2009
- The rate of increase in the number of megacities will slow between 2009 and 2025
- Proportion of megacities that are in developing countries is increasing; or, most cities reaching megacity size are in less developed countries; or growth in number of megacities in Asia/India and China.
- The fastest growing megacities are in developing countries.
- The number of very large megacities (over 20 million) will increase significantly by 2025
- The population of each individual megacity is increasing.
- Growth of number of megacities in general
- Other valid trends – check with group leaders.
- Very few megacities in African countries
- Indian cities are the fastest growing.

7 4 marks

- 1 mark for any reasonable factor e.g. . 1
Provision of housing; basic infrastructure, such as water supply, electricity or public transport; waste disposal/sanitation; air, water and noise pollution; crime levels; retaining green space/natural environments; generating employment; retaining historic areas/cultural heritage; other credible answers (check with group leaders)
- 3 marks for discussing why it is a challenge to manage, 3
Lack of planning; difficult to manage where people settle; increasing costs whilst many inhabitants not paying taxes; overcrowding leads to poor living conditions and greater risks to health; this can lead to increased pressure on hospitals; doctors, etc.

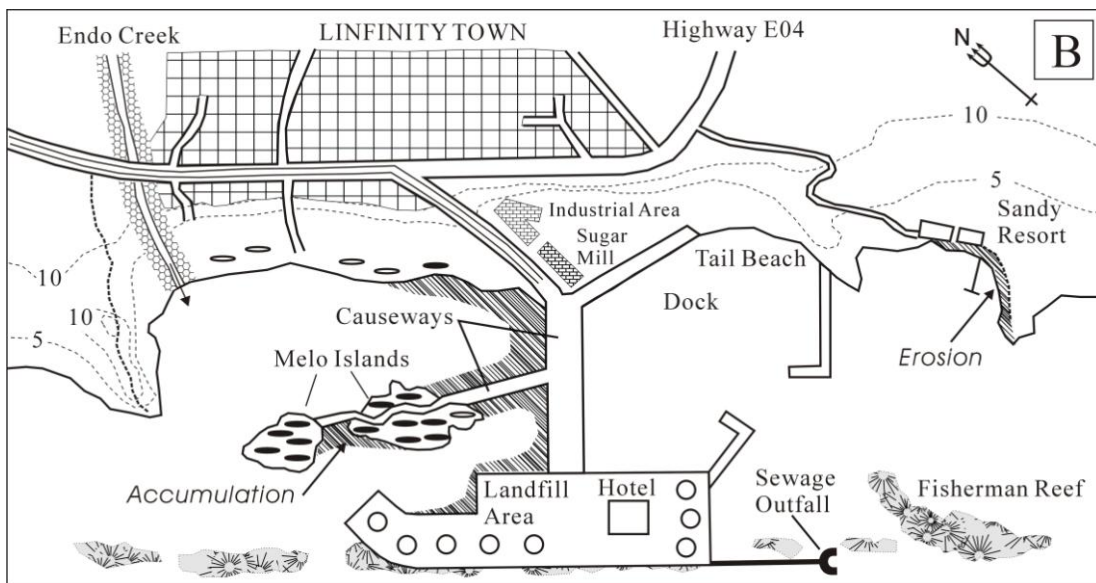
Section B - Impacts of Coastal Development

1 1 mark

Arrow on map pointing south east

2 1 mark

The new port and hotel/chalet complex will trap sediments on their western sides. Thus, beach will be created on the western side of the causeway and artificial dock walls. (See map)



3 1 mark

As less sediment will travel to south eastwards, therefore, Sandy Resort will be robbed of its beaches, and the wave's erosion force will increase. Sandy Resort will face the problem of coastal erosion. (see map)

4 9 marks

6 of samples below – ½ mark for identifying a development element and one mark for saying what it's impact is and why. (e.g. destroying sandbank at river mouth (1/2 mark) , and extra ½ mark for saying how (e.g straightening the river will increase its flow rate).

