# 2018 Secondary 4 Geography

<table>
<thead>
<tr>
<th></th>
<th>School</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Anderson</td>
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</tr>
<tr>
<td>2</td>
<td>Anglican High</td>
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<td>3</td>
<td>Anglo Chinese</td>
<td>SA2</td>
</tr>
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<td>4</td>
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<td>5</td>
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<tr>
<td>6</td>
<td>Xinmin</td>
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</tr>
<tr>
<td>7</td>
<td>Zhonghua</td>
<td>SA2</td>
</tr>
</tbody>
</table>
GEOGRAPHY

2236/01
29 August 2018
1 hour 40 minutes

Additional Materials: Insert
Insert 2
Writing Paper

READ THESE INSTRUCTIONS FIRST

Write your name, class and index number on all the work you hand in.
Write in dark blue or black pen on both sides of the paper.
Do not use staples, paper clips, highlighters, glue or correction fluid/tape.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.
Write ALL answers on your own writing paper except Question 1d(i) which should be answered on Insert 2.

Answer Question 1 from Section A.

Answer either Question 2 OR Question 3 from Section B.

<table>
<thead>
<tr>
<th>Section</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section A</td>
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<tr>
<td>Section B</td>
<td>25</td>
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<td>Total Marks</td>
<td>50</td>
</tr>
</tbody>
</table>

This document consists of 5 printed pages and 2 Inserts.

Setter: Ms Kwok Shi Min Shermine
Section A

This question is compulsory.

1 a (i) A group of managers from Berrygood Hotel Group embarked on a coastal investigation at North Bay Waterfront in Ontario, Canada to find out the suitability of building coastal resorts there.

Fig. 1 (Insert) shows the aerial view of North Bay Waterfront in Ontario, Canada.

They crafted 3 possible hypotheses:

1. ‘Sediment size becomes smaller in the direction of longshore drift.’

2. ‘Sediment size changes in the direction of longshore drift.’

3. ‘Sediment sizes becomes smaller when there is longshore drift.’

Select the best hypothesis for them to use and justify your answer. [2]

(ii) Explain how they can determine the direction of longshore drift along the coast. [3]

b The managers decided to collect sediments at Site A and B (Fig. 1, Insert) to compare the size of the sediment at the two sites.

(i) Describe how they can conduct fieldwork to collect sediments at the two sites. [5]

(ii) The managers of Berrygood Hotel Group sieved 100g of sample from each point and presented their results in the table below:

<table>
<thead>
<tr>
<th>Size of Sediment</th>
<th>Site A</th>
<th>Site B</th>
</tr>
</thead>
<tbody>
<tr>
<td>4mm</td>
<td>7g</td>
<td>0g</td>
</tr>
<tr>
<td>3mm</td>
<td>43g</td>
<td>1g</td>
</tr>
<tr>
<td>1mm</td>
<td>28g</td>
<td>7g</td>
</tr>
<tr>
<td>0.5mm</td>
<td>14g</td>
<td>14g</td>
</tr>
<tr>
<td>0.1mm</td>
<td>8g</td>
<td>78g</td>
</tr>
</tbody>
</table>

Table 2

Using Table 2 above, as well as information from Fig. 1 (Insert), discuss the suitability of developing beach resorts at each site. [3]
The managers decided to conduct a questionnaire survey of the local residents living there (Fig. 2, Insert) to find out potential challenges they may face in developing the site.

Explain how systematic sampling can be used to select 100 respondents to answer the questionnaire survey. [2]

d (i) The results of the questionnaire survey are presented in Table 3 (Insert).

With reference to Table 3, represent the responses for Question 5 by completing the pie chart in Insert 2. [3]

(ii) With reference to Table 3, comment on the feasibility of building budget youth hostels and live concert venues along the coast based on the demographic of residents at North Bay Waterfront. [5]

(iii) Suggest how the managers could improve on the reliability of the questionnaire survey in Fig. 2 (Insert), as well as their sampling method. [2]
Section B

Answer **ONE** Question from this section.

2 a) Fig. 4 (Insert) shows a news clipping about the USA- North Korea Political Summit held on 12 June 2018 in Singapore.

With reference to Fig. 4, explain how this event may boost tourism numbers in Singapore. [4]

b) Fig. 5 (Insert) shows a tourist participating in a cultural lesson on the significance of traditional dress of the Long neck Karen Tribe in North Thailand. Fig. 6 (Insert) shows a tourist snapping photographs of a woman from the same tribe.

With reference to Fig. 5 and 6, evaluate the impact of tourism on the Long neck Karen Tribe. [5]

c) Discuss the factors that could give rise to large destructive waves along a coastline. [4]

d) Fig. 7 (Insert) shows a map of the Japanese Shinkansen (Bullet Train). Fig. 8 (Insert) shows the interior of the Maharaja Express Luxury Train in India.

With reference to Fig. 7 and 8, compare the Shinkansen and the Maharaja Express in terms of their appeal to tourists and the profile of tourist that they would appeal to. [4]

e) 'Developing tourism along the coast does the coastal environment more harm than good.'

To what extent do you agree with the statement? Use examples to support your answer. [8]
3 a) Fig. 9 (Insert) is a graph that charts the presence of mangrove forests along the coast and its effect on wave height. Fig. 10 (Insert) shows two coastal areas, one protected by mangrove forest (Coast M), and one left exposed (Coast N).

With reference to Fig. 9 and 10, compare and account for the level of impacts of a tsunami on Coast M versus Coast N. [5]

b) Fig. 11 (Insert) shows modified tetrapods also known as TetraPOT.

With reference to Fig. 11, discuss the benefits of this tetrapod design in protecting the coast. [4]

c) Evaluate the impacts of fisheries and aquaculture in South East Asia. [4]

d) Fig. 12 (Insert) shows how the beach profile of a coastline may change after seawalls are built along the shore.

With the use of Fig. 12, explain how coastal processes and the presence of the seawall have modified the coastline. [4]

e) ‘Coastal degradation brings about mainly economic consequences.’

To what extent do you agree with the statement? Use examples to support your answer. [8]
INSERT

This Insert contains Fig. 1, 2 and Table 3 for Question 1, Fig. 4, 5, 6, 7, 8 for Question 2 and Fig. 9, 10, 11, 12 for Question 3.
Fig. 1 for Question 1
Questionnaire Survey of Local Residents at North Bay Waterfront

1. What is your age? (Please circle)
   - Below 18
   - 19- 35
   - 36- 55
   - 56- 70
   - Above
   - 70

2. How long have you lived at North Bay Waterfront? (Please circle)
   - Less than 5 years
   - 5-10 years
   - 11-15 years
   - 15- 20 years
   - More than 20 years

3. Which household income bracket do you belong to? (Please circle)
   - Less than $50,000 a year
   - $50,000 to $100,000 a year
   - $100,000 to $350,000 a year
   - $350,000 to $500,000 a year
   - More than $500,000 a year

4. Which activity do you most often participate in at the beach? (Please circle)
   - Fishing (Commercial)
   - Fishing (Hobby)
   - Picnic
   - Sports (Beach and Water)
   - Recreational yachting and Boating

5. If tourism facilities are to be build along the coast, what would be your top concern with regards to its development? (Please circle)
   - Destruction of natural coastal features
   - Overcrowding
   - Pollution and Litter
   - Competition for resources
   - High noise levels

   Thank you for your response!

Fig. 2 for Question 1
<table>
<thead>
<tr>
<th>Question 1</th>
<th>Below 18</th>
<th>19-35</th>
<th>36-55</th>
<th>56-70</th>
<th>Above 70</th>
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<tr>
<td>No. of respondents</td>
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<td>16</td>
<td>25</td>
<td>25</td>
<td>30</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Question 2</th>
<th>Less than 5 years</th>
<th>5-10 years</th>
<th>11-15 years</th>
<th>15-20 years</th>
<th>More than 20 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of respondents</td>
<td>2</td>
<td>5</td>
<td>15</td>
<td>12</td>
<td>66</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Question 3</th>
<th>Less than $50,000 a year</th>
<th>$50,000 to $100,000 a year</th>
<th>$100,000 to $350,000 a year</th>
<th>$350,000 to $500,000 a year</th>
<th>More than $500,000 a year</th>
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<tr>
<td>No. of respondents</td>
<td>0</td>
<td>5</td>
<td>23</td>
<td>49</td>
<td>24</td>
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</table>

<table>
<thead>
<tr>
<th>Question 4</th>
<th>Fishing (Commercial)</th>
<th>Fishing (Hobby)</th>
<th>Picnic</th>
<th>Sports (Beach and Water)</th>
<th>Recreational yachting and Boating</th>
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<td>30</td>
<td>12</td>
<td>24</td>
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</table>

<table>
<thead>
<tr>
<th>Question 5</th>
<th>Destruction of natural coastal features</th>
<th>Overcrowding</th>
<th>Pollution and Litter</th>
<th>Competition for resources</th>
<th>High noise levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of respondents</td>
<td>21</td>
<td>32</td>
<td>28</td>
<td>4</td>
<td>15</td>
</tr>
</tbody>
</table>

Table 3 for Question 1
SINGAPORE – Top officials are scrambling to plan the historic meeting between President Donald Trump and the North’s leader Kim Jong Un planned for June 12 in the city-state which was chosen due to its track record of excellent infrastructure, facilities and expertise to host high-profile events on a massive scale. It also boasts strong security forces, and a world class transport system.

While some may lament the sudden influx of media and diplomats, businesses see it as an opportunity. Hotel rooms are being snapped up, and thousands of media reporters and foreign diplomats are expected to jet in to cover the historic event. The famous Escobar has come up with two special summit drinks. The "Trump" is a blue, bourbon-based cocktail while the "Kim" is a red-coloured cocktail with soju, a Korean liquor, as its base. Both cost $12.60, a reference to the summit’s expected date.

Fig. 4 for Question 2a)
Shinkansen Lines (Current as of March 2016)

- In operation
- Planned or under construction

Running at speeds of up to 320 km/h, the shinkansen is known for punctuality (most trains depart on time to the second), comfort (relatively silent cars with spacious, always forward facing seats), safety (no fatal accidents in its history) and efficiency. Thanks to the Japan Rail Pass, the shinkansen can also be a very cost effective means of travel. Prices start at $450 SGD for a 7 day pass of unlimited travel, and passenger may also choose to buy single journey tickets, with prices depending on distance travelled.

Fig. 7 for Question 2d)
Maharaja's Express can be introduced as one of the most popular luxury trains running on Indian rails. The train was incepted in 2010 with a view to provide unmatched luxury to guests looking for the royal experience. King size beds that were studded with jewels, cabins that would put Five Star hotel suites to shame, hospitality that even the Rajahs of yore would envy. It is all these things and more that makes the Maharaja's Express not just a journey. It is a lifestyle - 7 days of godly bliss, recreating the lifestyle of a princely era. The price for the shortest 8 day 7 nights journey starts from $8000 SGD.

Fig. 8 for Question 2d)
Fig. 9 for Question 3a)
Fig. 12 for Question 3d)
Copyright Acknowledgments:

Fig 1: http://rwsummers.ca/river_sand_marina/
Fig 4: http://indianexpress.com/article/world/singapore-summit-wth-north-koreas-kim-jong-un-on-june-12-donald-trump-5200782/
http://japan-forward.com/5-reasons-singapore-is-chosen-to-host-the-u-s-north-korea-summit/
Fig 5: https://www.thailandhilltribeholidays.com/visit-long-neck-village/
Fig 6: https://www.pri.org/stories/2017-12-06/thailands-long-neck-villages-arent-just-controversial-tourist-attractions-theyre
Fig 7: https://www.nippon.com/en/features/h00077/
Fig 8: https://www.connaissseursvoyage.fr/autres-categories/grands-trains-du-monde/fiche/296-l-inde-le-maharaja-s-express-l-indian-panorama.html
Fig 10: https://www.youtube.com/watch?v=9jn9YDv08
Fig 11: http://orientaldaily.on.cc/cnt/china_world/20161102/mobile/odn-20161102-1102_00160_042.html
INSERT 2

This Insert 2 contains the pie chart for Question 1d(i)
GEOGRAPHY

READ THESE INSTRUCTIONS FIRST

Write your name, class and index number on all the work you hand in.
Write in dark blue or black pen on both sides of the paper.
Do not use staples, paper clips, highlighters, glue or correction fluid/tape.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.
Write ALL answers on your own writing paper.

Answer either Question 1 OR Question 2 from Section A.

Answer either Question 3 OR Question 4 from Section B.

| Section A | 25 |
| Section B | 25 |
| Total Marks | 50 |
Section A

Answer ONE Question from this section.

1 a) Study to Fig. 1 (Insert), which shows the formation of the Marianas volcanic islands arc and oceanic trench in the Pacific Ocean.

With reference to Fig. 1, and the use of the slab-pull theory, account for the formation of the Marianas islands arc and oceanic trench. [5]

b) Explain the formation of storm surges during a tropical cyclone. [4]

c) Study Fig. 2 (Insert), which shows an early warning system for earthquakes used by the Japanese Meteorological Agency. There are more than 1000 early warning sensors which communicate by radio waves to earthquake early warning centres located in major cities such as Tokyo. The sensors cover almost all of the country.

Use Fig. 2 and the information above to evaluate the effectiveness of the early warning system used in Japan to manage earthquakes. [4]

d) Study Fig.3 (Insert), which describes the climate conditions of an Island located near the equator.

Use the information in Fig.3, name and account for the climate type of the Island. [4]

e) "The benefits of living near volcanoes are much lesser than perceived."

To what extent do you agree with this statement? Use examples to support your answer [8]
2  a) Study Fig. 4 (Insert), which shows information on preparing for a tropical cyclone in the USA.

