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Section A

This question is compulsory.

- 1 (a)** Study Fig. 1, which shows a photograph of a coastal stretch in Tajung Lobang, Sarawak.



Fig. 1

- (i) Draw a field sketch of the view shown in Fig. 1 from the same perspective. Annotate the main coastal features and processes of the coastal stretch. [4]
- (ii) A group of students studying this stretch of the coast went on a field trip during their June holidays. They wanted to investigate how sediments may be transported along this stretch and carried out a fieldwork investigation.
- Suggest a hypothesis about how sediments are transported along this coastline. [1]
- (iii) With the help of a diagram, describe how the students should go about the investigation to test the hypothesis stated in (ii). [5]
- (iv) Describe some of the challenges the students may face in their fieldwork

investigation along this coastal stretch.

[3]

- (b) A group of Secondary 4 students went to Marina Bay Sands to investigate on the reasons why tourists visit Singapore. Fig. 2 shows the data collated from the responses of tourists from four different countries.

Reasons for Visit	Indonesia	Malaysia	China	Australia
Food	35%	20%	25%	43%
Transport facilities	20%	14%	0%	10%
Shopping	30%	25%	35%	17%
Cultural and eco-attractions	15%	36%	30%	25%
Other attractions	0%	5%	10%	5%

Fig. 2

- (i) Using Fig. 2, construct a pie chart to represent the data from the Chinese tourists' responses. [3]
- (ii) State the advantages and disadvantages of using a pie chart to represent data. [3]
- (iii) Suggest how the students obtained the data in Fig. 2. [2]
- (iv) Fig. 3 shows the results of the bipolar survey carried out by the students with both tourists and locals at Marina Bay Sands.

Bipolar survey on the perception of Marina Bay Sands						
Positive aspects	+2	+1	0	-1	-2	Negative aspects
Pleasant surroundings	16	1		1		Unpleasant surroundings
Many shops and services	9	5			1	Few shops and services
Smooth traffic	6	7		3	2	Heavy traffic
Little litter	10	5		3	2	Much litter
Well-maintained buildings	13	6		2	1	Poorly-maintained buildings

Fig. 3

The students wanted to investigate the hypothesis, 'The built environment in Marina Bay Sands has positive effects on tourists' experiences.'

Using information from Fig. 3, comment on the validity of the hypothesis and support your conclusion. Suggest how the students might improve the way the bipolar survey was carried out.

[4]

Section B

- 2 (a) (i) Refer to Fig. 4 and describe the beach change rates in Barbuda. [3]
- (ii) Suggest possible reasons for beach changes experienced by the beach in Barbuda. [4]
- (b) Define *wave refraction* and explain how it affects wave energy at headlands and bays as shown in Fig. 5. [5]
- (c) Refer to Fig. 6, identify coastal landform A and describe its formation. [5]
- (d) Evaluate the success of hard engineering methods which have been put in place to protect the coastlines from erosion. [8]
- 3 (a) (i) Refer to Fig. 7, describe the distribution of coral reefs in the world. [3]
- (ii) Using information from Fig. 8 and what you have learnt, describe the pressures on coral reef ecosystems such as the Great Barrier Reef. [5]
- (iii) Suggest possible reasons why tourists are attracted to the Great Barrier Reef. [4]
- (b) Using information from Fig. 9 and other examples, explain how outbreaks of diseases and disasters lead to regional fluctuations in the tourism industry of a country. [5]
- (c) Assess the contributions of the planning authorities and non-governmental organisations in protecting tourist areas. [8]

Marking Scheme

Section A

This question is compulsory.

- 1 (a) Study Fig. 1, which shows a photograph of a coastal stretch in TajungLobang, Sarawak.

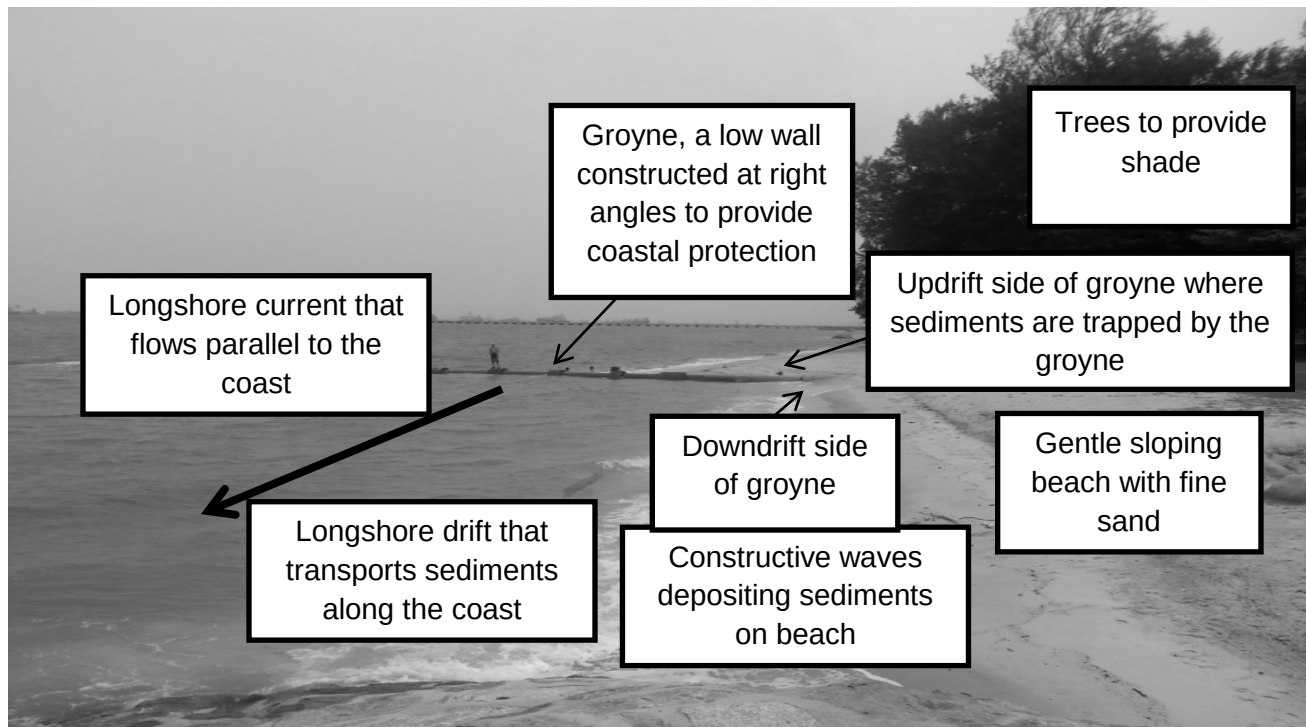


Fig. 1

- (i) Draw a field sketch of the view shown in Fig. 1 from the same perspective. Annotate the main coastal features and processes of the coastal stretch.

[4]

1m for feasible sketch with same perspective [reserve]
3m max for annotations [2 annotations@1m]

Possible annotations:

- 1m for gentle sloping beach with fine sand
 - 1m for constructive waves depositing sediments on the beach
 - 1m for trees to provide shade
 - 1m for longshore current that flows parallel to the coast [in the correct direction]
 - 1m for longshore drift that transports sediments along the coast [in the correct direction]
 - 1m for groyne, a low wall constructed at right angles to provide coastal protection
 - 1m for updrift side of groyne, accumulation of sediments
 - 1m for downdrift side of groyne, erosion of sediments
- [Accept other possible annotations]

- (ii) A group of students studying this stretch of the coast went on a field trip during their June holidays. They wanted to investigate how sediments may be transported along this stretch and carried out a fieldwork investigation.

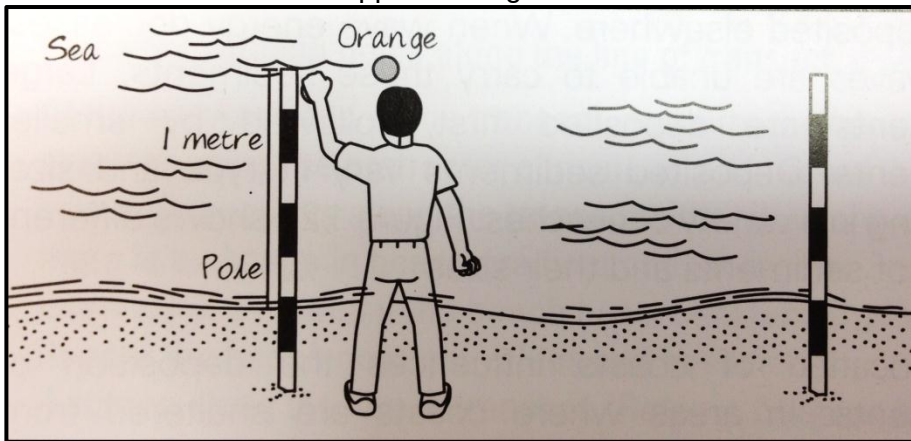
Suggest a hypothesis about how sediments are transported along this coastline. [1]

Sediments are transported along the coastline according to the direction of the longshore drift / Transport of sediments are influenced by wave movement along the beach [1]

[Accept other possible answers.]