- Straightening the river - will increase the river's flow rate and destroy the natural sandbank near the river's mouth
- Construction of the causeway – increased turbidity during construction will kill seagrass beds. Construction of the causeway will physically destroy the seagrass beds that were located where the causeway is built. The causeway will interfere with natural sand movement, causing accumulation of sand in some areas and erosion in others. Accumulation of sand would also smother seagrass beds.

Q	Answers	Marks
---	---------	-------

- New industrial area and sugar mill – likelihood of increase in polluted run-off into the sea, damaging seagrass beds and reef; also likely to affect air pollution because of heavy vehicle traffic
- Resort apartments replacing vegetable plots – this could have a potentially positive impact as run-off from fertilizer may be reduced, if sewage from the resort apartments is properly treated.
- New docks – increased shipping is likely to have a negative impact on water quality and so impact on the seagrass and reef ecosystems
- Holiday villas on Melo Islands – depending on the prior condition of these islands, the villas may displace natural ecosystems
- Expansion of the town – greater population is likely to cause more pollution to flow into the sea, damaging seagrass beds and reefs
- Upgrading roads – air pollution from increased traffic, water pollution from road run-off, given proximity to sea
- Hotel landfill area - Moving sediments to create new land will increase the turbidity of the water, and directly affect the photosynthesis process of the coral reef. Construction of the landfill area will physically destroy the reefs that were located where the landfill area is built.
- Hotel's sewage outfall (or hotel) - The hotel/chalet complex will put sewage and pollutants into the sea, and damage the reef and seagrass ecosystems.
- Reclamation destroys the sea grass and the reef, etc.

5 3 marks

1 mark for each valid impact

- Increase in construction will bring extra jobs to the area.
- New industries, e.g. sugar mill will provide extra jobs.
- New industries and increased population will lead to increase in service industries
- Population of area will increase because of new jobs.
- New schools and health facilities required because of increased population; or, increased population of area will place a strain on schools, health and other community facilities.
- Increased traffic on roads may lead to congestion.
- More services coming to the town due to population increase.
- Rise in crime rates because of increased population
- Improved transport infrastructure (road and sea) will bring opportunities for new and enlarged industries.

Section C - Climate and Climate Change

1 3 marks

1 mark for each correct reason

- Location far from equator causing low incoming radiation from the sun (insolation)
- High albedo due to snow/ice cover – incoming radiation reflected back into atmosphere. [It is OK for the student to describe albedo without necessarily using the technical term.]
- Cold winds from the Polar high pressure area; or, cold sea currents [These 2 cannot be counted separately. Students will need to include both the low sun angle and albedo, plus 1 of winds or currents to get full marks.]

2 3 marks

Describe three elements:

- Circulation to the north (warm) ½
- Circulation to the south (cold) ½
- Circulation on the surface ½
- Circulation in the bottom (down) ½
- Change in the density – cooling, freezing, salt (one of these) 1

Description

Thermohaline circulation is driven by differences in density.

Warm salty surface water flows north from the Atlantic Ocean towards the Arctic. As the water flows north, heat picked up in the tropics is transferred into the atmosphere and the temperature of northerly seas is raised. This means countries in northwest Europe such as Norway and Denmark experience more temperate climates than their latitude suggests they should.

The Atlantic water cools as it approaches the Arctic. A combination of evaporation into the atmosphere and cooler Arctic temperatures increase the water's density. That density is further increased by brine (salt saturated water) dripping from the sea ice as it forms.

This water eventually becomes so dense it overturns – sinking down into the depths of the Arctic Ocean to begin flowing south again. This process is known as North Atlantic Deep Water formation. It is vital to thermohaline circulation.

3 3 marks

1 mark for each identified pattern with additional credit for naming areas, e.g. Greenland, Pacific Ocean.

- The Arctic Ocean is warming the most of any area in the world, by 6 degrees C or more in the 100 years to 2099.

Q	Answers	Marks
---	---------	-------

- Land at the same high latitudes (e.g. Greenland and Antarctica) is not warming as much as the Arctic Ocean
- In other areas of the world, in general land areas are warming at a higher rate than their surrounding seas, e.g. Australia, Africa.
- The areas of the world which are projected to warm the least by 2099 are in oceans i) a wide continuous band in the southern oceans from about 30 to 60 degrees South, and ii) an area in the North Atlantic Ocean from about 40 degrees to 60 degrees North. [Students may describe these areas in relation to adjacent named landmasses, rather than latitudes.]