Evaluate how infrastructure management might reduce the impacts of tropical cyclones.

b) Study Fig. 5 (Insert), which shows a volcanic island in the Pacific Ocean.

(i) Use the information in Fig. 5 to describe how temperature at X will be different from Y

(ii) Account for the lack of rainfall at the dry plains at location Z.

c) Compare the formation of local winds and regional monsoon winds.

d) ‘Impacts of climate change are impossible to manage at a national level by countries.’

To what extent do you agree with this statement? Use examples to support your answer.
Section B

Answer either Question 3 or Question 4

3 a) Study Fig. 6 (Insert), which shows the percentage of childhood obesity in 5 different countries.

   Compare the percentages of childhood obesity by gender between the countries.  [5]

b) Study Photograph A (Insert), which shows a type of irrigation system on a farm in New Zealand.

   Describe the advantages of such an irrigation system and its impact on the environment.  [4]

c) Discuss how poor transport networks and storage facilities can affect food security in a region.  [4]

d) Fig. 7 (Insert) shows a report on the safety of GM crops by scientists.

   With reference to Fig. 7 and the use of examples, discuss why GM crops remain controversial.  [4]

e) 'The effect of overconsumption of food has a greater impact on the economy of a country than on the health of individuals.'

   To what extent do you agree with the statement? Use examples to support your answers.  [8]
4 a) Study Fig. 8 (Insert), which shows data for patients per doctor ratio in different countries.

(i) Compare the patients per doctor ratio for the countries shown in Fig. 8. [3]

(ii) Suggest the extent to which the countries shown in Fig. 8 are equipped to cope with mosquito borne diseases such as Zika. [5]

b) Discuss the relationship between sanitation and life expectancy in countries. [5]

c) Study Fig. 9 (Insert), which shows information about poverty, diet and the health of an individual in an impoverished area of a Developed Country (DC).

Using information from Fig.9, discuss the relationship between poverty and health in a DC. [4]

d) 'Education is the key to manage the outbreak and spread of infectious disease.'

To what extent do you agree with the statement? Use examples to support your answers. [8]

END OF PAPER
This Insert contains Fig. 1, 2, 3 for Question 1, Fig. 4, 5, 6 for Question 2 and Fig. 7, 8, 9, 10 for Question 3.
Fig. 1 for Question 1a
Fig. 2 for Question 1c

An earthquake occurs!
Immediately after occurrence

After ten seconds

After 26 seconds

P-wave
S-wave
S-wave P-wave

Japan Meteorological Agency

Estimating the focus, magnitude and seismic intensities using data from one seismograph

Focus, magnitude & seismic intensities

Estimating the focus, magnitude and seismic intensities using data from two or three seismographs

More accurate estimate

Estimating the focus, magnitude and seismic intensities using data from three to five seismographs

More accurate estimate
The island is situated near the equator with abundant rainfall, high and uniform temperatures, and high humidity all year round. The length of its day is relatively constant throughout the year, and so is the amount of sunshine it receives daily. Frequent afternoon and evening thunderstorms are also common due to high relative humidity and temperature.
HURRICANE SHUTTERS PROTECT HOUSES AND OTHER STRUCTURES FROM EXTREMELY HIGH WINDS

The levee protects the house from flooding if the river overflows.

Concrete levee
Steel sheetpile reinforces the levee
Fig. 5 for Question 2b(i) and (ii)

Location Z: Dry Plains

Prevailing wind direction

Key:
- contours lines (height in metres)

3000
Fig. 6 for Question 3a

**Childhood Obesity Rates**
Percentage of overweight and obese children under the age of 20 in select countries

<table>
<thead>
<tr>
<th>Country</th>
<th>Girls (%)</th>
<th>Boys (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S.</td>
<td>29.7</td>
<td>28.8</td>
</tr>
<tr>
<td>China</td>
<td>14</td>
<td>23</td>
</tr>
<tr>
<td>South Korea</td>
<td>13.2</td>
<td>21.2</td>
</tr>
<tr>
<td>Japan</td>
<td>3.4</td>
<td>15.3</td>
</tr>
<tr>
<td>India</td>
<td>2.3</td>
<td>5.3</td>
</tr>
</tbody>
</table>

Source: Select countries; The Lancet, University of Washington | WSJ.com
Photograph A for Question 3b
Are GMOs SAFE? YES. The National Academies of Sciences, Engineering, and Medicine 2016 report reaffirms

Over 900 studies and publications were examined.

20+ scientists, researchers and agricultural and industry experts over a 2 year period reviewed animal studies, allergenicity testing, North American and European health data, and more.

SAFE.

Based on 20+ years of data since GMO crops were introduced.

No substantiated evidence of a difference in risks to human health between current commercially available genetically engineered (GMO) crops and conventionally bred crops.

The National Academies of SCIENCES · ENGINEERING · MEDICINE

Full report available at http://nas-sites.org/ge-crops/
**Fig. 8 for Question 4a(i) (ii)**

Number of residents for each physician in the country

<table>
<thead>
<tr>
<th>Country</th>
<th>Residents per Physician</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liberia</td>
<td>71,429</td>
</tr>
<tr>
<td>Sierra Leone</td>
<td>45,455</td>
</tr>
<tr>
<td>Guinea</td>
<td>10,000</td>
</tr>
<tr>
<td>U.S.</td>
<td>408</td>
</tr>
</tbody>
</table>

Source: World Health Organization
The Wall Street Journal
Fig. 9 for Question 4c

Family expands; economic status and lack of education lead to continued dietary choices

Less education, fewer job opportunities, lower socioeconomic status

Poor diet in early childhood

Lower academic performance throughout school

INDIVIDUAL IS UNHEALTHY AND VULNERABLE TO DISEASES

Copyright Acknowledgments:

Fig 1 for Question 1(a): https://oceanexplorer.noaa.gov/explorations/14fire/background/seamounts/media/xsect.html
Fig 2 for Question 1(c): http://www.jma.go.jp/jma/en/Activities/image/eew1.png
Fig.3 for Question 1(d): UCLERS 2012
Fig 4 for Question 2(a): http://www.raingutterssolution.com/blog/why-you-should-consider-hurricane-shutters-for-next-hurricane-season/
Fig 5 for Question 2(b) (ii): https://pubs.usgs.gov/of/1995/0271/body.
Fig 6 for Question 3(a): https://blogs.wsj.com/chinarealtime/2014/05/29/as-obesity-rises-chinese-kids-are-almost-as-fat-as-americans/
Photograph A for Question 3(c): https://www.rrigationnorthland.co.nz/services/irrigation/
Fig 7. for Question 3(d): https://nas-sites.org
Fig.8 for Question 4(a) (a): World Health Organisation via The Wall Street Journal
Fig. 9 for Question 4 (c): http://www.todaysdietitian.com/newarchives/100614p64.shtml
# Section A

This question is compulsory.

<table>
<thead>
<tr>
<th></th>
<th>A group of managers from Berrygood Hotel Group embarked on a coastal investigation at North Bay Waterfront in Ontario, Canada to find out the suitability of building coastal resorts there.</th>
</tr>
</thead>
</table>
| **ai)** | Fig. 1 (Insert) shows the aerial view of North Bay Waterfront in Ontario, Canada. They crafted 3 possible hypotheses:  
1. ‘Sediment size becomes smaller in the direction of longshore drift.’  
2. ‘Sediment size changes in the direction of longshore drift.’  
3. ‘Sediment sizes becomes smaller when there is longshore drift.’  
Select the best hypothesis for them to use and justify your answer. Hypothesis 3 is the best as it has an independent and dependent variable and a clear relationship between the variables. |
| **ii)** | Explain how they can determine the direction of longshore drift along the coast.  
- Use a wind vane to determine prevailing wind direction  
- Lay a measuring tape along a parallel transect along the coast and mark the start point with a ranging pole  
- Throw a biodegradable orange into the sea at the start point and time with a stopwatch  
- After 10 minutes, observe which direction the orange floats to determine the direction of LSD. |
| **b)** | The managers decided to collect sediments at Site A and B (Fig. 1, Insert) to compare the size of the sediment at the two sites. Describe how they can conduct fieldwork to collect sediments at the two sites.  
- Lay a measuring tape along a perpendicular transect  
- Using ranging poles to mark out points at regular intervals to take measurements from  
- At each point, lay down a quadrat. Using a number generator, use random sampling to select the squares to take sediments from |
- From each square, use a spoon to scoop the sediments
- Place each scoop in a labelled Ziplock bag.

ii) The managers of Berrygood Hotel Group sieved 100g of sample from each point and presented their results in the table below.

<table>
<thead>
<tr>
<th>Size of Sediment</th>
<th>Site A</th>
<th>Site B</th>
</tr>
</thead>
<tbody>
<tr>
<td>4mm</td>
<td>7g</td>
<td>0g</td>
</tr>
<tr>
<td>3mm</td>
<td>43g</td>
<td>1g</td>
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<tr>
<td>1mm</td>
<td>28g</td>
<td>7g</td>
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<tr>
<td>0.5mm</td>
<td>14g</td>
<td>14g</td>
</tr>
<tr>
<td>0.1mm</td>
<td>8g</td>
<td>78g</td>
</tr>
</tbody>
</table>

Table 2

Using Table 2 above, as well as information from Fig. 1 (Insert), discuss the suitability of developing beach resorts at each site.

Site A is not suitable as a beach resort whilst Site B is suitable.

Site A has a majority % of coarser sediments with 50% of sediment being 3mm and above whilst Site B has majority % of finer sediment with 92% of sediment being under 0.5mm. Finer sediment will be more suitable for recreational activities such as picnics.

Site A is also much narrower in width than Site B as seen in Fig. 1, and thus there is less space on the beach to carry out recreational activities, which makes it less suitable for a beach resort. [1]

c) The managers decided to conduct a questionnaire survey of the local residents living there (Fig 2, Insert) to find out potential challenges they may face in developing the site.

Explain how systematic sampling can be used to select 100 respondents to answer the questionnaire survey.

The students can situate themselves along the beach (must state a suitable location) [1] and interview every 10th (state any regular interval) local who passes by that point. [1]

di) The results of the questionnaire survey are presented in Table 3 (Insert).

With reference to Table 3, represent the responses for Question 5 by completing the pie chart in Insert 2.

1m for suitable title
1m for accurate pie chart percentage
1m for suitable label or legend
ii) With reference to Table 3, comment on the feasibility of building budget youth hostels and live concert venues along the coast based on the demographic of residents at North Bay Waterfront.

Building youth hostels and live concert venues is not very feasible [1] due to high chances of conflict of interests and values with the locals [1] - Reserve 2 marks.

Any 3 marks for use of data to substantiate with explanation:

As the local are mostly elderly (55% above 56 years old), who have lived there for a large portion of their lives (78% more than 15 years), highly likely to retire there [1], which may not make the area suitable for mass youth tourism which will disrupt the environment they are used to and may cause the elderly distress.

Also the locals there are of generally higher income levels (95% above $100,000 a year) and enjoy activities such as water sports, yachting [1] which may not be the same activities that youth tourists on a budget may enjoy or be able to afford.

Locals are most worried about overcrowding and pollution (60%), which may be likely if live concert venues are built and larger volumes of budget tourists visit the area.

High noise levels are a significant concern (12%), which will surely occur if such concert venues are built.

The building of hostels and venues may cause sedimentation in the sea which may destroy natural coastal features, which is a big concern amongst the locals (21%). [1]

---

iii) Suggest how the managers could improve on the reliability of the questionnaire survey in Fig. 2 (Insert), as well as their sampling method.

They should include open-ended questions rather than only close ended questions in order to allow the respondents to put in their own opinions rather than be confined by fixed choices which may not truly represent their opinion [1].

They should conduct stratified sampling in order to ensure that they do not miss on collecting data from various groups of locals. This will ensure greater representation of all groups. [1]
## Section B

**Answer ONE Question from this section.**

### 2 a)

Fig. 4 (Insert) shows a news clipping about the USA- North Korea Political Summit held on 12 June 2018 in Singapore.

With reference to Fig. 4, explain how this event may boost tourism numbers in Singapore.

- Due to high media coverage from more than 3000 journalists about the country, it serves to advertise Singapore as an ideal and secure tourist destination with excellent facilities and attractions.
- Advertising about Singapore as a suitable venue for MICE tourism with excellent facilities for meetings and conventions.
- Serves to pique the interest of those who are interested in niche tourism and have a great interest in visiting the sites that the world leaders visited as well.
- During the event itself, tourism numbers would surge due to the high number of media, diplomats and interested onlookers who snapped up hotel rooms in order to attend or cover the summit.

[4]

### 2 b)

Fig. 5 (Insert) shows a tourist participating in a cultural lesson on the significance of traditional dress of the Long neck Karen Tribe in North Thailand. Fig. 6 (Insert) shows a tourist snapping photographs of a woman from the same tribe.

With reference to Fig. 5 and 6, evaluate the impact of tourism on the Long neck Karen Tribe.

**Cap at 2m if no reference to figure. Accept up to 2m of impacts not related to figure 5 and 6.**

- Exchange of values when the Karen Tribe are able to educate tourists and help them understand the value and uniqueness of their culture, sense of pride about their own cultural traditions.
- Entry fee and tour guide fee paid by tourists can go towards supporting the local economy and give them a sustainable means of livelihood.
- Fees paid by tourists can also go towards cultural preservation, and keeping old traditions alive.
- Cultural exploitation and degradation if not well managed, and locals are treated as exhibits, culture for sale.
- Dilution of culture when local traditions are watered down and modified for the enjoyment of tourists rather than preserved.