- (iii) **With the help of a diagram, describe how the students should go about the investigation to test the hypothesis stated in (ii).** [5]

Credit 2m max for a well-supported diagram



Credit 1m each, max 4m

Investigation to test sediment transportation:

- Find a safe spot where the view of the open sea is not blocked and mark off two points with a ranging pole.
- At the first ranging pole, throw an orange a metre away from the water's edge.
- Observe the patterns of the travelling path of the orange for at least 10 minutes.
- Record the movement pattern on a recording sheet, paying attention to the series of swash and backwash
- Use a compass to determine the direction of the sediment movement to determine the direction of the longshore drift along the coastline

- (iv) **Describe some of the challenges the students may face in their fieldwork investigation along this coastal stretch.** [3]

Credit 1m each

- Presence vessels or ships moving along the coast may create unusual wave energies that can impact accuracy of recordings.
- Presence of groynes may interfere with movement of floating object in investigation
- Human inaccuracies in recording movement of object.
- Weather conditions could impede accuracy of recordings

[Accept other possible answers]

- (b) A group of Secondary 4 students went to Marina Bay Sands to investigate on the reasons why tourists visit Singapore. Fig. 2 shows the data collated from the responses of tourists from four different countries.

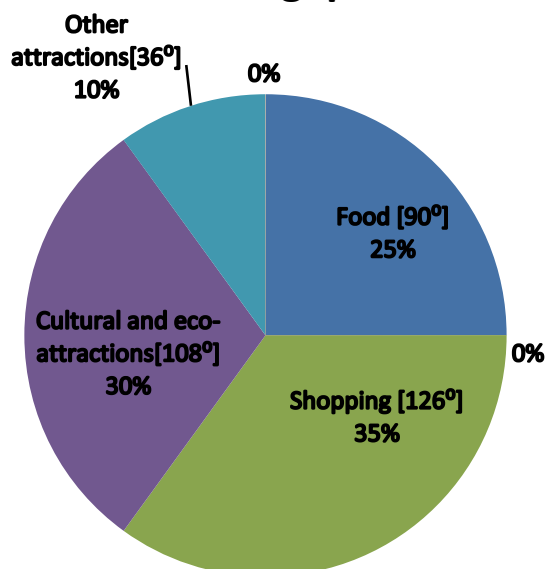
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Cultural and eco-attractions	15%	36%	30%	25%
Other attractions	0%	5%	10%	5%

Fig. 2

- (i) Using Fig. 2, construct a pie chart to represent the data from the Chinese tourists' responses.

[3]

Reasons to Visit Singapore



Credit 1m for title given to pie chart

Credit 1m for pie chart presentation

Credit 1m for labelling of sectors with the respective reasons and percentages accurately

- (ii) State the advantages and disadvantages of using a pie chart to represent data.

[3]

Credit 1m each

Advantages (max 2m):

- Easy to interpret
- Shows percentage total for each category

Disadvantages(max 2m):

- Value of the actual data number is unknown
- Unable to show change over time
- Unable to include too many categories
- Comparison of two data sets is difficult

(iii) **Suggest how the students obtained the data in Fig. 2.**

[2]

Through questionnaire / survey [1] with closed questions/open questions [1] on reasons for visiting Singapore

[Accept other possible answers]

(iv) **Fig. 3 shows the results of the bipolar survey carried out by the students with both tourists and locals at Marina Bay Sands.**

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Fig. 3

The students wanted to investigate the hypothesis, ‘The built environment in Marina Bay Sands has positive effects on tourists’ experiences.’

Using information from Fig. 3, comment on the validity of the hypothesis and support your conclusion. Suggest how the students might improve the way the bipolar survey was carried out.

[4]

- The hypothesis is true/valid[1]
- Majority of the sample size have provided feedback that MBS has pleasant surroundings/ many shops and services/ smooth traffic/ little litter/ well-maintained buildings[1]

[Accept other possible answers]

Suggestions for improvement:

Credit 1m each, max 2m

- To have the same sampling size for each category
- Could provide a wider range of variables e.g. the attractions available
- Interview the locals separately from the tourists as the locals may have bias opinions

[Accept other possible answers]

Section B

- 2 (a) (i) Refer to Fig. 4 and describe the beach change rates in Barbuda. [3]

Credit 1m each, max 3m

- General trend: The beach sites in Barbuda experience both positive (accretion of the beach) and negative (erosion of the beach) change rates
- Dulcina experiences the highest positive beach change rate of 5.4m/yr
- Palmetto experiences the highest negative beach change rate of 4.3m/yr
- Governors Bay experiences the lowest positive beach change rate of 0.3m/yr
- Coco Point K Club experiences the lowest negative beach change rate of 0.4m/yr

[Accept other possible answers]

- (ii) Suggest possible reasons for beach changes experienced by the beach in Barbuda. [4]

Credit 1m each, max 4m

- Types of waves: More destructive waves than constructive waves encourage negative rates of change
- Tides: During high tides, waves erode and transport more sediments away causing negative rates of change
- Currents: Strong currents carry large amounts of energy leading to coastal erosion which results in negative rates of change
- Geology: In areas with less resistant rocks, more erosion will take place, leading to negative rates of change
- Lack of ecosystems: When there is a lack of ecosystems such as mangroves and coral reefs, the coastline will be directly affected by destructive waves, causing erosion and negative rates of change
- Human activities: Human activities such as construction, recreational activities, tourism and port facilities alter coastlines, causing erosion and negative rates of change

[Accept other possible answers]

- (b) Define *wave refraction* and explain how it affects wave energy at headlands and bays as shown in Fig. 5. [5]

Credit 1m each

- Wave refraction is the process by which waves change direction as they approach a coast [reserve 1m]
- Waves approach a headland and bend/converge towards it
- More erosion will occur at the headland where wave energy is high and concentrated
- Waves diverge when they reach the adjacent bays
- More deposition will occur in bays where wave energy is spread out and reduced

- (c) Refer to Fig. 6, identify coastal landform A and describe its formation. [5]

Credit 1m each, max 5m

- Coastal landform: Arch [reserve 1m]
- Within headlands, some rocks may be less resistant to erosion than other rocks
- These parts of the headlands will be eroded more quickly, especially by hydraulic

- action and abrasion
- Waves attack lines of weakness at the base of the headland and undercut it
- The continuous action of the waves forms a cave at the area that is hollowed by wave action
- Caves may develop on each side of the headland
- Erosion may eventually join caves together, leaving a bridge of rock known as an arch above the opening

(d) Evaluate the success of hard engineering methods which have been put in place to protect the coastlines from erosion.

[8]

Answers may include the following points:

Seawalls

- Seawalls are constructed to protect coastlines against wave attack by absorbing wave energy.
- Most seawalls are made of concrete or stone and are built parallel to the coast.
- They have been constructed in thousands of locations throughout the world.
- Example: Seawalls in the Isle of Wight, United Kingdom
- Limitation 1: Seawalls are costly to build and maintain as constant repairs have to be made to prevent their collapse.
- Limitation 2: Seawalls only absorb some wave energy and reflect incoming waves. Most seawalls only achieve initial success. The powerful backwash of reflected waves washes away the beach materials at the foot of and beneath the seawall. This erosion of waves eventually undermines the base of the seawalls, leading to their collapse.
- For example: a seawall along the coast of Drakes Island in England collapsed due to erosion occurring at its base.

Groynes

- Low walls constructed at right angles to the shore to retain sediments that might otherwise be removed due to longshore drift.
- These structures absorb or reduce the energy of the waves and cause materials to be deposited on the updrift side of the groyne facing the longshore drift.
- Limitation 1: Groynes are unsightly and expensive to build and maintain.
- Limitation 2: Moreover, no new materials are carried and deposited on the downdrift side which is not protected by the groyne. As a result, longshore drift will gradually erode away the unprotected part of the beach.
- Example: large amounts of sediments were eroded on the downdrift side of the groyne built along Sandy Hook in New Jersey, United States of America. The groyne was eventually demolished.
- To prevent or reduce the erosion of beach materials on the downdrift side of the groyne, the tips of groynes are sometimes angled about 10 degrees, depending on the direction of the prevailing waves.
- If successful, groynes can help sustain and even extend beach areas.