4 2 marks

1 mark for the fact that melting of the ice, means that the short wave solar radiation is no longer reflected but absorbed (differences in albedo), resulting in heating of the Arctic Ocean.

1 mark for the fact that this warming means that more ice is melted, further reducing the albedo, leading to further warming, and so on, that is, a positive feedback loop,

5 4 marks

1 mark for each full explanation given

Energy

- Replacing fossil fuels by a variety of alternative energy sources like wind power, solar energy, biofuels, heat pumps, etc, will result in less CO₂ being released into the atmosphere, thus reducing the potential warming.
- More efficient use of energy, including reduced use of energy. This includes insulation of houses, energy efficient machines, energy saving pulps etc. As much of the energy used is derived from fossil fuels, reducing the amount of energy used will result in less CO₂ being released into the atmosphere, thus reducing the potential warming.

Transport

Increase numbers of electric cars. As long as the electricity is derived from non-fossil fuel sources, this will result in fewer greenhouse gases (CO₂, CO) being released into the atmosphere, thus reducing the potential warming.

Subsidies for hydrogen-fuelled cars. These produce no greenhouse gases during operation and so will result in fewer greenhouse gases being released into the atmosphere, thus reducing the potential warming.

Q	Answers	Marks
---	---------	-------

Make it easier for people to use bicycles to commute. Same explanation as hydrogen cars.

Provide incentives for people to use public transport. Public transport is a more efficient way of moving people – ie uses less energy to move the same number of people than in cars. Public transport options often don't use diesel/petrol, e.g gas-powered buses, electric (which can derive from non-fossil fuels) trains. These factors mean that less greenhouse gases are produced, thus reducing potential warming.

Transfer freight to railways. More efficient way of moving freight. Same explanation as public transport.

Agriculture

Assisting farmers to switch to crops that better suit the new climate will mitigate the effects of climate change in that essential food production will be maintained. This will also assist farmers to retain their source of income.

Opening up new areas which become suited to cropping because of changes in temperature or rainfall, eg northern Canada and Russia. This will mitigate the effects of climate change in that essential food production will be maintained.

Research programmes to breed cattle that emit less methane, a powerful greenhouse gas. Less greenhouse gases being released into the atmosphere will reduce the potential warming.

Provide better irrigation

Improved protection against floods and landslides

Improving efficiency of production of foodstuffs for livestock

Q	Answers	Marks
---	---------	-------

Section D - Vulnerability to Natural Hazards in the Pacific Islands

1 3 marks

½ mark for each of 2 correct answers in each row

At risk from	Country or territory name
Only earthquakes	1: Nauru 2: Kiribati 3. Indonesia
Only earthquakes and tropical storms	Any two of: Tuvalu, French Polynesia, Cook Islands, Niue, Fiji, New Caledonia, Norfolk Island, Wallis and Futuna
Earthquakes, tropical storms and volcanic eruptions	Any two of: Papua New Guinea, Vanuatu, Samoa, American Samoa, Solomon Islands, Tonga

Q	Answers	Marks
---	---------	-------

2

8 marks

2 marks for each factor – must give 2 natural and 2 human, and assign to correct category. ½ mark for identifying factor correctly then ½ or 1 for explanation + ½ for example then = 2 x 4 = 8