[5]
in the way they traditionally are.
- Due to demand from tourists to see locals in this traditional lifestyle, they may intentionally be exploited and kept in poverty to continue fuelling this supply for tourists.

c) Discuss the factors that could give rise to large destructive waves along a coastline.

- Waves are generated by wind blowing across the sea, larger the wind energy (higher speed), the larger the waves.
- Long fetch which means that waves travel over long distances and can gain more speed which may lead to larger waves.
- Uneven coastlines may give rise to large destructive waves at the coastline, when the waves converge at headlands resulting in large destructive breakers.
- Extreme weather events and storm events such as cyclones and tsunami events may cause storm surges that result in large destructive waves.

[d] Fig. 7 (Insert) shows a map of the Japanese Shinkansen (Bullet Train). Fig. 8 (Insert) shows the interior of the Maharaja Express Luxury Train in India.

With reference to Fig. 7 and 8, compare the Shinkansen and the Maharaja Express in terms of their appeal to tourists and the profile of tourist that they would appeal to.

The Shinkansen would appeal to tourists who value convenience and efficiency as it connects most of the major cities travelling at very high speeds of 320km/h whilst the maharaja express would appeal to tourists who have time to enjoy the sights and sounds of the journey as it passes over a week. [1]

The Shinkansen is the quickest mode of transport to various cities in Japan, whilst the maharaja express would appeal to tourists who are looking for an experience on board the train, the luxury train replicating a royal lifestyle. [1]

Tourists of most demographics and purpose of travel can use the Shinkansen, as it is a relatively cheap and reliable form of transportation, whilst the Maharaja express would cater to high-income tourists as the cost of a trip starts at a high price of $8000. [1]

The Maharaja express is also a form of niche tourism for travellers who have an interest in experiencing the Maharajah lifestyle and Indian hospitality, whilst the Shinkansen is not a destination in itself. [1]
e) 'Developing tourism along the coast does the coastal environment more harm than good.'

With reference to examples, to what extent do you agree with the statement? [8]

Possible Points:

- **-ve:**
  - High levels of sedimentation which may destroy coral ecosystems
  - Deforestation of mangroves to make way for coastal development
  - Pollution of water through untreated sewage disposal, littering etc.
  - Overcrowding on the beach
  - Trampling on corals
  - Boating, yachting, anchor damage on corals

- **+ve:**
  - More incentive to carry out coastal protection to protect the beach from erosion
  - Ability to carry out high cost soft engineering such as planting mangroves and beach nourishment to protect aesthetics of the coast.
  - Funds by tourists to conserve the environment and protect coral and mangrove ecosystems and preserve biodiversity

**Evaluation:**

- Level of positive and negative impact depends on management of coastal development
- Need to ensure that coastal development is sustainable and benefits the locals and environment through government enforcement and NGO advisories.
### Section 3

**a)**

Fig. 9 (Insert) is a graph that charts the presence of mangrove forests along the coast and its effect on wave height. Fig. 10 (Insert) shows two coastal areas, one protected by mangrove forest (Coast M), and one left exposed (Coast N).

With reference to Fig. 9 and 10, compare and account for the level of impacts of a tsunami on Coast M versus Coast N.

- The impact of the tsunami on exposed coast N will be much higher than that on protected coast M.
- Mangroves have dense root systems which can hold soil together.
- And they are able to absorb and dissipate wave energy.
- Which reduces wave heights from the tsunami as seen in Fig 9, where exposed coasts experienced 15 times higher wave heights than protected coasts.
- Which prevent inland flooding from occurring at coast M as much as on coast N, and reduces force of the tsunami wave.

**b)**

Fig. 11 (Insert) shows modified tetrapods also known as TetraPOT.

With reference to Fig. 11, discuss the benefits of this tetrapod design in protecting the coast.

- This tetrapod features an interlocking design which dissipates the force of incoming waves.
- Reducing erosion of the tetrapod by allowing water to flow around rather than against them.
- The modified design had mangroves grown within the tetrapod, and the roots can also help to hold soil together to prevent erosion.
- It also increases the natural look of the coastal protection measure to increase its aesthetic appeal.
- Also provides habitats to support the biodiversity such as crabs and herons.

**c)**

Evaluate the impacts of fisheries and aquaculture in South East Asia.

**+ve:**
- Brought about economic benefits to the locals living there who make their livelihood and income from fishing and aquaculture, esp locals in SEA LDCs who may not have other viable sources of income.

**-ve:** Ca mau, Vietnam/ Trang Province, Thailand
- Have to clear mangrove forests to make way for aquaculture prawn ponds which may increase threat of the coast to tsunami
- Prawn effluent and feed, as well as chemicals which may lead to eutrophication and may severely degrade the water.
quality such that it is no longer able to support marine life
- Overfishing and by-catch have significant impacts on biodiversity levels and marine life.
- Sediments and waste may settle on the seabed, suffocating corals and organisms that live beneath fishery nets.

Accept as long as at least 1 positive, 1 negative impact. Cap at 2m without any named example from South East Asia.

d) Fig. 12 (Insert) shows how the beach profile of a coastline may change after seawalls are built along the shore.

With the use of Fig. 12, explain how coastal processes and the presence of the seawall have modified the coastline.

- Erosive processes such as Hydraulic action and abrasion act on the coast. Hydraulic action is when air becomes trapped in joints and cracks on a cliff face. When a wave breaks, the trapped air is compressed which weakens the cliff and causes erosion.
- Abrasion is when rock and sand particles are hurled at the rock by waves to scrape away rock fragments on the cliff
- The presence of the seawall prevents erosion from the section of the beach behind the seawall.
- However, the presence of the seawall concentrates energy on it to create a stronger backwash, increasing erosion in front of the seawall causing loss of beach in front of the seawall that declines in width overtime.

---

e) 'Coastal degradation brings about mainly economic consequences.'

With the use of examples, to what extent do you agree with this statement?

Economic:
- Loss of tourism opportunities.
- Loss of coastal environment which supports biodiversity, hence lower fish and seafood catch

Environmental:
- Destruction of coastal environment reduces habitat and breeding ground for marine life, reducing biodiversity

Social
- Loss of traditional livelihoods which depend on fishing and the coastal environment

Evaluation:
- The consequences are all interlinked as the health of the
environment is necessary for any economic benefit to arise from it.

- Environmental consequences will be of larger consequence in the long run if they are irreversible, will threaten more than just the economy, may threaten our food and water sources.

END OF PAPER
GEOGRAPHY

11 September 2018
1 hour 30 minutes

Additional Materials: Insert
Writing Paper

READ THESE INSTRUCTIONS FIRST

Write your name, class and index number on all the work you hand in.
Write in dark blue or black pen on both sides of the paper.
Do not use staples, paper clips, highlighters, glue or correction fluid/tape.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.
Write ALL answers on your own writing paper.

Answer either Question 1 OR Question 2 from Section A.

Answer either Question 3 OR Question 4 from Section B.

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<table>
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This document consists of 4 printed pages and 1 Insert.
Section A

1. a) Study to Fig. 1 (Insert), which shows the formation of the Marianas volcanic islands arc and oceanic trench in the Pacific Ocean.

With reference to Fig. 1, and the use of the slab pull theory, account for the formation of the Marianas islands arc and oceanic trench. [5]

- Slab pull occurs when an oceanic plate subducts into the underlying mantle. (1m)
- As the oceanic plate is denser than the hotter mantle beneath it, this contrast in density causes the plate to sink into the mantle. (1m)
- The process of a tectonic plate descending into the mantle is termed subduction, at which an oceanic trench is created. (1m)
- As seen in Fig. 1, the Marianas trench is found at the are where subduction occurs between 2 oceanic plate. (1m)
- The oceanic plate that does not subduct gets compressed and fault lines allow rising magma to form a chain of volcanic islands as seen in Fig. 1. (1m)

Reserve 1 m if no reference is made to Fig. 1.

b) Explain the formation of storm surges during a tropical cyclone. [4]

A storm surge is a rise in sea level that occurs during tropical cyclones forming over warm tropical oceans. It is an abnormal rise of water over predicted tide range generated by the strong winds associated with tropical cyclones. Tropical cyclones are intense storms that produce strong winds, the high wind speed and low-pressure zone will push the water into shore, which can lead to flooding along coastal areas. Reserve 1 m if high wind speed and low-pressure zone is not mentioned.
Study Fig. 2 (Insert), which shows an early warning system for earthquakes used by the Japanese Meteorological Agency. There are more than 1000 early warning sensors which communicate by radio waves to earthquake early warning centres located in major cities such as Tokyo. The sensors cover almost all of the country.

Use Fig. 2 and the information above to evaluate the effectiveness of the early warning system used in Japan to manage earthquakes.

- The Earthquake Early Warning monitors earth movements with the use of extensively spread out sensors and is able to transmit information aimed at mitigating earthquake-related damage.
- It can help to prevent injuries and death by promptly slowing down trains, controlling elevators to avoid danger and enabling people to quickly protect themselves in various environments such as factories, offices, houses and near cliffs or coastal areas. However despite its benefits, it has limitations.
- **Timing**
  The window of time from the announcement of an Earthquake Early Warning until the arrival of the main tremors is very short as seen in Fig.2, i.e. a matter of seconds (or between several seconds and a few tens of seconds) in areas that are close to the focus of the earthquake, the warning may not be transmitted before strong tremors hit.
- **False alarms**
  When using data from only one seismograph, false Earthquake Early Warnings may occur as a result of noise from accidents, lightning or device failure.
d) Study Fig.3 (Insert), which describes the climate conditions of an Island located near the equator.

Use the information in Fig.3, name and account for the climate type of the island.

- The island has a tropical equatorial climate.
- Low latitude location near the equator allows for high amount of sunlight throughout the day and high temperature as seen in Fig. 3.
- High rainfall could be attributed to the high Relative humidity as it is an island.
- In Fig.3, convectional rainfall seems frequent and common, and this is another trait of a warm and wet tropical equatorial climate.


e) "The benefits of living near volcanoes are much lesser than perceived."

To what extent do you agree with this statement? Use examples to support your answer

Essay should have a clear stand and cover at least 3 benefits and 3 risks of living near volcanoes.
"I agree/disagree that the benefits of living near volcanoes are much lesser than perceived."

Benefits of living near volcanoes are mainly economic and are long term hence benefits are not lesser than perceived. It is beneficial:

Fertile volcanic soil
- Rich in minerals after volcanic rock has been weathered and broken down for thousands of years. Therefore favourable to plant growth
- Agriculture as source of income/without use of fertilizer, lower cost therefore can get more profit
- Example: Bali, Indonesia can support tea, coffee and rice for many decades and still remain fertile

Precious stones and minerals, building materials
- After millions of years erosion of upper layers of volcanic rocks, such as diamonds from pressurized carbon cooled in magma pipes
- Diamonds can be sold at high cost as source of income
- Example: Kimberley, South Africa, is the world’s richest source of diamonds
- Production of other daily items for sale as source of income or provide resources found locally.
  - Example: Sulphur from active volcano in East Java, Indonesia, used to make matches and fertilizers.

Tourism
- Activities for tourists, such as hiking and camping to enjoy scenery.
- Rich in history for tourists to learn.
- Locals live near to provide services for the tourists such as tour guides or sale of souvenirs.
- Example: Archaeology of preserved Pompeii, Italy buried under ash due to eruption of Mount Vesuvius in 79CE attract 3 million visitors yearly.

Risks are often ignored as volcanoes can lay dormant for a long time and people might get complacent and forget the risks.

Hazards include:
- Destruction by volcanic materials will cancel out any benefits of living near volcanoes.
- With volcanic bombs being pelted from a violent eruption or the fast flowing lava of a shield volcano such as Kilauea of Hawaii, many homes and infrastructure can be easily destroyed and people need to move away from the area, sometimes permanently. For example, Kilauea which has been quietly erupting since 1982 has recently in May 2018, been erupting more violently spewing out huge amount of lava and ash, destroying properties and farmland.
- Landslides and lahars can occur as the slopes of the volcano can slip and collapse during an eruption. This is seen in the eruption of the Nevado Del Ruiz in the Andes mountain 1981, where an entire villages were buried and many lives were lost.
- Pollution is seen when dust and ash is ejected during a violent eruption can cause traffic disruption and major economic losses for aviation, agriculture and other major commercial sector. For example, the Icelandic volcano that erupted in 2010 caused air traffic disruption costing the airline industry 1.8 billion, with nothing much to be done except to wait out for the eruption.

<table>
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| 1-3m  | - Generalized answers or with minimal detail on benefits and risks.  
- A basic answer with little development on the details of benefits and risks.  
- Reasoning rather weak and expression may be unclear in organisation of answers.  
- Only addresses benefits of living near volcanoes with no mentioned of any risks.  
- No attempt to address the accuracy of the statement.  
- No named example is given in the entire essay. |
| 4-6m  | - Answers contain some appropriate detail. Simple details of impacts, able to distinguish between risks and benefits of living near volcanoes.  
- BUT content lack balance and some relevant detail, i.e. simple description |
| 7-8m | - Answers are comprehensive and supported by sound knowledge.  
- Specific details and elaboration of at least three reasons for each corresponding type of risk and benefit.  
- Detailed examples is given to highlight risks or benefit of living near volcanoes.  
- Assessment of the harm and good of living near volcanoes. |
2 a) Study Fig. 4 (Insert), which shows information on preparing for a tropical cyclone in the USA.

Evaluate how infrastructure management might reduce the impacts of tropical cyclones.