Gabions

- Gabions are wire cages usually filled with crushed rocks.
- These cages are built along a shore or behind a beach to prevent or reduce coastal erosion by weakening wave energy.
- Gabions absorb wave energy better than seawalls,
- This is because the gaps between the rocks allow water to filter through.
- In this way, gabions prove to be successful defences against high energy waves.
- Limitation 1: However, the wire cages are unsightly.
- Limitation 2: They are also costly as they need to be maintained regularly.
- Limitation 3: Gabions are easily corroded by seawater and damaged by excessive trampling or vandalism.

- Example: Gabions were installed when the East Coast Park in Singapore was first reclaimed. The gabions were subsequently removed as they were vandalised.
- Example: Gabions along the Andaman Coast, Thailand, successfully protect the coast from erosion.

Breakwaters

- Breakwaters help break the force of oncoming waves.
- They can be built either parallel to the coast or with one end attached to the coast.
- When constructed offshore, breakwaters can create a zone of calm water behind them.
- Materials are then deposited and build up in this zone of calm water to form beaches.
- The calm water zone is often used as a sheltered harbour for boats.
- Limitation 1: They are aesthetically unappealing and are costly to build.
- Limitation 2: Protect the coast unevenly. Materials deposited in the zone behind the breakwater are protected while those in the zones located away from the breakwater are subjected to wave action and possible erosion.
- Example: Breakwaters built in Portland Harbour, England, resulted in erosion and flooding problems, which affected properties, beaches and communication infrastructure.
- Example: A breakwater at Almeria, Spain, successfully protects the coast from erosion.

Tetrapods

- Tetrapods are four-pronged concrete structures that help dissipate wave energy. They are stacked offshore in an interlocking position.
- In contrast to breakwaters or seawalls, tetrapods allow water to pass around them rather than hit against them. Hence, no powerful backwash is generated, which reduces the possibility of tetrapods being damaged by waves.
- Tetrapods are pre-casted, which means they cast into their final shape before being positioned. They can be placed quickly compared to other structures which may take time to build while coasts are still under attack from waves.
- Example: Crescent City, a town on the coast of northern California, has used tetrapods for many years to defend against coastal erosion and to reduce the impact of tsunamis, which occurred 31 times between 1933 and 2008.
- Limitation 1: Aesthetically unappealing and expensive to build.
- Limitation 2: They are also dangerous to swimmers, surfers and boaters.

A full answer does not need to include all the above points

At each level, students will show the following characteristics

Level 1 (0 – 3 marks)

- Simple description of one method
- No examples given
- No or weak attempt at evaluation
- E.g. Seawalls are constructed to protect coastlines against wave attack by absorbing wave energy. Most seawalls are made of concrete or stone and are built parallel to the coast. However, seawalls are costly to build and maintain as constant repairs have to be made to prevent their collapse.

Level 2 (4 – 6 marks)

- Describes two methods with some detail
- Some examples given, although lacking in details
- Some attempt at evaluation on both methods
- E.g. Seawalls are constructed to protect coastlines against wave attack by absorbing wave energy. Most seawalls are made of concrete or stone and are built

parallel to the coast. For example, Seawalls in the Isle of Wight, United Kingdom. However, seawalls are costly to build and maintain as constant repairs have to be made to prevent their collapse. Seawalls only absorb some wave energy and reflect incoming waves. For example, a seawall along the coast of Drakes Island in England collapsed due to erosion occurring at its base.

Level 3 (7 – 8 marks)

- Describes at least three methods in detail
- Detailed examples given
- Good evaluation on all methods
- Mention of other hard engineering methods in conclusion
- E.g. Seawalls are constructed to protect coastlines against wave attack by absorbing wave energy. Most seawalls are made of concrete or stone and are built parallel to the coast. They have been constructed in thousands of locations throughout the world. For example, Seawalls in the Isle of Wight, United Kingdom. However, seawalls are costly to build and maintain as constant repairs have to be made to prevent their collapse. Seawalls only absorb some wave energy and reflect incoming waves. Most seawalls only achieve initial success. The powerful backwash of reflected waves washes away the beach materials at the foot of and beneath the seawall. This erosion of waves eventually undermines the base of the seawalls, leading to their collapse. For example, a seawall along the coast of Drakes Island in England collapsed due to erosion occurring at its base.

3 (a) (i) Refer to Fig. 7, describe the distribution of coral reefs in the world. [3]

Credit 1m for each point, max 3m

- Mostly found between the Tropic of Cancer in the northern hemisphere and the Tropic of Capricorn in the southern hemisphere
- Southeast Asia has the highest distribution of coral reefs, example, The Philippines and Indonesia
- Indo-Pacific region: Northern Australia, along Papua New Guinea and the Southeast Asian region
- High distribution of coral reefs in the Caribbean islands – along Bahamas, Haiti, Costa Rica, Panama
- East China Sea northwards to the Korean Peninsula, and in The Gulf in the Middle East
- South Pacific and Indian Ocean – along Sri Lanka and Maldives

(ii) Using information from Fig. 8 and what you have learnt, describe the pressures on coral reef ecosystems such as the Great Barrier Reef. [5]

Credit 1m each, max 5m

- Coral bleaching: occurs when higher sea temperatures result in the loss of algae; this causes the corals to turn completely white or be bleached.
- Storms can result in high-energy, destructive waves, resulting in the destruction of coral reefs
- Poisonous starfish act as coral predators, destroying them
- Overcollecting: Overfishing in reefs and surrounding waters, disrupting the balance of the ecosystem's food chain
- Fishing method: Dynamite blasting and the use of cyanide to stun fish, destroying coral reef habitat
- Tourism activities such as building of facilities can destroy coral reefs
- Waste discharged into water can stress corals
- Boat anchors may damage corals

- Pollution: excess fertilisers, chemicals, oil leakages and heavy metals, and sewage can pollute and turn waters to become turbid or murky, preventing sunlight from reaching the coral polyps
- Siltation: When the water is filled with sediments, corals suffocate due to siltation (could be triggered by coastal development)

(iii) Suggest possible reasons why tourists are attracted to the Great Barrier Reef. [4]

Credit 1m, max 4m

- A famous diving site because of its corals
- A fishing and shell gathering site
- A form of educational tourism where people learn about the coral reef ecosystem and how they support the food chain
- A form of honeypot tourism where large groups of people are attracted to due to its scenic beauty site
- Tourist facilities such as hotels, shopping centres and transport stations are developed at the site, attracting tourists

[Accept other possible answers]

(b) Using information from Fig. 9 and other examples, explain how outbreaks of diseases and disasters lead to regional fluctuations in the tourism industry of a country. [5]

Credit 1m each, max 4m for points on either disasters or outbreaks of diseases

Max 3m if no examples are provided

- **Disasters** are events that cause great damage to properties, lead to injuries or even great loss of life.
- A disaster deters tourists as it poses greater risks to the safety of tourists and may disrupt essential tourist infrastructure.
- Example: After the March 2011 Japan Tohoku earthquake and tsunami, Japan saw a dip in the international tourist arrivals.
- Disasters also discourage the citizens of the affected country from travelling overseas.
- Example: South Korea saw a drop in its tourists arrivals after the Tohoku earthquake as a third of its tourists are from Japan
- **Outbreak of disease** refers to the sudden and widespread occurrence of disease in an area, causing a huge drop in tourist arrivals as tourists do not want to risk getting infected with a contagious disease.
- Government agencies may also advise travellers to avoid areas with disease outbreaks.
- Example: The outbreak of SARS resulted in travel warnings issued by WHO and the Asian tourism industry was greatly affected/ SARS outbreak in 2003, killed 775 people and infected more than 8000 in 25 countries, discouraging people from travelling, causing a dip in the tourism industry.

[Accept other possible examples]

(c) Assess the contributions of the planning authorities and non-governmental organisations in protecting tourist areas. [8]

Planning authorities

- Greatly influence the future quality of the environments by determining how many visitors a site can cope with and allocating space for infrastructure such as roads and hotels.
- For example: the Singapore Tourism Board (STB) ensures that while attracting

large numbers of tourists to Singapore, its development plans also take into account the need to conserve national heritage. The STB has implemented programmes to conserve the ethnic districts of Singapore. The programmes involve enhancing the cultural zones of Chinatown, Kampong Glam and Little India. This way, visitors and locals will have a greater appreciation of Singapore's rich heritage.