Factor	How the factor contributes to vulnerability
Natural Factors: Elevation or height above sea level	Low lying islands are at more risk from tropical cyclones, storm surges, rising sea levels, tsunamis. <u>Tuvalu and Tokelau are only 5m</u> above sea level and could be completely flooded from a cyclone's storm surge which would destroy both homes and crops meaning the whole population would be vulnerable. By contrast, <u>Fiji is much higher (up to 1 324m)</u> and people have the opportunity to move inland and/or not all crops would be flooded.
Land Area	Small islands such as <u>Nauru (21 sq km)</u> have an increased chance of the whole island being affected by a large event such as tropical cyclone, volcanic eruption, earthquake, etc since these events can often affect a large proportion of the island. Larger islands like <u>PNG at 462 840 sq km</u> are more likely to have areas that aren't affected and people from those areas can assist those in areas that are affected.
Island Type	The type of island will partly determine what type of hazard may affect it and to what degree. Atolls such as <u>Tokelau</u> are more at risk from tsunamis and tropical cyclones since atolls are low-lying and could be completely flooded by high seas, whereas Plate Boundary (Continental) islands, such as PNG, are likely to be affected by earthquakes. Volcanic Islands such as <u>Tonga</u> are more likely to be affected by eruptions or landslides which are very unlikely to affect atolls. At least 2 types for a strong explanation (ie. Need to compare)

Q	Answers	Marks
Human: Percent Urban (urbanisation)	The higher this percentage, the more people are at risk since they are often concentrated into densely populated areas. Urban centres are often in coastal locations which can also increase the risk of coastal hazards and tropical cyclones. <u>Nauru and Guam have highly urbanised societies (100% and 95%)</u> meaning their entire populations are concentrated in one small area and entirely at risk. Urban areas may also have squatter settlements and therefore greater numbers of people who are not adequately able to cope with such hazards compared to many rural communities.	
Population	Countries such as <u>Tokelau</u> with very small populations (<u>1,170</u>) don't have the infrastructure or specialists to cope with severe natural disasters without outside aid. Higher population means potentially more casualties.	
Population Density	Countries with relatively high population densities have a larger percentage of their population at risk from localised hazards, e.g. earthquakes. Concentrated population in small area leads to increased risk.	

3 4 marks

1 mark for each strategy (up to 2), and 1 mark for each explanation as to how the strategy could reduce damage and loss of life

- risk assessment and community preparedness, educating people about risks and what to do, eg. Earthquake drill. If people already know what to do when a hazard occurs, then they are more likely to do that during an emergency, e.g. knowing to move to a cyclone-proof building in advance of the cyclone hitting; people close to the sea knowing to move to higher land after feeling a strong earthquake. This will reduce loss of life.
- monitoring systems and warnings – radio alerts. E.g. meteorologists tracking a cyclone and warnings of an approaching cyclone then being broadcast on radio. These give people more time to prepare - get to a safer area and prepare their buildings (e.g. cyclone shutters) thus leading to less loss of life and less damage,
- engineering for mitigation, e.g. improved flood defences, earthquake-proof buildings. These potentially stop damage occurring to more high-value property, and protect the population.
- islands collaborating to provide more resources (capital, human) to build better defences, e.g. cooperating to deploy the buoys in a tsunami-warning system that spans multiple countries; sharing personnel and equipment for finding and recovering people trapped during an earthquake.
- Land use zones, building in more suitable, less vulnerable areas.

Watch for repeated ideas, eg. Moving inland/moving to higher ground both relocation.

Q	Answers	Marks
---	---------	-------

Section E - Rivers

1 4 marks

- Traction (1/2) where large bedload - boulders, cobbles, larger pebbles (1/2) - is rolled along the bottom (1/2). Only really occurs at high discharge (1/2). Distance travelled is relatively short (1/2)
- Saltation (1/2) where smaller items of bedload - smaller pebbles, gravel, sand -(1/2) bounce/hop along the river bed (1/2); local changes in flow lead to it being dropped and then picked up again (1/2).
- Suspension (1/2) where finer sand, silt, clay (1/2) is carried within the water itself (1/2).
- Solution (1/2) where certain rock types, e.g. chalk, limestone (1/2) are dissolved (1/2) in the slightly acidic river water (1/2).

Note

Students need to identify 4 processes (by getting at least ½ mark for each process), to get full marks. They can add other marks (up to a maximum of 4 for the total) by getting extra marks for details of some processes, up to a maximum 2 marks for any one process.

Students who only identify 3 processes can only get max 3 marks; students who only identify 2 processes can only get max 2 marks; students who only identify 1 process can get only max 1 mark.