- As seen in Fig. 4, shutters on windows can help to protect against strong winds from damaging glass window and prevent flooding during storm surges.
- Levees built near low lying areas as seen in Fig. 4 may also be useful in protecting communities and homes during storm surges and flooding brought by tropical cyclones.
- Preparedness measures in terms of infrastructure management can help to reduce vulnerabilities to strong winds, torrential rainfall, storm surge and flooding during tropical cyclones.
- It can help to prevent objects from falling and being blown away during a tropical cyclone, thus reducing injuries and damages to properties.
- However, infrastructure management is expensive and richer nations are able to plan ahead and afford these mitigation measures.

reserve1 mark if no reference to Fig.4

b) Study Fig. 5 (Insert), which shows a volcanic island in the Pacific Ocean.

(i) Use the information in Fig. 5 to describe how temperature at X will be different from Y.

- Temperature at X will be lower as compared to Y.
- The climate on mountains get progressively colder with increased altitude.
- This happens because as altitude increases, air becomes thinner and is less able to absorb and retain heat. The cooler the temperature the less evaporation there is, meaning that there is more moisture in the air.
- Air pressure decreases with altitude. As a result of the reduced air pressure, rising air expands and cools.
(ii) Account for the lack of rainfall at the dry plains at location Z. [3]

- Z is a rain shadow zone as it is a region having little rainfall because it is sheltered from prevailing rain-bearing winds from the Pacific Ocean that is coming from the south west.
- The tall mountains facing the ocean blocks the winds from carrying moisture to the area.
- The area experiences orographic precipitation, which are rain, snow, or other precipitation produced when moist air is lifted as it moves over a mountain range.
- As the air rises and cools, orographic clouds form and serve as the source of the precipitation, most of which falls upwind of the mountain ridge as seen in Fig. 5.

c) Compare the formation of local winds and regional monsoon winds. [5]

- Unlike regional winds, local winds occur at a smaller scale.
- Both are similar in terms of movement from high pressure to low pressure zone.
- Local winds are breezes that occur because water and land absorb and lose heat from the sun at different rates.
- During the day, the land heats much more quickly than the sea, causing air over land to rise.
- As the warm air rises, cool air from the sea is blown in underneath, producing a sea breeze blowing inland.
- The situation is reversed at night, with the cool air over land drawn in under the warm air over the sea, producing a generally weaker land breeze.
- On the other hand, regional monsoon winds are large-scale, seasonally changing wind circulations that form due to the temperature differences between land and ocean, like a giant sea breeze.
- Monsoons dominate the climate in the tropical regions of Asia, They are known locally as the Northeast Monsoon and the Southwest Monsoon, and are responsible for much of the variation in rainfall over the regions throughout the year.
- The Northeast Monsoon develops during the northern hemisphere winter between December and March, when the land over much of continental Asia is colder than the ocean. This causes sinking cold air over land to blow towards the ocean, replacing the void left by the rising warm air over the ocean.
- The reverse is true of the Southwest monsoon from June to Sept.
• Monsoon winds are influenced by the Coriolis effect such that surface winds are deflected to the right in the northern hemisphere to become northeasterly winds during the Northeast Monsoon and southwestern winds during the Southwest Monsoon.

d) 'Impacts of climate change are impossible to manage.'

To what extent do you agree with this statement? Use examples to support your answer.

Answers should have a clear stand:

Impacts of climate change should be discussed: rising sea level, global warming and unpredictable/extreme weather events. Crops disruption and food supplies being affected.

eg. Singapore has embarked on measures like setting a minimum height for land reclamation and has diversified food supplies. International responses like the Kyoto Protocol and national responses such as the Singapore Green Plan may be discussed but must be linked to how it is used to reduce Greenhouse gases emission.

EG: The Kyoto Protocol [P] aims to reduce the levels of greenhouse gases in the atmosphere by having countries reduce their combined greenhouse gas emissions by at least 5% below their 1990 levels [E]. Many countries like Finland and Greece have met or exceeded these targets [Eq]. However, the Protocol has not been fully successful as some countries like Spain and Denmark did not achieve their targets and international strategies seem useless.

It is true that impacts of climate change are challenging, and richer countries would be better to cope with it using technology and engineering techniques to mitigate its impacts.

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| 1-3m  | • Answers are generalised or with minimal support if any given at all.  
• Reasoning of why impacts of climate change can or cannot be managed is rather weak and expression may be unclear as to how it can or cannot be managed.  
• A basic answer that has little development.  
• Answers lack examples or other evidence or, it is sketchy that it adds little support to the answer. |

PRELIMS 4E GY 2018 2236/2
4-6m

- Answers contain some appropriate detail. Simple details of impacts, able to explain at least one international and national strategy and how it is successful.
- BUT content lack balance and some relevant detail, i.e. simple description
- Support is patchy so argument is not fully substantiated.
- At least 1 named example is given but is not fully developed to support points.

7-8m

Level 3 (7-8 marks)

- Answers are comprehensive and supported by sound knowledge.
- Both international and national strategies with another alternative discussed are considered and well-supported.
- Reasoning is clear and logical with good expression of language.
- Examples or other evidence to support answers are extensive.

For L3 (8 marks), conclusion is well-explained; candidates are able to weigh how richer nations are able to deal with climate change impacts more effectively, though local communities can be proactive in replanting forests like mangroves to protect coastlines.

Section B

Answer either Question 3 or Question 4

3 a) Study Fig. 6 (Insert), which shows the percentage of childhood obesity in 5 different countries.

Compare the percentages of childhood obesity by gender between the countries. [5]

Answers must show comparative words, such as

- The Highest in the USA with 29.7 for girls and 28.8 percent for boys.
- Compared to the rest, India has the lowest rate of obesity, with 2.3 for girls and 5.5 for boys.
- China is in the middle range, but fast catching up the USA.
- Answers must include data from all 5 countries and compare percentage.

b) Study Photograph A (Insert), which shows a type of irrigation system on a farm in New Zealand.

Describe the advantages of such an irrigation system and its impact on the environment. [4]

- Ensure enough water for crop production
- Water coverage under the centre pivot is very uniform.
- Low maintenance and suitable for flat terrain.
- May cause soil compaction as it is a heavy equipment.
- Water logging and soil salinasation as water could be drawn from the ground for irrigation.

c) Discuss how poor transport networks and storage facilities can affect food security in a region.

- Food security refers to having reliable access to a sufficient quantity of affordable, nutritious food
- Poor transport network will hinder the transport of crops for sale and fresh produce or food will not be able to reach communities.
- For example, many mountainous regions in Nepal often lack access to fresh produce due to poor transport network
- Storage facilities help to ensure that food last longer and help to reduce waste
- In Singapore, food that is imported and stored in refrigerated warehouses ensure good food security.
- Reserved one mark if no regions are provided.

d) Fig. 7 (Insert) shows a report on the safety of GM crops by scientists.

With reference to Fig.7 and the use of examples, discuss why GM crops remain unpopular with consumers.

- Although it has been deemed safe by scientists as seen in Fig.7, people are still unsure of the effects of GM crops.
- Speculation that it may cause allergies, ill health is widely reported in the media.
- People are uncomfortable with tweaking with the nature and from what they read in the media.
- Owned by large agribusiness such as Monsanto, which is seen is profit driven over the concerns of health of consumers.
- Impact on biodiversity is of concern to many consumers who are not keen to support the consumption of such crops. e.g. the monarch butterflies.
e) 'The effect of overconsumption of food has a greater impact on the economy of a country than on the health of individuals.'

To what extent do you agree with the statement? Use examples to support your answers. [8]

Answers should have a clear stand:
I agree/disagree with the statement to a large/small extent...

Answers should include:

- Effect of overconsumption must be discussed clearly. It could be a population that is overweight and obese due to having too much fats/ rich food.
- This could also manifest in terms of degenerative diseases such as diabetes and heart problems due to excessive consumption of sugar and fats.
- Impacts of overconsumption on individual health -- ill health such as diabetes, coronary diseases.
- Impacts on the economy: rising expenditure on health care, high rate of absenteeism from work, low productivity.

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| 1-3m  | • Answers are generalised or with minimal support if any given at all.  
• Impacts on health and the economy caused by obesity and ill health are vaguely described or not considered  
• A basic answer that has little development.  
• Answers lack examples or other evidence or, it is sketchy that it adds little support to the answer. |
| 4-6m  | • Answers contain some appropriate detail. Simple details of impacts, able to explain at least one impact on health and the economy caused by obesity and ill health are discussed are considered but not well-supported  
• BUT content lack balance and some relevant detail, i.e. simple description  
• Support is patchy so argument is not fully substantiated.  
• At least 1 named example is given but is not fully developed to support points. |
| 7-8m  | Level 3 (7–8 marks)  
• Answers are comprehensive and supported by sound knowledge.  
• Both impacts on health and the economy caused by obesity and ill health are discussed are considered and well-supported.  
• Reasoning is clear and logical with good expression of language.  
• Examples or other evidence to support answers are extensive. |
Study Fig. 8 (Insert), which shows data for patients per doctor ratio between countries in West Africa and USA.

(i) Compare the patients per doctor ratio for the countries shown in Fig. 8.
- USA shows the lowest doctor to patient at 408 patients per doctor.
- In comparison, Liberia has the highest of patients per doctor at 71429 patients to a doctor.
- Sierra Leone has the second highest as compared to the rest at 45,455 patients per doctor and Guinea shows a moderate patients per doc as compared to the rest at 10000 patients per doctor.

(ii) Suggest the extent to which the countries shown in Fig. 8 are equipped to cope with mosquito borne diseases such as Zika.
- Based on the data shown in Fig. 8, USA should be able to cope with mosquito borne diseases the best as its lower doctor to patients ratio suggest better quality health care.
- This could mean that patients in the USA are able to access testing and seek treatment for screening for infectious diseases earlier, hence reducing fatalities and other impacts on unborn children.
- Liberia and Sierra Leone would also probably struggle the most to cope with infectious diseases as its high patients to doctor ratio suggests poor access to health care facilities.
- For an infectious and mosquito disease like Zika, it could struggle to contain the spread and patients could delay treatment as they can't get access to a doctor for treatment.
- Guinea might be able to cope better as compared to Liberia and Sierra Leone as its patients to doctor ratio is much lesser.
- Reserve 1 mark if no reference is made to data in Fig. 8.
b) Discuss the relationship between sanitation and life expectancy in countries.

- Sanitation refers to the conditions relating to public health, especially the provision of clean drinking water and adequate sewage disposal.
- Life expectancy is a social development indicator that refers to the average period that a person may expect to live in an area.
- There is a clear link between sanitation and life expectancy in many developed countries such as Singapore, USA, the UK as compared to areas without access to sanitation in the slums areas of LDCs such as the Philippines.
- Access to clean drinking water will prevent water borne diseases such as cholera and is essential for good public health. Eg. Yemen had cholera outbreak in 2018 due to improper sewage disposal due to civil war.
- With clean and adequate disposal of sewage and waste, contamination of drinking of water is reduced and this will help improve health and life expectancy.
- Sanitation also affects living environment and with good living environment in place, life expectancy can be greatly extended.
- Reserve 2 marks for definition and reserve 1 mark if no reference made to any specific countries.

---

c) Study Fig. 9 (Insert), which shows information about poverty, diet and the health of an individual in an impoverished area of a Developed Country (DC).

Using information from Fig. 9, discuss the relationship between poverty and health in a DC.

- There is a cyclical relationship between social economic status and health.
- Without enough disposal income, diet is limited for the poor, this could result in malnutrition or nutrient deficiency in the diet of the individual.
- For example, many of the poor in inner cities of the USA are obese due to limited diet of fast food which are high in fats and sugar.
- Due to ill health brought about by poor nutrition, many of the children underperform in school, resulting in limited employment opportunities.
- This in turns perpetuate the poverty cycle and poor nutrition leading to poor health for the individual.
- Reserved 1 m for naming a DC.

e) 'Education is the key to manage the outbreak and spread of infectious disease.'

To what extent do you agree with the statement? Use examples to support your answers.

[8]

Answers should have a clear stand:
I agree/disagree with the statement to a large/small extent...

Answers should include:
- Education can help to reduce the outbreak and spread of infectious diseases such as Malaria, HIV/AIDS, Dengue etc.
- Explain how population can take preventive measures to prevent outbreak of diseases and spread through the use of clear examples
- But it might be hard to carry out if population is uneducated and literacy rate is low-- other agencies must come in to educate the population through economic incentives and governments play central role in disease management through border controls and laws.

<table>
<thead>
<tr>
<th>Marks</th>
<th>Descriptors</th>
</tr>
</thead>
</table>
| 1-3m  | - Answers are generalised or with minimal support if any given at all.  
       - A basic answer that has little development on how education can help to prevent infectious diseases.  
       - Answers lack examples or other evidence or, it is sketchy that it adds little support to the answer.  
       - Use of wrong examples such as degenerative diseases to explain answers. |
| 4-6m  | - Answers contain some appropriate detail. Simple details how education can be used to manage infectious disease and evaluate its limitations,  
       - BUT content lack balance and some relevant detail, i.e. simple description instead of in depth evaluation.  
       - Support is patchy so argument is not fully substantiated.  
       - At least 1 named example is given but is not fully developed to support points. |
| 7-8m  | |
Level 3 (7–8 marks)
- Answers are comprehensive and supported by sound knowledge.
- Answers contain detailed explanation of how education can be used to manage infectious disease and evaluate its limitations in relation to another 2 factors such as government and economic reasons.
- Reasoning is clear and logical with good expression of language.
- Examples or other evidence to support answers are extensive.
For L3 (8 marks), conclusion is well-explained; candidates are able to weigh how all stakeholders play equal roles in the manage of infectious diseases.