- Each group has a part to play in taking care of tourist areas.
- Among the various groups, the planning authority is the most important group in ensuring that the tourist areas are protected.
- The planning authority should consider local sensitivities in the area while maintain its physical and socio-cultural condition.
- Planning authorities should be the first to enforce rules, regulation, values and principles for sustainable tourism in consultation with the industry and community.
- In turn, local communities and tour operators should refer to them when organising tours.

Strengths

- Develop and maintain infrastructure and attractions that help manage the impact of tourism in an area
- Draft laws and policies that help improve the quality of a tourist site
- For instance, planning authorities can craft laws that limit the number of visitors to an attraction or regulate the type of commercial activity in an area. They may also impose entrance fees to a tourist site.
- As part of the government, they also work and cooperate more easily with other government agencies to manage the impact of tourism
- They also have the advantage of being able to utilise a range of government resources.

Limitations

- Difficult to plan for unforeseen factors: Even the most well-planned and well-funded programme can sometimes fail due to unforeseen factors such as extreme weather, natural disasters or a general lack of interest from the public.
- Opposing stakeholders: Stakeholders, such as local communities or NGOs, may oppose the management strategies of planning authorities.
- For example, stakeholders may do so because the management strategies affect their livelihood or change their way of life. Stakeholders may also oppose planning authorities when they think that a different approach is needed to solve a problem. Tourism management strategies often have limited impact without cooperation from stakeholders.

Non-governmental organisations (NGOs)

- NGOs are non-profit organisations operating independently of governments.
- A number of NGOs are concerned with tourism's impact on natural and human environments
- Since 1990, The International Ecotourism Society (TIES) has developed guidelines, conducted training courses, provided technical assistance and published research papers related to tourism and the environment.
- It works with numerous organisations, including travel associations and conservation groups in 124 countries.
- Groups such as TIES can be instrumental in achieving sustainable tourism and for protecting the environments frequented by tourists.

Strengths

- Facilitate communication between various stakeholders: NGOs sometimes act as channels of communication between various stakeholders, such as between local communities and tour operators or between tour operators and planning authorities. NGOs sometimes also help encourage other stakeholders, such as local communities, to actively participate in managing the impact of tourism.
- Support various stakeholders in managing the impact of tourism: NGOs support the

tourism management efforts of various stakeholders such as local communities and planning authorities. The support comes in the form of additional manpower, expertise or marketing campaigns.

Limitations

- Difficulty in obtaining external funding: often rely on donations and may be hampered by the lack of financial resources.

A full answer does not need to include all the above points

At each level, students will show the following characteristics

Level 1 (0 – 3 marks)

- Brief description on the responsibilities of both stakeholders
- No examples given
- No or weak attempt at evaluation
- E.g. NGOs are non-profit organisations operating independently of governments. A number of NGOs are concerned with tourism's impact on natural and human environments. Since 1990, The International Ecotourism Society (TIES) has developed guidelines, conducted training courses, provided technical assistance and published research papers related to tourism and the environment.

Level 2 (4 – 6 marks)

- Describes the responsibilities of both stakeholders with some detail
- Some examples given, although lacking in details
- Some attempt at evaluation on both stakeholders
- E.g. NGOs are non-profit organisations operating independently of governments. A number of NGOs are concerned with tourism's impact on natural and human environments. Since 1990, The International Ecotourism Society (TIES) has developed guidelines, conducted training courses, provided technical assistance and published research papers related to tourism and the environment. It works with numerous organisations, including travel associations and conservation groups in 124 countries. The NGOs are effective as they sometimes act as channels of communication between various stakeholders, such as between local communities and tour operators or between tour operators and planning authorities.

Level 3 (7 – 8 marks)

- Describes the responsibilities of both stakeholders in detail
- Detailed examples given
- Good evaluation on both stakeholders
- Mention of other stakeholders
- E.g. NGOs are non-profit organisations operating independently of governments. A number of NGOs are concerned with tourism's impact on natural and human environments. Since 1990, The International Ecotourism Society (TIES) has developed guidelines, conducted training courses, provided technical assistance and published research papers related to tourism and the environment. It works with numerous organisations, including travel associations and conservation groups in 124 countries. Groups such as TIES can be instrumental in achieving sustainable tourism and for protecting the environments frequented by tourists. The NGOs are effective as they sometimes act as channels of communication between various stakeholders, such as between local communities and tour operators or between tour operators and planning authorities. NGOs sometimes also help encourage other stakeholders, such as local communities, to actively participate in managing the impact of tourism. They also support various stakeholders in managing the impact of tourism: NGOs support the tourism management efforts of various stakeholders such as local communities and planning authorities. The support

comes in the form of additional manpower, expertise or marketing campaigns. However, they face difficulty in obtaining external funding, often rely on donations and may be hampered by the lack of financial resources.

ST ANDREW'S SECONDARY SCHOOL
MID YEAR EXAMINATION 2015
SECONDARY 4 EXPRESS / 5 NORMAL ACADEMIC
GEOGRAPHY 2236/02
Paper 2

Section A - Answer one question from this section.

- 1 (a)** Study Figs 1, 2 and 3 (Insert), which shows information about earthquakes in the Himalayan mountain range.
- (i)** Use Figs 1 and 2 to help you show how both the location of, and the earthquake in 2015 in Nepal are a result of plate tectonics. [5]
- (ii)** Use Fig. 3 and other information to help you explain the extent of earthquake in Nepal and the risks faced by the people. [5]
- (iii)** Suggest some short-term responses to manage the extent of damages of the earthquakes. [3]
- (b)** Describe how an earthquake may lead to tsunami. [4]
- (c)** With reference to examples, assess the effectiveness of strategies used to reduce the risks created by earthquakes. [8]
- 2 (a)** Study Photographs A and B (Insert) which show two different types of volcano.
- (i)** Describe and explain the differences between the two volcanoes. [5]
- (ii)** Suggest the benefits and risks of living on the slopes of a volcano. [5]
- (b)** Study Figs 4, 5 and 6 (Insert), which show the climographs of locations A and B on either side of a mountain.
- (i)** Compare the total precipitation between locations A and B. [2]
- (ii)** Account for the differences in the total annual precipitation between locations A and B. [5]
- (c)** With reference to examples, assess the strategies used to reduce the impact of tropical cyclones. [8]

Section B - Answer one question from this section.

- 3 (a)** Study Fig. 7 (Insert), which shows the percentage of stunting in children under 5 year of age in the world.
- (i)** Describe the distribution of the countries with the highest percentage of stunting in children under 5 year of age. [3]

- (ii) Explain the possible causes for high percentage of stunting in children under 5 year of age in those countries. [4]

- (b) Study Fig. 8, which gives information on the link between malnutrition and poor literacy.

Children who are malnourished are less able to read or write than those fed a healthier diet, according to research by the University of Oxford for Save the Children.

The UK charity's study of 7,300 eight-year-olds growing up in Ethiopia, India, Peru and Pakistan show the extent to which children's brains can be permanently damaged if they don't receive the right nutrition in their first two years.

The report adds that a quarter of the world's children are thought to have their development impaired by malnutrition and claims quality schooling can be cancelled out by malnourishment.

Fig. 8

Use Fig. 8, to help you explain the impacts on malnutrition on less developed countries. [5]

- (c) Study Photograph C (Insert), which shows an irrigation method and Photograph D (Insert), which shows the effect of such irrigation method.

With reference to Photographs C and D, explain the pros and cons of the irrigation method. [5]

- (e) 'Genetically modified food not only benefits the farmers, it helps to overcome the problem of food shortage as well.'

To what extent, do you agree with the statement?
Give reasons to support your answer. [8]

- 4 (a) Study Photograph E (Insert), which shows a farming process.

Describe the farming process shown in Photograph A, and explain the advantages and limitations. [5]

- (b) Study Fig. 9 (Insert), which shows different food storage facilities.