2 1 mark

Tracing provided

A curved 5 cm isoline must touch the 5s on the sketch, be on the correct sides of the 3s and 6s, and extend to the margins. Only careful accuracy gets full mark.

3 3 marks

- The lower velocities are found near to the banks and the surface where the water is slowed down by friction 1
- On the inside of the meander depths are shallower and velocity of the water slows so that deposition occurs 1
- On the outside of the bend the water travels more quickly and erodes the bank, giving a steeper profile 1

4 1 mark

Diagram provided

5 1 mark

Between 0.6 and 0.7 cm/sec

Q	Answers	Marks
---	---------	-------

6. 3 marks

Only give marks for explanation NOT description

Relates to size (ie width) and shape. Upper part of river valley is steep-sided, V-shaped and narrow. Profile is caused because vertical erosion is dominant. (1)

In its middle part the profile is wider in cross-section and flatter in shape as the river begins to erode laterally because of increasing discharge and closer to base level (1)

Lower part is wide and flat with low valley sides as the river approaches its mouth discharge increases and there deposition of finest material.

Gradient is gentle. (1)

7 2 marks

Explanation key here.

- Potholes are circular shaped; cylindrical; vary in depth; some merge with each other; some are exposed above the river level. The water can be seen to be swirling/eddy. This creates a shallow hollow that is deepened by the same process 1
- The water contains some of the load being carried by the river and this hits the base and sides of the hole to both widen and especially deepen it, smoothing the edges. This is an example of the abrasion process 1
- It is most effective at times of high velocity and discharge. As vertical erosion is the dominant process, potholes tend to form well above base level where potential energy is relatively high 1

Q	Answers	Marks
---	---------	-------

Section F - Agriculture

1 4 marks

On-site (2 marks, ½ for each)

- Reduction in soil quality because of the loss of nutrient rich upper layers
- Reduced water holding capacity
- Removal of finer soil particles
- Increase in erosion by eg. Gullying because of lack of vegetation cover
- Reduced agricultural capacity
- economic, less production
- Landslide

Off-site (2 marks, ½ for each)

- Movement of sediment into water courses
- silting up of dams
- destruction of ecosystems of lakes
- contamination of drinking water
- increased downstream flooding
- other valid impacts – check with group leaders
- economic and social eg. Famine, sandstorms

2 2 marks – 2 forms of degradation, ½ mark for identifying, and ½ mark for describing effects

- Soil salinization, often caused by irrigation farming or land clearing, leads to a decline in soil fertility. Farmers have to change to more salt-tolerant crops, or in severe cases, the land becomes completely unusable. Salinization also damages farm infrastructure such as pipes and machinery.
- Desertification – can be caused by overgrazing (rapid population growth – increase in livestock number): vegetation destruction, but also by natural changes in local climate.. Farmers need to change their production, eg from crops to livestock, or in severe cases, abandon the land altogether.
- Soil contamination/pollution, for instance by overuse of pesticides. Remediation is expensive. The contamination limits what can be grown on the land in the future. For instance land treated with a lot of pesticides to grow sugar, can't then be used for growing vegetables.
- Other valid forms of agricultural degradation – check with group leaders

Q	Answers	Marks
---	---------	-------

3 3 marks

- Image A Brazil
- Image B Saudi Arabia
- Image C Vietnam
- Image D Ireland
- Image E Spain
- Image F Bolivia

4 6 marks

- Image A: Brazil. The near horizontal light area shows the main road through the darker dense rainforest. Lines at right angles to these are logging roads cut into the forest. Logging has taken place either side of the roads, and the farmers have followed, planting their crops into these cleared areas as these are the most accessible. 2
- Image B: Saudi Arabia. Rotational irrigation from a central source produces a fertile circular area that is cultivated (dark patches). The light areas around the circles are the un-irrigated desert/arid areas 2
- Image C: Vietnam. The image shows rice paddies with raised banks between the fields to enable flooding of individual fields. Canals visible which are used for irrigation; each field is accessible from the river/canal. The small size of the paddies reflects the largely un-mechanized intensive farming methods. 2