TABLE OF SPECIFICATIONS (TOS)

AO1: Knowledge
- Demonstrate relevant factual knowledge – geographical facts, concepts, processes, interactions and trends
- Demonstrate knowledge of relevant fieldwork techniques – identification of geographical question, sequence of fieldwork inquiry, primary and secondary data collection methods

AO2: Critical Understanding and Constructing Explanation
- Select, organise and apply concepts, terms and facts learnt • Make judgements, recommendations and decisions
- Evaluate data collection methods and suggest improvements

AO3: Interpreting and Evaluating Geographical Data
- Comprehend and extract relevant information from geographical data (numerical, diagrammatic, pictorial and graphical forms)
- Use and apply geographical knowledge and understanding to interpret geographical data – Recognise patterns in geographical data and deduce relationships – Compare and contrast different views – Present geographical data in an appropriate form and in an effective manner – Draw conclusions based on a reasoned consideration of evidence
- Evaluate the validity and limitations of fieldwork evidence and of the conclusions reached

Table of Specification for Geography 2236/2

<table>
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<tr>
<th>Section A:</th>
<th>Question</th>
<th>Max Mark</th>
<th>AO1+2</th>
<th>AO1+3</th>
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PRELIMS 4E GY 2018 2236/2
<table>
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<td>(b)</td>
<td></td>
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<td>(c)</td>
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<td><strong>Total</strong></td>
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<tr>
<td>Health and Disease</td>
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<td></td>
<td>(aii)</td>
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<td>(b)</td>
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</tr>
<tr>
<td><strong>Total</strong></td>
<td>25</td>
<td>13</td>
<td>12</td>
</tr>
</tbody>
</table>
READ THESE INSTRUCTIONS FIRST

Write your index number and name on all the work you hand in.
Write in dark blue or black pen on both sides of the paper.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.

Section A
Answer Question 1.

Section B
Answer one question.

Write all answers on the writing paper provided.
Candidates are encouraged to support their answers with the use of relevant examples.
Sketch maps and diagrams should be drawn whenever they serve to illustrate an answer.

At the end of the examination, fasten all your work securely together.
Hand in Section A, Section B and the question paper separately.
The number of marks is given in brackets [ ] at the end of each question or part question.
A group of students from Barbados, which is an island located in the Caribbean, carried out a fieldwork investigation on the effect of coral reefs on the coast.

(a) The students wanted to find out the effect of coral reefs on wave energy. They suggested that the frequency of waves at the shore will inform them of the wave energy that the coast experiences. They decided to find out the frequency of waves at two different locations (A and B) shown in Fig. 1, Photograph A for location A and Photograph B for location B (Insert). They counted the number of waves that break in a minute for 5 minutes during high tide, and then calculated the average number of waves per minute to get the wave frequency. The data that they collected is shown in Table 1.
Table 1

Wave frequency at each location (average number of waves per minute)

<table>
<thead>
<tr>
<th>Location</th>
<th>11.00 am</th>
<th>11.30 am</th>
<th>12.00 pm</th>
<th>12.30 pm</th>
<th>1.00 pm</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>11</td>
<td>10</td>
<td>10</td>
<td>9</td>
<td>11</td>
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<tr>
<td>B</td>
<td>7</td>
<td>6</td>
<td>6</td>
<td>7</td>
<td>6</td>
</tr>
</tbody>
</table>

(i) Comment on the time interval shown in Table 1 that the students chose in order to count the frequency of waves. [1]

(ii) With reference to Fig. 1, Photograph A and B (Insert), suggest one other factor that might affect wave frequency in the locations shown. [1]

(iii) With reference to Fig. 1 and Table 1, state a suitable hypothesis for the students’ investigation. What conclusion can the students make about the hypothesis based on the data shown in Table 1? [3]

(iv) The students decided to calculate the wave length in each location. Explain how they might be able to do this. [2]

(b) The students also wanted to find out more about how the presence of coral reefs affected human activities along the coast. They devised a questionnaire, shown on Fig. 2, which asked locals such as shopkeepers and visitors to the beaches along the coast to give each statement a score ranging from -3 to +3. They obtained 10 completed questionnaires, the results of which were tabulated and shown on Fig. 2. They conducted the survey at Bridgetown (shown on Fig. 1) on the same day they calculated the frequency of waves.

Results of questionnaire

<table>
<thead>
<tr>
<th>Negative points</th>
<th>-3</th>
<th>-2</th>
<th>-1</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>Positive points</th>
</tr>
</thead>
<tbody>
<tr>
<td>The coral reefs do not attract many visitors to the coast.</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>6</td>
<td>The coral reefs attract many visitors to the coast.</td>
</tr>
<tr>
<td>The coral reefs allow for few businesses to open along the coast.</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>3</td>
<td>5</td>
<td>The coral reefs allow for many businesses to open along the coast.</td>
</tr>
<tr>
<td>There are few water activities along the coast.</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>There are many water activities along the coast.</td>
</tr>
</tbody>
</table>

Fig. 2

(i) Using information from Fig. 2, draw a bi-polar graph to show the results of the questionnaire. [3]
(ii) Use Fig. 2 to suggest the advantages and difficulties in using the questionnaire method shown to collect data for analysis. [4]

(iii) Explain how the students might use the stratified sampling method to select locals to do the questionnaire. [3]

(c) The students created a landuse map along a main road in Bridgetown known as Broad Street shown in Fig. 3 in order to find out more about how the presence of coral reefs has influenced the human activities in the area.

<table>
<thead>
<tr>
<th>Hotel</th>
<th>Restaurant</th>
<th>Souvenir shop</th>
<th>Hotel</th>
<th>Restaurant</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Broad Street</td>
<td></td>
</tr>
<tr>
<td>Watersports activities shop</td>
<td>Hotel</td>
<td>Restaurant</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Fig. 3

(i) With reference to Figs. 2 and 3, suggest the impacts of the presence of coral reefs on Bridgetown. [2]

(ii) Outline how the students might have conducted the landuse survey to show the impact of coral reefs on people in Bridgetown. [6]
Section B
Choose one question from this section.

2  (a) Study Fig. 4 (Insert) which shows the changes in the severity of coral bleaching at the Great Barrier Reef, Australia and the proportion of coral reefs being bleached.

Describe the extent of changes in the severity of coral bleaching from 1998 to 2016. [5]

(b) Study Fig. 5 (Insert) which shows the changes in temperatures at the coral sea surface in March.

Describe how temperatures have changed from 1900 to 2016 and suggest how this may affect corals. [4]

(c) Describe the different conditions that result in deposition. [4]

(d) Study Fig. 6 (Insert) which shows the visitor arrivals to Top Southeast Asian Destinations.

Compare the trends in arrivals to Thailand and Malaysia from 2007 to 2017. [4]

(e) ‘The environmental disadvantages of tourism outweigh any other advantages tourism might bring.’

To what extent is this true? Support your answer with evidence. [8]
(a) Study Fig. 7 which shows the value of coral reefs.

With reference to Fig. 7 and examples, describe the value of coral reefs to the economy and environment. [4]

(b) Study Fig. 8 (Insert) which shows the changes in the areas for coral bleaching.

Use Fig. 8 to describe the changes in the distribution and extent of coral bleaching. [4]

(c) Explain how currents and geology influence coastal environments. [5]

(d) Study Fig. 9 (Insert) which shows the distribution of coral reefs in the world.

Using information from Fig. 9, account for the distribution of coral reefs in the world. [4]

(e) 'Laws and regulations are the most effective way to reduce erosion of coastal areas.'

How far do you agree? Support your answer with examples. [8]

END OF PAPER
Acknowledgements

Question 1 Figure 1: https://barbados.org/
Question 1 Photograph A: https://barbados.org/
Question 1 Photograph B: https://barbados.org/
Question 2 Figure 4: https://wallpaper.mscotel.com/great-barrier-reef-bleaching-2017/
Question 2 Figure 5: https://www.climatecoalition.org/blogs/climate-change-devastating-great-barrier-reef
Question 2 Figure 6: https://blog.euromonitor.com/2014/01/diagram/2014-sharp-growth-for-inbound-tourism-to-
southeast-asia.html
Question 3 Figure 8: https://www.researchgate.net/figure/Global-trends-in-the-extent-and-severity-of-mass-coral-
bleaching-1998-2006-adapted-from_fig1_31323136
Question 3 Figure 9: https://slideplayer.com/slide/4914088/
Photograph A for Location A for Question 1

Photograph B for Location B for Question 1

Fig. 4 for Question 2

Changes in the severity of coral bleaching at the Great Barrier Reef, Australia
Fig. 8 for Question 3
Changes in the areas for coral bleaching
Fig. 9 for Question 3

Distribution of coral reefs in the world
AGLICAN HIGH SCHOOL
PRELIMINARY EXAMINATION 2018

CORE GEOGRAPHY

Paper 2
Secondary 4

Additional Materials: 5 sheets of writing paper and 1 insert (4 pages)

READ THESE INSTRUCTIONS FIRST
Write your index number and name on all the work you hand in.
Write in dark blue or black pen on both sides of the paper.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.

Section A
Answer one question.

Section B
Answer one question.

Write all answers on the writing paper provided.
Candidates are encouraged to support their answers with the use of relevant examples.
Sketch maps and diagrams should be drawn whenever they serve to illustrate an answer.
The insert contains Fig. 1, Fig. 2, Fig. 4 and Fig. 5 for Question 1, Fig. 6 for Question 2, Fig. 8 for Question 3 and Fig. 11 and Fig. 13 for Question 4.

At the end of the examination, fasten Section A and B separately.
Hand in the question paper, Section A and Section B separately.
The number of marks is given in brackets [ ] at the end of each question or part question.

| Section A | 25 marks |
| Section B | 25 marks |
| TOTAL:    | 50 marks |

Parent's Name:

Parent's Signature:

This document consists 7 printed pages and 1 insert.

[TUR]:
Section A

Answer one question from this section.

1 (a) Study Fig. 1 and Fig. 2 (Insert), which shows the topographic map of the United Kingdom and its annual average rainfall amount.

With reference to Fig. 1 and Fig. 2, explain the type of rainfall that is experienced by United Kingdom. [4]

(b) Explain why relative humidity may vary from place to place. [3]

(c) Study Fig. 3 below and Figs. 4 and 5 (Insert), which show information about the natural hazards in parts of Southeast Asia.

![Fig. 3](image_url)

(i) Use Figs. 3 and 4 (Insert) to help you show how the occurrence of natural hazards in parts of Southeast Asia are a result of plate tectonics and/or its location. [5]

(ii) Use Fig. 5 (Insert) to compare the pattern of earthquakes with 0-69 km depth to that of 300-700km depth. [5]

(d) 'The benefits gained from living in volcanic areas are limited compared to the problems created.'

To what extent do you consider this statement to be true? Give reasons to support your answer. [8]
2 (a) Study Fig. 6 (Insert), which shows the differences in temperatures over parts of southern Asia on 18 July 2016.

Account for the differences in temperatures in the area shown on Fig. 6. [5]

(b) Study Fig. 7, which shows carbon dioxide emissions from the global electric power sector.

*Intergovernmental Panel on Climate Change (IPCC) representative concentration pathway estimates

*Carbon capture results in a net carbon negative when carbon dioxide is removed from the atmosphere.

Fig. 7

(i) Describe the changes in the carbon dioxide emissions from 1980 to 2100. [4]

(ii) Suggest reasons for both the changes and range in the projections of carbon dioxide emissions from 1980 to 2100. [4]

(c) Describe the characteristics of tropical cyclones. [4]

(d) 'National responses to climate change are effective in reducing greenhouse gas emissions.'

How far do you agree with this statement? Give examples to support your answer. [8]
Section B

Answer one question from this section.

3 (a) (i) Fig. 8 (Insert) shows child mortality rates in 2015 across the world.

With reference to Fig. 8, describe the pattern of child mortality rates throughout the world. [3]

(ii) Suggest reasons for the pattern of child mortality rates shown in Fig. 8. [4]

(b) Fig. 9 shows the step-by-step production of rice, while Fig. 10 shows how technology can intensify the production of rice.

![Fig. 9](image-url)
(i) With reference to Fig. 9 and Fig. 10, explain how technology is able to intensify production of rice at various stages of production. [5]

(ii) Use Fig. 9 and other examples to suggest how shortages in rice supply might occur due to problems that affect the various stages of production. [5]

(c) 'Technological strategies are most effective in solving the problem of food shortage.' How far do you agree with this statement? Give reasons to support your answer. [8]
4 (a) Fig. 11 (Insert) shows the malaria death rates (per 100,000 people) throughout the world in 2015, while Fig. 12 shows the number of malaria deaths in the world by age group.

![Graph showing malaria deaths by age group]

**Fig. 12**

With reference to Fig. 11 and 12, describe the patterns of malaria deaths in the world and explain the impacts of malaria on people and countries. [6]

(b) Explain how environmental factors contribute to the spread of malaria. [4]

(c) Fig. 13 (Insert) shows the areas in parts of Asia that experience resistance to artemisinin, an anti-malarial drug used to treat patients suffering from malaria.

Using Fig. 13, explain how the resistance to artemisinin is a challenge in reducing the spread of malaria in the region shown. [4]
(d) Fig. 14 shows the main strategies that international organisations such as the World Health Organisation (WHO) and the World Bank employ to prevent and treat malaria.

![Diagram of malaria vector control and case management](image)

Fig. 14

With reference to Fig. 14 and your own knowledge, describe the strategies that international organisations might take to reduce the spread of malaria.

(e) ‘LDCs are more at risk of infectious diseases than degenerative diseases.’ How far do you agree with this statement? Support your answer with examples.