With the help of Fig. 9, briefly explain how advancement in food storage facilities helps to overcome food shortage. [4]

- (c) Study Fig. 10 (Insert), which shows the distribution of HIV/AIDS in parts of Africa. Describe the distribution of the areas with more than 10% of HIV/AIDS infection rates. [3]

- (d) Describe the socio-economic impacts of high HIV/AIDS infection rates. [5]

- (e) Describe the efforts made to manage the outbreak of HIV/AIDS in a country you have studied.
Assess the success of these efforts. [8]

End of paper

ST ANDREW'S SECONDARY SCHOOL
MID YEAR EXAMINATION 2015
SECONDARY 4 EXPRESS / 5 NORMAL ACADEMIC
GEOGRAPHY 2236/02
Paper 2 - Marking Scheme

Section A - Answer **one** question from this section.

- 1 (a)** Study Figs 1, 2 and 3 (Insert), which shows information about earthquakes in the Himalayan mountain range.
- (i)** Use Figs 1 and 2 to help you show how both the location of, and the earthquake in 2015 in Nepal are a result of plate tectonics. [5]
- Material in the mantle is heated by the core, causing the mantle material to expand, rise and spread out beneath the plates,
 - As it spreads beneath the earth crust, it cools and sinks pulling the plates along, resulting in converging plate boundaries.
 - Converging plate boundary between Indian Plate and Eurasian Plate collide,
 - compression forces cause the massive folding and uplifting of continental crust from intense pressure
 - There is a slow build-up of stress on the rocks, when the rocks can no longer withstand the increasing stress, they can suddenly slip amany metres causing an earthquakes.

One mark each. Accept relevant explanation.
Reserve one mark for reference to Figs 1 and 2.

- (ii)** Use Fig. 3 and other information to help you explain the extent of earthquake in Nepal and the risks faced by the people. [5]

Extent of earthquake:

- From Fig. 3, magnitude of earthquakes are 6.5 and above on Richter Scale
- Epicentres of the earthquakes are within Nepal thus increasing the risks and extent of damage

Risks:

- Loss of lives
- Destruction of infrastructure
- Destruction of property
- Landslides
- Fire
- Disruption of services

Elaboration is necessary for marks to be awarded.

One mark each.

Reserve one mark each for the extent of earthquake as well as for risks.

- (iii)** Suggest some short-term responses to manage the extent of damages of the earthquakes. [3]

- Handling the status of the affected area: after affected areas are declared as 'emergency zones', a specialized authority is assigned to provide immediate aid to people and restore emergency services to the affected areas.
- Searching for and rescuing casualties: People trapped under collapsed buildings are quickly located and freed
- Providing medical aid, food and water: The injured are treated and clean drinking water is provided to survivors to prevent dehydration and the spread of diseases
- Setting up emergency shelters: Tent cities are set up as temporary housing for those who have lost their homes in the earthquake
- Calling for humanitarian aid: Foreign and local Governments may offer money, medical

or food aid to an affected area.

Elaboration is necessary for marks to be awarded.
One mark each.

(b) Describe how an earthquake may lead to tsunami. [4]

- The formation of tsunamis waves begins when seismic energy from an offshore earthquake forces out a mass of sea water.
- The tsunami waves may start at a height of less than 1 m, with wave lengths of 100 to 150 km at speed of 800 km/h and may pass undetected.
- On reaching shallower water, great friction slows the waves and forces them to increase in height
- At the point of impact on the coast, the tsunami waves could be travelling at 30 to 50 km/h and may reach heights of around 15 m.
- Sometimes, the sea recedes from the coast before advancing onshore. If the sea recedes, it only does so minutes before the tsunami reaches the shore. The sea receded because water first rushes to fill the void caused by the movement of the sea floor. Water is then forced out again soon afterwards, resulting in a tsunami.

Reserved marks for underlined phrases
One mark each

(c) With reference to examples, assess the effectiveness of strategies used to reduce the risks created by earthquakes. [8]

Level 1 (0- 3 marks)

- At this level, answers lack detail.
- A basic answer that has little development e.g. One or two general statements about the strategies of coping with earthquakes by people living there
- There may be no or little attempt at assessment of strategies e.g. building modifications and early warning system
- Measures can be either before or after the earthquake \ not necessarily both. No assessment of how effective the measures are.

Level 2 (4- 6 marks)

- At this level, answers will contain some appropriate detail about the strategies of coping with earthquakes by people living there
- The content will lack balance and some relevant detail. This means that measures both before and after the earthquake are considered but support is patchy so that the answer is not full.
- Assessment may be given but may be general in nature eg. type of building modification – existing or new
- Limited indication of how well people cope / how effective measures are eg. low rise buildings reduce damage / early warning and evacuation of people in danger zones
- An example will be presented to support answers in at least one place in the answer

Level 3 (7- 8 marks)

- At this level, answers will be comprehensive and supported by sound knowledge e.g. good explanation about the strategies of coping with earthquakes by people living there
- There will be assessments of the extent to which strategies are successful
- There should be a balance / mention of measures before and after an earthquake.
- An indication that generally, developed countries have greater ability / resources / awareness to reduce the impact than less developed countries
- Examples to support answers can be found in most places in the answer

Answer may include the following points

Land use regulations

- A set of rules implemented to restrict developments in certain areas.

Example

- In California, United States of America, all new building developments are not built across fault lines or areas at risk of liquefaction.
- In Memphis, USA, areas at risk of major liquefaction are mapped out and help in the regulation of land use.
- Liquefaction occurs when vibrations from an earthquake cause saturated soil to flow like liquid
- The ground becomes unstable and buildings should not be constructed in these areas as it is unsafe
- Another land use regulation is the prohibition of constructing new buildings on low-lying land which are vulnerable to tsunamis
- Developments may be allowed only when protective barriers such as seawalls facing the ocean are constructed

Example:

- These regulations are commonly implemented along the coasts of Japan and North American where the Pacific Ring of Fire is located

Limitations:

- However, the impact of earthquakes and tsunamis are inevitably unpredictable. For instance, Japan's rigorous building codes and quake-resistant buildings may have limited the number of casualties from the 11th Mar 2011's earthquake but the devastation in coastal areas and a final death toll is predicted to exceed 10,000
- Another concern is such areas are already built-up or privately own.
- Government needs to purchase the land in these areas from private owners and compensate them to move out in order to put into place effective protection measure. And it may be very costly to do so.
- These private owners may be reluctant to move as they often believe that another hazard would not happen

Other possible answers:

Planning the location of infrastructure:

- Local authorities assess the locations where infrastructure is built before approval. This assessment is based on a set of guidelines. These guidelines would consider the following:
 - o Nature and extent of earthquake risks (level of expected ground shaking/ vulnerability to ground failures/ tsunamis)
 - o Population distribution
 - o Type of building construction
 - o Technological hazards

Limitations:

- In Kamaishi, the 4 metre waves surmounted the seawall — the world's largest, erected a few years ago in the city's harbour at a depth of 209 feet, a length of 1.2 miles and a cost of \$1.5 billion — and eventually submerged the city centre.
- The planning failed to consider the vulnerability to earthquakes and tsunamis where industrial activities are located, ie. the nuclear generation plants near the coastal areas. If the seawall was supposed to protect the nuclear generation plants from tsunamis, then the height and energy of the waves are underestimated.

Earthquake monitoring:

- In earthquake prone areas, sensitive instruments such as the seismometer and

computers, are used to measure movements of the Earth's surface. The information produced by these instruments is evaluated to determine if an earthquake is likely to occur.

- For eg, scientists look out for signs such as an increase in the tremors of the Earth or changes in water levels of seas and oceans.
- The authorities will inform the people living in the affected areas to evacuate the area and move to safer grounds.
- Such a planned system of detecting earthquakes and preparing people can help prevent deaths and reduce the damage caused in the event of an earthquake.
- Eg, The Pacific Tsunami Warning Centre in Hawaii monitors earthquakes and possible tsunamis occurring in the Pacific Ocean through a network of underwater sensors.
- Evidence of its usefulness – it saved many lives when the earthquake took place in Haicheng, China in 1975.
- Limitation: its effectiveness is limited as authorities may choose to ignore the warnings to avoid disruption to business and tourism. This is because the predictions of the scientists are not always accurate and may turn out to be false alarms.

Use of technology to predict and monitor tectonic activities

- **Estimate earthquake probabilities** through studying history of large earthquakes and measuring rate of strain accumulation in rock & time required to develop into an earthquake.
- Use **more seismic instruments** to monitor **frequency of Earth's vibration** and detect development of tsunamis.
- Help people evacuate before disaster strikes.
- Efforts to **monitor & forewarn people effective to certain extent**.
- The Pacific Tsunami Warning Centre has been set up in Hawaii.
- The **Indian Ocean earthquake in 2004** detected and warning issued 15 minutes later by Pacific Tsunami Warning Centre.
- However, **officials in Jakarta lacked basic equipment** e.g. **telephone lines to relay warning signals on time**.
- This resulted in **immense destruction to lives, crops & properties** in **seaside villages of Sumatra** swallowed by gigantic tsunami waves.
- **Effectiveness** of above **constrained by shortage of funds & technology** in developing countries.