END OF PAPER

Acknowledgements

Fig. 1: [http://mapsof.net/uploads/static-maps/topographic_map_of_the_uk.jpg](http://mapsof.net/uploads/static-maps/topographic_map_of_the_uk.jpg)
Fig. 2: [https://www.metoffice.gov.uk/learning/precipitation/rain/how-much-does-it-rain-in-the-uk](https://www.metoffice.gov.uk/learning/precipitation/rain/how-much-does-it-rain-in-the-uk)
Fig. 3: [https://www.researchgate.net/figure/Present-day-tectonic-features-of-South-East-Asia-based-on-mapping-by-Hall-2002_fig1_280085067](https://www.researchgate.net/figure/Present-day-tectonic-features-of-South-East-Asia-based-on-mapping-by-Hall-2002_fig1_280085067)
Fig. 4: [https://reliefweb.int/sites/reliefweb.int/files/resources/99B768FDE21CD36E652572F00055AE3B-ocha_ND_idn070502.pdf](https://reliefweb.int/sites/reliefweb.int/files/resources/99B768FDE21CD36E652572F00055AE3B-ocha_ND_idn070502.pdf)
Fig. 5: [http://www.shipdetective.com/images/maps/hazards/indonesia_seismicity_map.jpg](http://www.shipdetective.com/images/maps/hazards/indonesia_seismicity_map.jpg)
Fig. 6: [http://www.vaer-sentral.no/en/weather/weather-for-professionals/temperature/asia.html](http://www.vaer-sentral.no/en/weather/weather-for-professionals/temperature/asia.html)
Fig. 7: [http://www.decodingsustainability.com/science-based-targets/](http://www.decodingsustainability.com/science-based-targets/)
Fig. 8: [www.fao.org](http://www.fao.org)
Fig. 9: [www.fao.org](http://www.fao.org)
Fig. 10: [http://www.knowledgebank.irri.org/step-by-step-production](http://www.knowledgebank.irri.org/step-by-step-production)
Fig. 11: [http://www.knowledgebank.irri.org/](http://www.knowledgebank.irri.org/)
Fig. 12: [IHME Global Burden of Disease](http://www.healthdata.org)
Fig. 13: [IHME Global Burden of Disease](http://www.healthdata.org)
Fig. 14: adapted from [https://www.thelancet.com/article/S0140-6736(10)60831-8/abstract?code=lancet-site](https://www.thelancet.com/article/S0140-6736(10)60831-8/abstract?code=lancet-site)
Fig. 1 for Question 1
Topographic map of the United Kingdom

Fig. 2 for Question 1
United Kingdom's annual average rainfall amount

*Ignore the names of cities in small font in Fig. 1
Fig. 4 for Question 1
The natural hazards in parts of Southeast Asia

Fig. 5 for Question 1
Magnitude and Depth of Earthquakes
Fig. 6 for Question 2
Differences in temperatures over parts of southern Asia on 18 July 2016

Fig. 8 for Question 3 (a)
Child mortality rates in 2015
Fig. 11 for Question 4 (a)
Malaria deaths throughout the world in 2015

Fig. 13 for Question 4 (c)
Areas in parts of Asia that experience resistance to artemisinin, an anti-malarial drug
ANSWERS

Section A

This question is compulsory.

1 A group of students from Barbados, which is an island located in the Caribbean, carried out a fieldwork investigation on the effect of coral reefs on the coast.

(a) The students wanted to find out the effect of coral reefs on wave energy. They suggested that the frequency of waves at the shore will inform them of the wave energy that the coast experiences. They decided to find out the frequency of waves at two different locations (A and B) shown in Fig. 1, Photograph A for location A and Photograph B for location B (Insert). They counted the number of waves that break in a minute for 5 minutes during high tide, and then calculated the average number of waves per minute to get the wave frequency. The data that they collected is shown in Table 1.
Table 1

Wave frequency at each location (number of waves per minute)

<table>
<thead>
<tr>
<th>Location</th>
<th>11.00 am</th>
<th>11.30 am</th>
<th>12.00 pm</th>
<th>12.30 pm</th>
<th>1.00 pm</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>11</td>
<td>10</td>
<td>10</td>
<td>9</td>
<td>11</td>
</tr>
<tr>
<td>B</td>
<td>7</td>
<td>6</td>
<td>6</td>
<td>7</td>
<td>6</td>
</tr>
</tbody>
</table>

(i) Comment on the time interval shown in Table 1 that the students chose in order to count the frequency of waves. [1]

- The data was taken at regular, 30 min intervals. 5 sets of data were also collected. This regular, frequent collection of data makes the data collected representative of the type of waves at each location.

OR

- The data was taken at the same time interval for both location A and B, hence there is greater accuracy in comparison of wave frequency.

(ii) With reference to Fig. 1, Photograph A and B (Insert), suggest one other factor that might affect wave frequency in the locations shown. [1]

- Human activities such as boating or sailing shown in the photographs may affect the wave frequency by increasing it.
- It is facing the open sea, and hence may experience stronger winds that could affect wave energy.

(iii) With reference to Fig. 1 and Table 1, state a suitable hypothesis for the students' investigation. What conclusion can the students make about the hypothesis based on the data shown in Table 1? [3]

- Hypothesis: 'The presence of coral reefs decreases wave frequency.'
- Conclusion: The hypothesis is true.
- Data (must be given as average, with comparatives): Location B, which has about 9 coral reef sites along its coast, has a lower average wave frequency of 6.4 waves per minute, while Location A, which has no coral reef sites along its coast has a higher average wave frequency of 10.2 waves per minute.

(iv) The students decided to calculate the wave length in each location. Explain how they might be able to do this. [2]

- Calculate the wave period, T (in seconds), which is the time taken for one complete wave to pass a point:
  - \( T = \text{time taken for 10 wave crests to pass a ruler} / 10 \)
- Calculate the wave length = 1.56 \( \times \) T

Anglican High School Humanities Department 2018
2236/01/S4 PRELIMINARY EXAMINATION /2018
(b) The students also wanted to find out more about how the presence of coral reefs affected human activities along the coast. They devised a questionnaire, shown on Fig. 2, which asked locals such as shopkeepers and visitors to the beaches along the coast to give each statement a score ranging from -3 to +3. They obtained 10 completed questionnaires, the results of which were tabulated and shown on Fig. 2. They conducted the survey at Bridgetown (shown on Fig. 1) on the same day they calculated the frequency of waves.

### Results of questionnaire

<table>
<thead>
<tr>
<th>Negative points</th>
<th>-3</th>
<th>-2</th>
<th>-1</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>Positive points</th>
</tr>
</thead>
<tbody>
<tr>
<td>The coral reefs do not attract many visitors to the coast.</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>6</td>
<td>The coral reefs attract many visitors to the coast.</td>
</tr>
<tr>
<td>The coral reefs allow for few businesses to open along the coast.</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>3</td>
<td>5</td>
<td>The coral reefs allow for many businesses to open along the coast.</td>
</tr>
<tr>
<td>There are few water activities along the coast.</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>There are many water activities along the coast.</td>
</tr>
</tbody>
</table>

Fig. 2

(i) Using information from Fig. 2, draw a bi-polar graph to show the results of the questionnaire.

- 1m for title and axis
- 1m for plotting of positive numbers
- 1m for plotting of negative numbers
- Can be drawn as both horizontal or vertical graphs
- Numbers should be totaled up for each negative & positive points.

(ii) Use Fig. 2 to suggest the advantages and difficulties in using the questionnaire method shown to collect data for analysis.

- **Advantages:**
  - Able to show the degree people agree or disagree with the statements
  - Able to show a net overall perception or impression of the place
  - The 'neutral' value of '0' allows people who are unsure to give a neutral stand – which reduces inaccuracies in data collected
- **Difficulties**
  - Statements have vague terms such as 'many' – visitors may have differing opinions of what 'many' or 'few' counts as
  - Visitors who fill in the questionnaire may have differing opinions about the definition of terms such as water activities
  - Visitors would not know exactly if the cause of the many businesses are the coral reefs – a correlation cannot be made, as they would need to know how the area has changed over time
(iii) Explain how the students might use the stratified sampling method to select locals to do the questionnaire.

- Categories: Decide on the different sub-sets or categories that can describe the profile of locals in the area (e.g. gender, occupation, purpose of visit)
- Parent Population: Use reliable secondary sources of information such as recent surveys to find out the general number of people in the population for each category or sub-set who usually visit the area / number of locals in the country.
- No. of visitors per category: Decide on number of visitors to interview for each sub-set, ensure that each sub-set is proportionate to the sub-sets in the parent population. This ensures that the data is reliable and proportionate to the parent population.

(c) The students created a landuse map along a main road in Bridgetown known as Broad Street shown in Fig. 3 in order to find out more about how the presence of coral reefs has influenced the human activities in the area.

<table>
<thead>
<tr>
<th>Hotel</th>
<th>Restaurant</th>
<th>Souvenir shop</th>
<th>Hotel</th>
<th>Restaurant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broad Street</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Watersports activities shop</td>
<td>Hotel</td>
<td>Restaurant</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Fig. 3

(i) With reference to Figs. 2 and 3, suggest the impacts of the presence of coral reefs on Bridgetown.

- Positive economic impact
  - There is an increase in employment due to more visitors going to the area to see the coral reefs – this is seen in Fig. 2, where the total positive score was 8 as compared to negative score of 2 for 'the coral reefs attract many visitors to the coast'
  - This is seen in the number of hotels and shops related to the coral reefs or tourism (4 hotels and 3 restaurants)
  - This would eventually lead to an increase in income for the locals

(ii) Outline how the students might have conducted the landuse survey to show the impact of coral reefs on people in Bridgetown.

- 1m for stating time and location:
  - Time: anytime between 8 to 5pm, which is a typical timing for shops to be open
  - Location: along the entire Broad Street
- 4m for explanation of survey method:
- On a blank sheet of paper, mark out the main street 'Board Walk'.
- From the starting point (which should be at one end of Broad street), start walking down and observing the different land uses on the ground floor or the second floor of the buildings.
- Use boxes to represent the buildings along the assigned street.
- Label the different land uses observed in the respective boxes.
- Repeat this process until you reach the other end of the street.

- 1m for tabulating types of land uses and link to impact of coral reefs.
- Tabulate the number of each type of land use into a table as shown below:

<table>
<thead>
<tr>
<th>Accommodation</th>
<th>Food and Beverage</th>
<th>Shops</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

- A high number of commercial buildings would mean that the area caters mostly to visitors or tourists. This means that there is increased employment and income in the area.
Section B

Choose one question from this section.

2 (a) Study Fig. 4 (Insert) which shows the changes in the severity of coral bleaching at the Great Barrier Reef, Australia and the proportion of coral reefs being bleached.

Describe the extent of changes in the severity of coral bleaching from 1998 to 2016.

[5]

- The severity of coral bleaching has increased over the years
- In fig, it shows that in the north-eastern region of great barrier reef, the severity of coral bleaching has changed drastically from a low in 1998 to extreme in 2016
- In the central region of great barrier reef/increased severity of coral bleaching concentrated largely in the central and north-eastern zone of great barrier reef
- The severity of coral bleaching has also increased in the southern zone of great barrier from a low to a moderate
- Anomaly is that in 1998, and 2002, in the south-west zone of great barrier reef, some high to extreme coral bleaching observed but in 2016, these regions were in the moderate range of coral bleaching.
- In 1998, highest proportion of reefs had low coral bleaching of about 45% and extreme coral bleaching in 1998 was also low at about 11%
- However, this has changed over the years in 2016, only 9% of reefs were in the range of low coral bleaching and highest proportion of reefs of 48% were in extreme coral bleaching.
- Proportion of reefs in the low coral bleaching category has decreased drastically by 36% and proportion of reefs in the extreme coral bleaching category has increased drastically by 37%

(b) Study Fig. 5 (Insert) which shows the changes in temperatures at the coral sea surface in March.

Describe how temperatures have changed from 1900 to 2016 and suggest how this may affect corals.

[4]

- Generally, temperatures at coral sea surface has increased over the years at about 2.7°C
- In between certain time periods such as in the 1920s, slightly after 1940s and 1980s, there are spurs of increased changes in temperatures but after 1990s, coral sea surface temperatures have been increasing throughout
- This results in coral bleaching which is the loss of algae as a result of higher sea temperatures and thus corals lose its colour
- Corals growth will be inhibited which results in dying of coral reefs
(c) Describe the different conditions that result in deposition.

- Wave energy (fetch, wind speed and wind duration) capped at 1m
- Sheltered coast
- Shallow seabed
- Wave refraction
- Obstructions in the sea e.g. island
- Bend along the coastline

(d) Study Fig. 6 (Insert) which shows the arrivals to Top Southeast Asian Destinations.

Compare the trends in arrivals to Thailand and Malaysia.

- Arrivals to both countries increased
- Increase to Thailand was higher at about 12mil and Msia was about 600k
- Msia started out to be highest in arrivals in 2007 and was consistently higher than Thailand but both countries had the same number of arrivals in the middle of 2013
- Msia had the slowest rate of increase of 2.85% whereas Thai had the fastest increase of 85%
- Thailand surpassing Malaysia in the forecast after in 2013
- During the forecasted period, arrivals in Msia slowed down and was lower than Thailand by 3.6 mil

(e) 'The environmental disadvantages of tourism outweigh any other advantages tourism might bring.'

To what extent is this true? Support your answer with evidence.

<table>
<thead>
<tr>
<th>0</th>
<th>Content not relevant to the topic/incomplete essay without covering main points</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Some elaboration for environmental disad and 1 other advantage</td>
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</tbody>
</table>
| 7 | Fulfilled level 2
|   | Attempt made to evaluate
|   | One reason provided to support stand.