Building Designs

Construction of earthquake-resistant buildings

- construction of such buildings **expensive & not easily affordable**
- due to **corruption** in certain countries, **required standards not met**.
 - o For eg in **May 2008, 7.8 magnitude Sichuan Earthquake** in
 - o China, many building esp schools collapsed burying several
 - o hundred thousand lives. This could be due to
 - o **corruption, shoddy work** on part of officials & contractors & **non-**
 - o **affordability** to
 - o use expensive building materials
- However, in more developed countries high-rise buildings use **flexible steel frames** while smaller buildings use **concrete frames** with **reinforcing bars** to absorb impact of earthquakes.
- Tall buildings to be built **on solid bedrock**.
- **Fire-resistant materials** to be used.
- Construction of earthquake-resistant buildings **effective** esp in developed countries like USA & Japan
- Eg **1989, magnitude 7.1 San Francisco Bay Earthquake** struck, the **48-storey-high Transamerica Pyramid Building** shook for about a minute but **undamaged** and no serious injuries occurred.

Use of technology to prevent fire hazards

- Electronic systems to cut off electricity & gas supplies automatically during earthquakes to prevent fires caused by 'live' wires or bursting gas pipes.
- Above **measure possible & effective in developed earthquake-prone countries** like USA & Japan.
- Eg in **1995 7.2 magnitude Kobe Earthquake** in Japan, although thousands were buried under collapsed buildings, **no record of deaths due to fire.**
- However, **2003 6.6 magnitude Bam Earthquake in Iran**, thousands not only buried but burnt to death. Bam was like war zone with smoke rising from collapsed buildings.
- Developing countries **lack technological expertise & financial resources** to conquer fire hazards

Education

- **Earthquake drills** to be taught & carried out in schools, offices & homes on regular basis.
- This **may be effective in developed countries** which have **proper planning & management skills**. Besides, good infrastructure provides access to people who being literate have awareness & positive attitude towards drills.
- Example, annual nation-wide drills are often conducted in Japan.
- In 2004, more than a million Japanese took part in drills during the Anti-Disaster Week.
- Japan is hence well prepared to enforce earthquake emergency plans & relief coordination.
- However, in **developing Indonesia, poor infrastructure hampers access** to people living in scattered remote villages.
- Besides, government officials may **lack proper planning & management** required in conducting drills while **people lack awareness** of significance of drills.

2 (a) Study Photographs A and B (Insert) which show two different types of volcano.

(i) Describe and explain the differences between the two volcanoes.

[5]

Shield (Photo A)

- Gentle slopes with flat top
- Broad base
- Basic lava, low viscosity
- Gentle eruption
- Lava, gases
- At divergent plate boundary

Stratovolcano (Photo B)

- Steep slope, steeper near the top, gentle at the base
- Narrower base
- Acid lava, high viscosity
- Violent eruption
- Pyroclastic materials, rocks, gas, ash cinder
- At convergent plate boundary

(ii) Suggest the benefits and risks of living on the slopes of a volcano.

[5]

Benefits:

- Fertile volcanic soil
- Precious stones and minerals, building materials
- Tourism
- Geothermal energy

Risks:

- Destruction by volcanic materials
- Landslides
- Pollution
- Effects on weather

Elaboration is necessary for marks to be awarded
Reserve 2 marks for benefits and 2 marks for risks
Max: 3 marks for benefits and 3 marks for risks

Benefits:**Fertile volcanic soil**

- Lava and ash from volcanic eruption breaks down and weathered to release nutrients into the soil, making soil highly fertile for farming. Fertile volcanic soils are excellent for growing of crops, rice cultivation
- A shortage of flat, suitable land for settlement forced people to settle in volcanic regions.

Examples:

- Mount Merapi in Java and Bali, Indonesia produces very fertile soil for cultivating of crops such as tea, coffee and rice. Despite continuous use, the soils are more fertile than most non-volcanic areas of Indonesia

Precious stones and minerals, building materials

- can only be extracted after million years and when the upper layers of the volcanic rocks are eroded.
- eg. gold, diamonds, copper and silver, are found in volcanic rocks, such as in the volcanic regions of Kimberley in S. Africa and Bougainville in Papua New Guinea.
- E.g. Diamonds, are heated and pressurized carbon that are cooled in magma pipes beneath the earth's surface. When refined, diamonds are useful as industrial tools and in scientific research. They are also used to make jewellery.
- E.g. building materials and production of other daily items. In East Java, Indonesia, sulphur is collected from active volcanoes to make matches and fertilisers and refine sugar.

Tourism

- Volcanic areas are rich in history and people can visit these areas to learn more about them
- E.g. the ruins of Pompeii, Italy which used to be a Roman town. It was buried by layers of ash from the nearby Mount Vesuvius when it erupted in 79 CE. The unearthed archaeological site has revealed buildings, pottery and mosaics left intact. Almost 3 million people visit the site every year.
- Interesting volcanic landforms can lead to the development of tourism industry which is an important source of revenue, eg. New Zealand and Hawaii.
- Hot spots for tourist attractions due to the beautiful scenery/attractions, eg. hot springs, geysers etc, hence generating economic growth.

Geothermal energy

- It is derived from the heat in the earth's crust. When the groundwater comes into contact with hot rocks beneath the surface, it heats up and erupts as hot water or steam. The hot water or steam can be harnessed to drive turbines and produce electricity
- E.g. Most of Iceland's electricity is generated from geothermal power because of the large number of volcanoes in the country. Over 70 per cent of homes in Iceland are heated by volcanic steam.
- Geothermal energy is an important source of clean energy which produces electricity, eg. in countries like New Zealand, Japan, Italy, Iceland and USA.

Risks:**Destruction by volcanic materials:**

- pyroclastic material, lava, rock fragments, volcanic bombs are erupted during violent explosions causing massive destruction, wiping out towns in just minutes, killing many people, plants even animals
- violent eruption may cause earthquakes resulting in buildings topple, often like toy houses. With the destruction in the many buildings, thousands of people are also left homeless
- lava flows can destroy everything in its path
- inhaling hot ash and gases can damage the respiratory system of people and even

result in serious injury or death

Examples:

- The ongoing eruption of Kilauea in Hawaii since 1983 has destroyed many homes and highways

Landslides

- due to structural collapse of the volcanic cone during the eruption
- up to hundreds cubic kilometres of landslides may occur thus obstructing rivers, blocked roads and buried villages and farmlands [1]

Examples:

- Eruption of Nevado del Ruiz in the Andes Mountains of South America in 1985 released a pyroclastic flow. The mixing of pyroclasts and glacial ice along its path triggered lahars. Lahars engulf the town of Armero and killed more than 20,000 people.

Pollution

- volcanic ash and dust pollute and remain in the air after eruption for months
- releases gases such as carbon dioxide, sulphur dioxide, hydrogen and carbon monoxide which may be harmful to people
- such material can contaminate water sources and vegetation
- volcanic ash contain acidic material which mixes with the water vapour in the air to create acid rain
- acid rain can harm fish in rivers, kill plants and corrode building

Examples

- The eruption of Eyjafjallajökull in Iceland in 2010 produced extensive volcanic ash clouds containing tiny particles of abrasive glass, sands and rock. These particles posed a serious danger to aircraft engines and structures.
- Water pollution from landslides or mudslides

Effects on weather

- Sulphur dioxide released from volcanic eruption may react with water vapour and other chemicals in the atmosphere to form sulphur-based particles
- These particles reflect the sun's energy back into space and temporarily cool the earth for periods of time ranging from a few months to ears

Examples

- The 1815 eruption of Mount Tambora in Indonesia was the largest in recorded history. The sound of the eruption can be heard more than 2600 km away. Following the eruption, mean global temperatures dropped by as much as 1.7 °C

Other possible risks:

- eruption of undersea volcanoes cause tsunamis to occur
- people who live near the coast may be killed, fishermen may lose their boats, tourism industry may become affected

(b) Study Figs 4, 5 and 6 (Insert), which show the climographs of locations A and B on either side of a mountain.

(i) Compare the total precipitation between locations A and B.

[2]

Location A

- Total precipitation: 1340 mm
- High monthly rainfall
- Max: 165 mm in July, Min: 70 mm in Oct

Location B

- Total precipitation: 225 mm
- Little or no rainfall per month
- Max: 30 mm in Dec& Jan, Min: 0 mm in Jul

(ii) Account for the differences in the total annual precipitation between locations A and B.

[5]

- Location A experiences relief rain while location B experiences the rain shadow effect
- Moist air passes over the sea and arrives at the coast where location A is.
- The warm, moist air is forced to rise up the windward side of the mountain and is forced to

- cool
- When the temperature of the air reaches dew point, condensation occurs and clouds form. When the water droplets are large and heavy enough, they fall as rain on the windward side of the mountain where location A is.
 - By the time the air moves over to the other side of the mountain range where location B is. This is known as the leeward side, the air is usually dry because most of the moisture would have fallen on the windward side
 - So little or even no rain falls on location B.

One mark each

Accept suitable, relevant explanation

- (c) With reference to examples, assess the strategies used to reduce the impact of tropical cyclones. [8]

Prediction and warning

- analysis of long-term climatological records
- this establishes the pattern of the occurrences and the severity of the damage caused by past cyclones
- analysis of this pattern makes it possible to predict when cyclones of a similar severity would occur
- accurate and regular forecasting of weather conditions through the use of satellite systems and computer models
- help to predict cyclone's path as well as the likely areas which may be affected and the degree of damage
- Installed warning systems so that warning can be issued early for people to evacuate quickly

Examples:

- Japan and the United States of America are some countries who have installed warning systems for tropical cyclones. Information about the severity of the tropical cyclones as well as information on the necessary precautionary measures needed to be taken can be announced to the public through these systems

Limitations

- Climate records of past events only indicate the frequency of tropical cyclones but does not give accurate details about when future tropical cyclones will occur
- Predicted paths of tropical cyclones may not be completely accurate because predictions are made based on weather information available at a particular point of time
- However, weather conditions may change quickly resulting in the inaccuracy of the prediction

Education

- preparation of people for cyclones through education
- Awareness of training and disaster management

Land use control

- Regulates the use of the land by placing restrictions on how the land can be used
- Planning to consider limits of types of development on vulnerable areas and propose uses more compatible with flooding
- Areas along the coasts are vulnerable to storm surges and flooding caused by tropical cyclones.

Examples:

- Developers may need to pay higher taxes to use the land along the coasts
- So the land can be used for recreational purposes such as parks.
- Protected zones serve as a barrier against storm surges and flooding

Limitations:

- Successful only if authorities are able to enforce them as effective implementation of

- land use controls requires time and manpower
- Also, developments such as buildings which are found along the coastlines may have been around for a long time; hence residents are reluctant to move out of these areas.
- Government needs to purchase the land in these areas in order to convert them into recreational areas and it may be very costly to do so

Floodplain management

- Master plan to reduce the potential of flood damage and protect valuable assets from flooding
- Involves mapping the land use of an area and implementing measures to prevent floods
- Ensure new developments in floodplains are not prone to flood
- Draw up evacuation plans to ensure that people are able to leave a flooded area as quickly as possible

Reducing vulnerability of structures and infrastructure

- Wind and water resistant designs and improved housing
- Galvanized steel hurricane ties are nailed to the roof to prevent it from being blown off by the strong winds
- A layer of secondary water resistance is added to the roofs of houses to prevent leaking if the roof is blown off
- Regular inspection of river embankments/ levees and coastal dykes and sea walls for breaches
- Locating utility lines underground to avoid damage by strong winds and storm surges. This can ensure that services are maintained during and after a tropical cyclone
- Coordination of agencies including government and transport

Examples

- In Florida, USA, the state government aids homeowners by employing specialized companies to improve the design of the roof and the openings of houses
- The measures were effective because the houses of most citizens living on Jensen Beach in Florida suffered only minor roof damage when Hurricane Wilma struck in 2005
- The construction of a protective barrier along the coast in Apia, Samoa, protected the coastline and the harbor when Cyclone Val struck the island in 1991. The harbor, previously destroyed by Cyclone Ofa in 1990, was left largely intact when Cyclone Val struck, mainly due to the presence of the new protective barrier

Assessment of strategies depend upon the cyclone(s) chosen as examples and success of strategies used

Candidates may comment that:

- Overview that there is no perfect solution that will stop all damage from cyclones because of their nature
- At the highest level there should be some indication of the degree of success/problems with different strategies

Assessment may include points such as

- Access to early warning and the role of media e.g. radio in keeping community aware of the latest situation
- Success of the coordination of evacuation and disaster response plans at local and national level e.g. how well identified/successful were evacuation guidelines/routes/numbers involved.
- Quality of emergency agencies and speed of recovery
- Town planning regulations regarding where new developments should be situated may have a positive effect e.g. how did newly designated areas for alternative use cope
- Was there a master plan and if so how effective was it in reducing effect of flooding
- Improvements in building standards and design should reduce damage e.g. special attention to buildings housing large number of people such as schools and hospitals
- Wind resistant external fabric of buildings e.g. reinforced internal walls, limited amount of

external glazing but even steel frames, masonry, reinforced concrete may not be the complete answer for future cyclones

- Strategies to reduce the effect of storm tides e.g. higher sea walls, reinforce sand dunes, planting mangroves
- Effectiveness of levees and dykes in reduce flooding

May be an overall comment indicating that strategies had some effect and reduced damage but could not prevent areas suffering some damage

Level 1 (0-3 marks)

- At this level, answers lack detail.
- A basic answer that has little development
- Answers may be general in nature or specific to a cyclone
- There may be no or little attempt at assessment of strategies.
- An example may or may not be given

Level 2 (4-6 marks)

- At this level, answers will contain some appropriate detail.
- The content will lack balance and some relevant detail. This means that only successful or not successful; points of the strategies are considered
- Or both success and failures are considered but support is patchy so that the answer is not full.
- Assessment may be given but may be general in nature
- An example will be presented to support answers in at least one place in the answer

Level 3 (7-8 marks)

- At this level, answers will comprehensive and supported by sound knowledge.
- There will be assessments of the extent to which strategies are successful, considering both the successful and not successful points
- Examples to support answers can be found in most places in the answer

Section B - Answer **one** question from this section.

- 3 (a) Study Fig. 7 (Insert), which shows the percentage of stunting in children under 5 year of age in the world.

- (i) Describe the distribution of the countries with the highest percentage of stunting in children under 5 year of age. [3]

- Found in LDCs within the Tropic of Cancer and Tropic of Capricorn [1]
- In parts of Africa: Niger, Ethiopia, Angola, Zambia, Madagascar, Yemen
- In the Middle Eastern countries: Iran, Afghanistan
- In Indian Subcontinent: Bangladesh
- In the Oceania: Papua New Guinea

Max: 3m

- (ii) Explain the possible causes for high percentage of stunting in children under 5 year of age in those countries. [4]

- Low disposable income: inadequate food consumption leading to malnutrition and even starvation
- Increase in food pricing: unable to afford even staple food anymore leading to malnutrition and starvation
- Lack technology to improve food production thus resulting in instability of food supply
- Civil war in countries such as Iran and Afghanistan depleted the food stocks in the countries and were not replenished. Cities and areas with heavy fighting reported food and water shortages while safety concerns restricted people from venturing out to find or buy food
- Natural disaster: Ethiopia was face with food shortage after many years of severe drought. Extreme low rainfall destroyed most of the country's harvest resulting in severe

food shortage.

- Rapid population growth: Bangladesh with a high population may have an increasing demand of food while food supply is not growing as a rate fast enough to meet the demand.

One mark each with elaboration

- (b) Study Fig. 8, which gives information on the link between malnutrition and poor literacy.

Children who are malnourished are less able to read or write than those fed a healthier diet, according to research by the University of Oxford for Save the Children.

The UK charity's study of 7,300 eight-year-olds growing up in Ethiopia, India, Peru and Pakistan show the extent to which children's brains can be permanently damaged if they don't receive the right nutrition in their first two years.

The report adds that a quarter of the world's children are thought to have their development impaired by malnutrition and claims quality schooling can be cancelled out by malnourishment.