<table>
<thead>
<tr>
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<th>Mere listing of content but weak understanding</th>
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<tbody>
<tr>
<td>5</td>
<td>Elaboration may be lacking for either adv/disadv but good</td>
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</tbody>
</table>
| 8 | Fulfilled level 2
<p>|   | Clear criteria used to evaluate relative importance of |</p>
<table>
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<th>with minimal link to focus of question.</th>
<th>elaboration for the other.</th>
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</thead>
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<tr>
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<td>• Examples for one may be brief.</td>
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<tr>
<td>2</td>
<td>Brief description of only advantages/advantages</td>
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<tr>
<td></td>
<td></td>
<td>• Detailed elaboration of both adv and disadv</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Good examples/evidence to support</td>
</tr>
<tr>
<td>3</td>
<td>Able to provide brief description of both disadv and adv but lack elaboration and examples.</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>factors</td>
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<tr>
<td></td>
<td></td>
<td>• Two reasons provided to support stand.</td>
</tr>
</tbody>
</table>
3 (a) Study Fig. 7 which shows the value of coral reefs.

![Diagram of coral reef values]

With reference to Fig. 7, describe the value of coral reefs:

- allowing wide range of marine creatures to breed and grow hence supports biodiversity
- marine creatures that live around reefs provide food for larger creatures
- coral reefs absorb wave energy thus protecting the adjacent land mass from erosion
- Coral reefs provide recreational activities such as diving e.g. great barrier reef and thus can be a form of tourist attraction

(b) Study Fig. 8 (Insert) which shows the changes in the areas for coral bleaching.

Use Fig. 8 to describe the changes in the distribution of coral bleaching.

- Generally, increase in the number of areas with coral bleaching
- In 1998, greater concentration of areas of severe bleaching was confined to the Caribbean/north of South America such as Colombia
- With no/low bleaching at the SEA region including the area north of Australia
- But in 2006, concentration of severe bleaching has expanded to the eastern coastal fringes of African continent and the SEA region such as coastal areas of Malaysia, Cambodia and Vietnam
- With increased severity of coral bleaching in the Caribbean area

(c) Explain how currents and geology influence coastal environments.
- Currents are large-scale continuous movement of water
- Which carry large amounts of energy and can influence coasts through the processes of coastal erosion, sediment transport and deposition
- Longshore current could affect the transportation and deposition of sediments and create landforms such as spits, tombolos and beaches in coastal areas. Geology:
  - Geology is the arrangement and composition of rocks
  - Rock arrangement could affect the shape of the coastlines. If there are alternating layers of hard and soft rocks, it could lead to differential rates of erosion of the coastline and the formation of headlands and bays.
  - Rock composition determines the hardness of rocks and their resistance to erosion which affects the rate of change along coasts.
  - More joints found in rocks → more/faster erosion of the coast
  - Rock hardness: harder rocks erode more slowly than softer rocks like limestone and shale.
  - Chemical composition: different chemical composition could lead to different rates of erosion.

(d) Study Fig. 9 (Insert) which shows the distribution of coral reefs in the world.

Using information from Fig. 9, account for the distribution of coral reefs in the world.

- Coral reefs are found between 30° N and 30° S, which are mostly in the tropics.
- Most of the corals are located in the tropics, with a large biodiversity found near the equator as these places have higher concentrations of sunlight. Corals require sufficient sunlight to trigger algae photosynthesis and the growth of corals.
- They are also found where there are average 20 isotherm where corals require warm waters where sea surface temperatures are not lower than 17-18°C. The high average temperature would also bring about favourable temperatures for corals to thrive.
- Most corals are found near warm ocean currents which ensure there is moderate amount of water movement to ensure that corals receive sufficient levels of oxygen. It also brings warm water to help corals thrive.
- Shallow waters near coastlines, higher concentrations of sunlight (similar to pt 2)

(e) 'Laws and regulations are the most effective way to reduce erosion of coastal areas.'

How far do you agree? Support your answer with examples.

| 0 | Content not relevant to the topic/incomplete essay without |
| 4 | Some elaboration for laws and 1 other strategy |
| 7 | Fulfilled level 2 |
|  | Examples may be |
|  | Attempt made to evaluate |
|  | One reason |

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2236/01/S4 PRELIMINARY EXAMINATION 2018
<table>
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<th>brief.</th>
<th>provided to support stand.</th>
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<td>8</td>
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<td>• Fulfilled level 2</td>
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<td></td>
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<td>• Clear criteria used to evaluate relative importance of factors</td>
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<td></td>
<td>• Limitations included</td>
<td>• Two reasons provided to support stand.</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>• Detailed elaboration of both laws and strategies</td>
<td>• Fulfilled level 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Good examples/evidence to support</td>
<td>• Clear criteria used to evaluate relative importance of factors</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Limitations included</td>
<td>• Two reasons provided to support stand.</td>
</tr>
<tr>
<td>3</td>
<td>Able to provide brief description of both laws and strategies but no supporting evidence</td>
<td>6</td>
<td>8</td>
</tr>
</tbody>
</table>

END OF PAPER
Section A

Answer one question from this section.

1 (a) Study Fig. 1 and Fig. 2 (Insert), which shows the topographic map of the United Kingdom and its annual average rainfall amount.

*Ignore the names of cities in small font in Fig. 1*
With reference to Fig. 1 and Fig. 2, explain the type of rainfall that is experienced by United Kingdom.

- Warm moist onshore wind from Atlantic Ocean/ Irish Sea/ Celtic Sea is forced to rise over the mountains.
- Air cools as it rises. When the dew point temperatures are reached, condensation occurs and clouds form.
- When the water droplets are large and heavy enough, rain falls.
- As relief rain falls on the windward side, it results in higher rainfall on the western coasts of UK (above 1000mm) in areas such as Scotland and Wales
- At the leeward side/ eastern coast of UK, it received lower rainfall of mostly less than 800mm as most of the moisture would have already been deposited.

(b) Explain why relative humidity may vary from place to place.

- RH varies with temperature
  - When temperature increases, the amount of water vapour in the air remains the same,
  - but the rise in temperature makes air more able to hold water vapour.
  - Thus, RH decreases as temperature increases and vice versa
- It may also change when the actual amount of water vapour varies
  - due to presence of water bodies contributing to an increase in water vapour through evaporation
  - also affected by the amount of vegetation in an area, transpiration may contribute to an increase in the amount of water vapour in an area

(c) Study Fig. 3 below and Figs. 4 and 5 (Insert), which show information about the natural hazards in parts of Southeast Asia.

https://www.researchgate.net/figure/Present-day-tectonic-features-of-South-East-Asia-based-on-mapping-by-Hall-2002_fig1_280085067
(i) Use Figs 3 & 4 to help you show how the occurrence of natural hazards in parts of Southeast Asia are a result of plate tectonics and/or its location.

- Areas such as Thailand, Cambodia and Northern parts of the Philippines located beyond 10°N experience tropical storms of varying intensity from 1 to 4
  → Due to presence of warm sea surface temperatures and Coriolis Effect
- Earthquake, tsunami, volcanic eruption- located near plate boundaries such as between Indian and Eurasian plates, Indian-Australian plate and Philippine plate, therefore areas such as the west coast of Sumatra in Aceh experience high earthquake intensities of degree IX-XII, higher risk of storm surge, tsunamis, volcanic eruption
  → due to convergence of plates stress builds up sudden release of stress results in stronger seismic waves nearer the epicentre
  → and areas which are further away such as Cambodia, Thailand, Malaysia and Kalimantan experience very low earthquake intensity as energy dissipates
  → tsunamis in these areas due to offshore earthquakes/movement of seafloor
Use Fig 5 to compare the pattern of earthquakes with 0-69 km depth to that of 300-700km depth.

- Overall: Both are generally located along plate boundaries/both follow a linear pattern along plate boundaries (similarity)
- Significant:
  - Highest concentrations:
    - Earthquakes with 0-69km depth are mainly found close to the plate boundaries between Eurasian and Philippine plates,
    - between Eurasian and Indian Plate off the coast of Sumatra and
    - between India-Australian and Philippines Plate
    - However, earthquakes with 300-700km depth are found slightly further away from the plate boundaries between Indian-Australian and Eurasian plates and between Eurasian and Philippines Plate
  - Lower concentrations:
    - There are a few earthquakes with 0-69km depth found in the middle of plates such as in the middle of Eurasian plate however, earthquakes with 300-700km are all found along plate boundaries

(d) 'The benefits gained from living in volcanic areas are limited compared to the problems created.'
To what extent do you consider this statement to be true? Give reasons to support your answer. [8]

<table>
<thead>
<tr>
<th>Level 1</th>
<th>Level 2</th>
<th>Level 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>Content not relevant to topic.</td>
<td>Problems and benefits.</td>
<td>Both problems and benefits well-explained.</td>
</tr>
<tr>
<td></td>
<td>• Examples for both may be brief. Name of location only without elaboration on what makes it a problem or how it is beneficial.</td>
<td>• Attempt made to evaluate.</td>
</tr>
<tr>
<td></td>
<td>• Evaluation for some parts may be one-sided.</td>
<td>• One reason provided to support stand.</td>
</tr>
<tr>
<td>1</td>
<td>5</td>
<td>8</td>
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<tr>
<td>Listing the problems or benefits only.</td>
<td>Problems and benefits.</td>
<td>Both problems and benefits well-explained.</td>
</tr>
<tr>
<td></td>
<td>• Elaboration may be lacking for one factor but good elaboration for the other.</td>
<td>• Clear criteria used to evaluate.</td>
</tr>
<tr>
<td></td>
<td>• Examples/ evidence for one group may be brief.</td>
<td>• Two reasons provided to support stand.</td>
</tr>
<tr>
<td></td>
<td>• Evaluation for some parts may be one-sided.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Generic statements of problems or benefits. Lack elaboration and examples.</td>
<td>Both problems and benefits well-explained.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Good examples/evidence to support each of the factors for problems and benefits.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Able to provide brief description of 1 risk/benefit only and list one other. One-sided evaluation. Lack egs.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Points of Elaboration:

Problems

- **Massive destruction by volcanic materials:**
  - Eruptions – lava, pyroclasts – ash, rock fragments and volcanic bombs.
  - Materials can lead to widespread damage of property
  - Lava – high temp – burns the areas it flows, low-silica lava moves rapidly and flows over long distances – destroys everything in its path with hot rock fragments
  - Inhaling the ash could result in serious injury/death.
  - Volcanic bombs – cause damage to properties – eg. Ongoing eruption of Kilauea in Hawaii since 1983 has destroyed many homes and highways
  - Landslides – structural collapse of volcanoes – have the potential to obstruct the flow of

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rivers causing floods, blocked roads and buried villages and farmlands.

- Eg. Eruption of Venado del Ruiz – Andes mts in SA in 1985 released a pyroclastic flow. Glacial ice along the way triggered lahars which engulfed the town of Armero and killed more than 20,000 people.

**Pollution**

- Ash particles ejected during a volcanic eruption can disrupt human activities over large distances from the volcano.
- Eventually settle on ground, block sunlight, suffocate crops, and cause respiratory problems for people and animals.
- Release gases that are harmful to people
- Eg. Eyjafjallajökull in Iceland – 2010 – economic risks

### Points of Elaboration: Benefits

- Fertile soil
- Precious stones and minerals, building materials
- Tourism
- Geothermal energy
2 (a) Study Fig. 6 (Insert), which shows the differences in temperatures over part of southern Asia on 18 July 2016.

Account for the differences in temperatures in the area shown on Fig 6.

1m for data and description of the area (using latitudes/ regions/ countries)
- temps are higher between 22 to 30°C within the tropics/ at lower latitudes/ SE Asia compared to higher latitudes/ Russia and northern parts of China where temps are lower between 2 to 14°C

2m for explanation of 1 factor:
- temps are higher nearer the equator because the solar angle is higher therefore the sun's rays are more concentrated on a small area.
- temps are lower at the higher latitudes because the solar angle is lower, which means that sun's rays strike at a lower angle and the solar energy is spread out over a wider area.
- in areas much further away from the equator/ higher latitudes, the sun's rays travel through a longer distance of the atmosphere resulting in more insolation to be lost through reflection and scattering/ more energy dissipated

1m for data and description of the area (using latitudes/ regions/ countries)
- there is also an area with 0 to 10°C in the Himalayas, which is a high mountain range/ southwestern parts of China.

2m for explanation of 1 factor:
- Temperatures fall with increasing altitude as air becomes less dense and contains less dust and water vapour.
- This means that long-wave radiation from the Earth's surface can escape more rapidly as they will not be trapped in the atmosphere/ less ability to absorb heat.

*Do not accept continental effect for areas near Himalayas
(b) Study Fig. 7, which shows the carbon dioxide emissions from the global electric power sector.

*Carbon capture results in a net carbon negative when carbon dioxide is removed from the atmosphere.

Fig. 7

(i) Describe the changes in the carbon dioxide emissions from 2000 to 2100. [4]

- From 1980 to 2014, increased by about 4 gigatonnes.
- From 2014 to 2100,
  - IPCC’s highest estimate: to grow drastically by 18 gigatonnes/ 360%
  - Lowest estimate: carbon dioxide emissions to decrease to -3 gigatonnes which results in a net carbon negative.
- Overall, majority of predicted carbon dioxide emissions would still lead to net-positive emissions and a corresponding rise in global temperatures.