Fig. 8

Use Fig. 8, to help you explain the impacts on malnutrition on less developed countries. [5]

- From Fig. 8, causes permanent brain damage in children resulted in impaired development as well as falling sick more often
- During their adolescence, frequent illness will lead to the loss of school days and educational opportunities. With fewer educational opportunities, children will have lower earning power in the future
- As an adult, they will fall sick more often leading to lower productivity thus lower income. This will also generate lower income for their countries
- The countries will also face increasing public health expenditures as more people may be falling sick. The higher spending on health care means that limited financial resources are diverted from other areas such as education, housing transportation or even agriculture. This slows down the country's economic development and growth
- These countries may depend on food aid and financial aid from other countries thus leading to long-term debt problems.
- With inadequate food supply leading to inadequate food consumption, it may cause many people to protest in order to communicate their unhappiness about the situation leading to political unrest

One mark each. Accept relevant answers.

- (c) Study Photograph C (Insert), which shows an irrigation method and Photograph D (Insert), which shows the effect of such irrigation method.

With reference to Photographs C and D, explain the pros and cons of the irrigation method. [5]

Identify: Flood irrigation. [1]

Effect: Salinisation [1]

Pros:

- Water is delivered to a long whole surface such as rice fields so that crops can be grown during the dry season or when there is a drought [1]

Cons:

- Salt is left behind when water evaporates directly from the moist soil [1]
- Increased concentration of salts in the soil reduced the productivity of the soil as crops

- are unable to grow well [1]
- Soil may be too hard and cracked resulting in little or no plant growth. [1]

(e) 'Genetically modified food not only benefits the farmers, it helps to overcome the problem of food shortage as well.'

To what extent, do you agree with the statement?

Give reasons to support your answer.

[8]

Ways GM Food help to overcome food shortage:

- From the year 1996 to 1999, there has been a sharp increase in the production of GM food. From 7 million acres in 1996, it rose to 100 million acres in 1999
- Increases income for farmers – GM food is modified to stay fresh for a longer period of time and be more pest-resistant, hence increasing the crop output and farmers' income
- Increases food supply – GM food crops are able to produce higher outputs. E.g. Super rice doubled the amount of output for rice
- Improves nutritional food value – GM food can be modified to have higher nutritional value. E.g. the golden rice is enriched with beta-carotene to supplement the lack of Vitamin A in rice diets in LDCs
- Reduces environmental pollution – Crops can be modified to reduce the reliance on chemicals like artificial fertilizers, pesticides and herbicides, hence reducing the negative impact on the environment

Potential Risks:

- Potential health risks – food might contain allergies. E.g. lectin in potatoes / fear of the unknown consequences of consuming food that is unnatural. E.g. GM pea caused health problems in research mice.
- Loss of biodiversity – Pest resistant plants are indirectly destroying harmless insects such as Monarch butterflies. E.g. BT toxin kills the European corn borer
- Loss of natural species – GM food crops may pollute natural crops that are not modified. E.g. When the pollen of a pest-resistant crop is carried by the wind or by insects to compatible natural crops, the offspring of the organic crops will also become pest-resistant / development of superweeds which require stronger herbicides to be used

Candidates may provide information about some of the following points.

Efforts and success may vary from country but the main ones are included below.

Candidates may express these efforts in a variety of relevant ways.

Level 1 (0-2 marks)

Describe one or two factors with brief details provided.

Examples are either general or just stated, without an explanation

No evaluation of effectiveness

Level 2 (3-5 marks)

Describe two factors and explain, but still lacking depth.

Examples are relevant but lacks depth.

Brief evaluation of effectiveness of each factor

Level 3 (6-8 marks)

Describes at least three factors with detailed explanations.

Examples are relevant and specific.

Clear evaluation of effectiveness of each factor

Describe the farming process shown in Photograph A, and explain the advantages and limitations. [5]

- High-tech farming in agrotechnology parks: Hydroponics or aeroponics
- These parks are equipped with the necessary infrastructure that modern farms require such as computers, nutrient solution.

Max: 2m

Advantages:

- Increase farm produce in a small area
- Reduce reliance on food import

Max: 2m

Limitations:

- High cost of setting up high-tech farm resulting in higher food prices
- Shortage of trained workers for high-tech farming
- Face competition from cheaper food imports

Max: 2m

(b) Study Fig. 9 (Insert), which shows different food storage facilities.

With the help of Fig. 9, briefly explain how advancement in food storage facilities helps to overcome food shortage. [4]

- Use of refrigerated warehouse and refrigerated delivery trucks to keep food fresh for a longer period of time
- Use of simple but effective silos, an air tight structure for storing food thus keep food fresh for a longer period of time
- Food can be distributed to places further away from its area of production
- Allowed a larger variety of food being made available and accessible for more people thus reducing food storage

One mark each

(c) Study Fig. 10 (Insert), which shows the distribution of HIV/AIDS in parts of Africa. Describe the distribution of the areas with more than 10% of HIV/AIDS infection rates. [3]

- Between Equator and Tropic of Capricorn [1]

10.1% - 20% [1]

- Central Africa: Cameroon, Central Africa Republic,
- East Coast: Somalia, Kenya, Malawi, Mozambique

20.1% - 38% [1]

- Highest level in Southern Africa: Zambia, Zimbabwe, Namibia, South Africa, Lesotho, Swaziland

(d) Describe the socio-economic impacts of high HIV/AIDS infection rates. [5]

- Reduces life expectancy in countries
- Increases infant mortality rate
- Orphan crisis: increase number of orphans leading to great burden on extended families and countries. Orphans suffer from emotional trauma, stigmatization, malnutrition and illness
- Increase health care expenditure:
 - o Govt spendings on treating complications from HIV/AIDS and expensive drugs
 - o Less funds for education system

- o Lower skilled workforce
- o Less foreign investment
- Slower economic growth:
 - o High absenteeism, decline in labour and loss of skilled labour resulting in lower labour productivity
 - o Increase costs of recruitment and training

One mark each with elaboration

- (e) Describe the efforts made to manage the outbreak of HIV/AIDS in a country you have studied.
Assess the success of these efforts. [8]

Candidates may provide information about some of the following points.

Efforts and success may vary from country but the main ones are included below.

Candidates may express these efforts in a variety of relevant ways.

An indication of success is given against some efforts as examples of what is acceptable.

Educating men, women, adolescents and children about the disease and prevention.

e.g. 'national women and girls awareness days' e.g. March 10th every year in countries such as South Africa.

Some efforts at spreading information are not very aggressive and reach only small percentage of population.

Research, counselling and care – but shortage of health care workers limits success.

Efforts of aid organisations and charities including community projects.

Attitude towards sexual activity

- Abstain from sex until marriage
- Be faithful to partner – can be very successful but difficult in the case of migrant workers.
- Correctly and consistently use condoms – can be as successful as reducing risk by 90% but depends upon overcoming traditions/religions/difficulties of communicating to rural areas and free access to condoms.
- Provision of clean drug using equipment – success difficult because of illegal nature of drug taking – not all users will come forward or agree to treatment. Also 40% of countries have laws that prevent or limit effective prevention services.
- Substitute therapy

Attitude towards mother to child transmission

- Antiretroviral drugs for HIV positive mothers and children – success rate of 40% - 70% in reducing transmission of AIDS to newborns in Botswana – large percentage lack access to drugs. In addition, the success depends on adequate nutrition as HIV/AIDS sufferers need more calories and protein than those unaffected.
- Alternatives to breast feeding

Attitude towards blood transfusion

- Blood screening and safe procedures – low level of blood screening in most LDCs but screening in India has seen reduction in infected blood since 1986.
In many countries such as India, medical treatment is often difficult because of the discrimination against women with HIV/AIDS in the form of ridicule, harassment and physical assault.
In some countries, there is a national action plan but in others the efforts lack coordination, finance, drugs and equipment
In Kenya, there is a National AIDS Strategic Plan 2009/10 to 2012/13.

Level 1 (0 – 3 marks)

At this level answers will lack detail and may be general in nature. A basic answer that has little development.

This will most likely be naming or brief descriptions of efforts.

There may be no or little attempt at assessment of success. A country may or may not be named.

Level 2 (4 – 6 marks)

At This level answers will contain some appropriate detail. The content will lack balance and some relevant detail.

This means that only successful or not successful points are considered. OR both successes and failures are considered but support is patchy so that the answer is not full.

Assessment may be given but may be limited or general in nature. A country will be named in answer.

Level 3 (7 – 8 marks)

At this level answers will be comprehensive and supported by sound knowledge.

There will be assessments of the extent to which efforts were successful, i.e. considering both successful and not successful points.

Efforts will be described in detail. Assessment of success will be directly related to each method described. A country will be named in answer.

End of paper