(ii) Suggest reasons for both the changes and range in the projections of carbon dioxide emissions from 1980 to 2100. [4]

- Increase between 1980 and 2014 was because of increase in human activities that caused greater release of greenhouse gases such as carbon dioxide
- Activities such as industrialisation and urbanisation cause burning of more fossil fuels which releases more carbon dioxide
- These increase in greenhouse gases which trap more heat have led to the enhanced greenhouse effect
- Which leads to increase in global temperatures (global warming), highest estimated increase of between 3.2 to 5.4°C, lowest -0.9 to -2.3°C
- There is a range of projections after 2014 as mitigation measures could be put in place to reduce rate of increase of emissions of greenhouse gases. However, these strategies may be limited in their effectiveness.

(c) Describe the characteristics of tropical cyclones. [4]

- Occurrence of tropical cyclones
  - 8–15° latitude from the Equator
  - Warm sea temperature greater than 26.5°C
- Characteristics of tropical cyclones
  - Weather systems developing over tropical or subtropical waters. Also known as typhoons and cyclones
  - Strong winds exceeding 64 knots or 119 km/hr, circulate clockwise in the southern hemisphere and counter clockwise in the northern hemisphere while spiraling inward to the cyclone centre or eye
  - Low pressure with clear skies and calm winds at the eye
(d) 'National responses to climate change are effective in reducing greenhouse gas emissions.'

How far do you agree with this statement? Give examples to support your answer. [8]

<table>
<thead>
<tr>
<th>0</th>
<th>Content not relevant to the topic.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Listing out the national responses only.</td>
</tr>
<tr>
<td>2</td>
<td>Generic statements for national level policies. Lack elaboration and examples.</td>
</tr>
<tr>
<td>3</td>
<td>Able to provide brief description of 1 policy and list the other. One sided-evaluation. Lack examples.</td>
</tr>
<tr>
<td>4</td>
<td>National policies discussed (at least one policy). Examples may be brief. Naming of policy only and brief description. Evaluation for some parts may be one-sided. Successes OR limitations only.</td>
</tr>
<tr>
<td>5</td>
<td>At least 2 national responses. Elaboration may be lacking for one policy but good elaboration for the other. Examples for one policy may be brief. Evaluation for some parts may be one-sided. Successes OR limitations only.</td>
</tr>
<tr>
<td>6</td>
<td>At least 2 national responses well-explained with balanced evaluation of each policies successes AND limitations. Good examples/evidence to support. For e.g. students may evaluate the success and limitations of each policy but may not have an overall opinion/evaluation of the relative importance of the policies.</td>
</tr>
<tr>
<td>7</td>
<td>At least 2 national responses well-explained. Attempt made to evaluate relative effectiveness. One reason provided to support stand.</td>
</tr>
<tr>
<td>8</td>
<td>At least 2 national responses well-explained. Clear criteria used to evaluate relative effectiveness of policies to address the problem of climate change. Two reasons provided to support stand.</td>
</tr>
</tbody>
</table>
National Level Policies

Details

SGP 2012: Reduce GHG emissions by using natural gas as an energy source
  • Launched by MOEnv in 2002, plan aims to generate 60% of SG's energy needs by using natural gas by 2012.
  • NG is a cleaner form of energy in comparison to coal because it does not produce smoke.

Balance & Examples

Successes:
  • As early as 2010, about 79% of SG's electricity was being generated from NG.
  • Exceeded the MOEnv's targets ahead of schedule.

Limitations:
  • NG required complex treatment plants to process and pipelines to transport. These pipelines have high maintenance costs because they need to be laid underground and have to be checked regularly for leakages.

OR

Details

Green Mark Scheme: Constructing 'green' buildings
  • Launched by the BCA in 2005, the scheme allows buildings to be evaluated and certified according to how energy-efficient and environmentally friendly they are.
  • Scheme aims to encourage more new 'green' buildings, which are more energy-efficient: buildings that use less energy to provide the same service.
  • An example is buildings that run on solar energy.

Successes:
  • Existing 'green' buildings, such as Plaza by the Park, Standard Chartered @ Changi and the National Library Building, have reported energy savings of 15% to 35% compared to conventional buildings.
  • This cuts down GHG emissions by reducing the use of fossil fuels to generate electricity.

Limitations:
  • Construction companies & developers in SG tend to be conservative about adopting new ideas and materials to build 'green' buildings.
  • 'Green' buildings are built using processes that are environmentally friendly and resource-efficient.
  • 'Green' buildings may cost more to build bc the materials may be more expensive.
  • Products such as bamboo or recycled metal that are non-toxic, reusable, renewable or recyclable.

OR

Plant-A-Tree
Section B

Answer one question from this section.

3 (a) (i) Fig. 8 (Insert) shows child mortality rates in 2015 across the world.

With reference to Fig. 8, describe the pattern of child mortality rates throughout the world. [3]

Reserve 1m for overall, 1m for significant. Max of 1m for anomaly.

Overall
- Generally, child mortality rates are lower in developed countries (DCs) than less developed countries (LDCs).
- Child mortality rates are lowest in countries nearest to the equator/tropics of cancer and capricorn, and decreases further away from the equator towards the north or south poles
- Do not accept: Uneven pattern
- Do not penalise if students write 'DC' instead of 'Developed Country' but emphasize that they should spell it out in formal exams

Significant
- Answers should have region and country examples, comparatives, data (do not penalise if no region for DCs)
- Highest mortality rates of 10 to 20% are located in LDCs in regions such as Sub-saharan Africa, in countries such as the Democratic Republic of Congo, South Sudan and the Central African Republic
- Lowest mortality rates of 0 to about 2% are located in DCs in regions such as North America, in countries such as United States of America and Canada as well as Europe, in countries such as Italy, United Kingdom and France.

Anomaly
- South Africa has slightly lower child mortality rates than the rest of the countries in Sub-saharan Africa.

(ii) Suggest reasons for the pattern of child mortality rates shown in Fig. 8.
Reserve 2m for one factor. Minus 1m per factor if point is not linked to child mortality rates (still give 1m for point explanation). Links are underlined in answers.

- Education
  - Low mortality rates in LDCs due to higher levels of education. People who are educated are more likely to be informed on how to lead a healthy lifestyle. Children who receive formal schooling are more likely to learn about health care and nutrition. This reduces risks of children falling sick and dying from illnesses, hence lower mortality rates.
  - Parents who are educated also generally earn higher incomes that give them greater access to quality medical treatment, food and living conditions for their children. This reduces child mortality rates as children are able to receive good or immediate medical help when sick.
  - When women are educated, they are more informed of nutrition and health care, and hence, child mortality rates tend to be lower. Mothers who are healthy are also able to care and provide for their children more effectively, improving the children's health and lowering child mortality rates.

- Poverty
  - High mortality rates in LDCs also due to poverty. Poverty is a state of not having enough money and material resources such as food, water, clothing and shelter. Hence, children from families in poverty tend to fall sick easily due to a lack of nutrition, increasing mortality rates.
  - Poverty limits the purchasing power that people have to afford basic health care. Children thus may not receive the proper medical treatment they need if their parents do not earn enough money. Hence, they do not get medical attention and may die from simple illnesses.
  - Lower mortality rates in DCs due to affluence - abundant supply of money, property and other material goods.

- Other points accepted:
  - Diet
  - Living conditions
  - Access to safe drinking water
  - Proper sanitation
  - sub-saharan africa - higher rates of infectious diseases such as malaria in certain countries

(b) Fig. 9 shows the step-by-step production of rice, while Fig. 10 shows how technology can intensify the production of rice.
(i) With reference to Fig. 9 and Fig. 10, explain how technology is able to intensify production of rice at various stages of production.

Reserve 1m for each stage. Minus 1m for any missing stage. Each point should be linked to ‘intensification of production’. If never state which stage, maximum 3m out of 5m. Give 1m for eg.

- **Pre-planting**
  - Land can be levelled in order to create flat surfaces that would increase efficiency of farming
    - Allow the use of machinery such as tractors that can plough large areas of land in shorter time and reduce need for manpower
    - Easier sowing of seeds over flat land
    - Less erosion of soil as compared to steeper relief
  - Seed quality – use of high-yielding varieties or hybrid rice in order to increase productivity
• These varieties have shorter growing periods and so more harvests can be obtained in a year

• Growth
  o Water management – use of irrigation channels to ensure sufficient water throughout growing period as rice requires a lot of water to grow
  o Fertilizer – use of organic or chemical fertilizer to increase fertility of land or restore fertility of land and ensure sufficient nutrients for plants to grow well

• Post-production
  o Airtight storage allows for longer shelf life of rice grains – reduces spoilage of food from dampness
  o Less food loss or wastage from grains that spoil or rot due to moisture

(ii) Use Fig. 10 and other examples to suggest how shortages in rice supply might occur due to problems that affect the various stages of production.

Must give at least 2 different stages. Max 3m if never state stage of production. Max 3m for 1 stage of production

Growing
• Extreme weather patterns
  o Might destroy crops during floods or droughts during growing period
  o Cyclone Yasi destroying banana crops in Australia

• Pests
  o Crops may be destroyed if pesticides are not used widely or in the case of an outbreak of pests during the growing season
  o E.g.: worms in Liberia displacing farmers and 46 villages

Post-production
• Inadequate logistics of food distribution and storage
  o lack of proper storage and transportation facilities in LDCs and rural farms especially may cause shortages in certain parts of the country
  o Some places may also become inaccessible due to unforeseen circumstances such as landslides
  o E.g.: Timor-Leste experiences food shortages due to lack of accessibility (many villages in rural, mountainous regions that are not very accessible)

(c) ’Technological strategies are most effective in solving the problem of food shortage.’ How far do you agree with this statement? Give reasons to support your answer.

<table>
<thead>
<tr>
<th>0</th>
<th>Content not relevant to the topic.</th>
</tr>
</thead>
</table>
| 4 | • Technological strategies discussed.  
   • Examples may be brief. Naming of strategy only and brief description. |
| 7 | • At least 2 strategies well-explained.  
   • Examples given for both strategies are accurate and |
| 1 | Stating or listing strategies (either technological or others) | 5 | At least 2 strategies given: technological and one other. Elaboration may be lacking for one strategy but good elaboration for the other. Examples for one strategy may be brief or generalised or inaccurate. Evaluation for some parts may be one-sided. Successes OR limitations only. |
| 2 | Vague or generalised statements about the strategies. Lack elaboration and examples. | 6 | At least 2 strategies well-explained with balanced evaluation of each strategy's successes AND limitations. Good examples/evidence to support. For e.g. students may evaluate the success and limitations of each strategy but may not have an overall opinion/evaluation of the relative effectiveness of the strategy. |
| 3 | Able to provide brief description of 1 technological strategy and list the other. One sided-evaluation. Lack examples. | 8 | At least 2 strategies well-explained. Examples given for both strategies are accurate and detailed. Clear criteria used to evaluate relative effectiveness of strategies to address the problem of food shortage. Two reasons provided to support stand. |

**Technological Strategies**

**Details**
- **Storage**
  - Refrigerated warehouse storage or refrigerated delivery trucks to keep food fresh for a longer period of time
  - Use of silos in LDCs
  - Successes: crops can be distributed to places further away, reduce loss of crops to pests
  - Limitations: expensive on a large scale, adds on to cost of production
- Example: Timor-Leste – the FAO has helped recue the loss of crops to pests by 20% to 40%
  - Farming technology
    - Use of HYVs, irrigation, chemical fertilisers, pesticides, machinery
    - Success: can grow food in places previously considered unsuitable for agriculture
    - Limitations: many farming technology too expensive
    - Example: Singapore high-tech farms, Green Revolution
  - Biotechnology

OR

**Political and Economic strategies**
- National strategies: FELDA or high-tech farming
- International strategies: Global Agriculture and Food Security Programme

**Agricultural strategies**
- multiple cropping
(a) Fig. 11 (Insert) shows the malaria death rates (per 100,000) throughout the world in 2015, while Fig. 12 shows the number of malaria deaths in the world by age group.

With reference to Fig. 11 and 12, describe the patterns of malaria deaths in the world and explain the impacts of malaria on people and countries. 

[6]

Reserve 1m for describe and 1m for explain.

Describe (2-3m):
Generally, incidence of malaria occurs among countries located along the equatorial region with tropical climates, within Africa and Asia.
Highest incidence rates are found in Africa in countries such as Democratic Republic of Republic of Congo (60-80 per 100000) and Nigeria (above 80 per 100000), and among young children under 5 years old and older people above 60 years old.
Lower incidence rates in countries in Southeast Asia and South Asia in countries such as Malaysia (0 - 2.5 per 100000) and India (2.5 - 5 per 100000), and among people between the age of 5 and 44.

Explain impacts (3-4m):
- Increased infant mortality rate as can be seen in fig. 12, where majority of deaths are among children under 5 years old. A large number may be infants.
- High death rate globally.
- There is a burden on households – increased medical expenses and eventually, funeral costs.
  - High death rates also mean that children who lose parents would become orphans and lose their main carer.
- Countries affected would have to care for these broken families.
- Loss of productivity due to high death rate among working people.

(b) Explain how environmental factors contribute to the spread of malaria. [4]

- Overcrowded living conditions.
  - Situations where large numbers of people live very close together in a small area. In such conditions, people tend to share same spaces and also tend to interact with each other more often and more closely.
  - Housing for refugees and migrant workers is often overcrowded with many people sharing one room. Such dwellings often have unhygienic conditions.
  - Their houses sometimes do not have proper doors and windows to keep out Anopheles mosquitoes that tend to be active at night.
- Poor drainage and stagnant water.
  - Creates conditions favourable for the growth of mosquito populations.
  - In places where there is low awareness of malaria and no precaution is taken to remove pools of stagnant water, mosquitoes breed quickly and without interruption.
  - E.g.: Rajasthan, India, water from 8000 km of canals in the Great Indian Thar Desert leaks into many places.
- Effect of climate.
  - Temperature, rainfall and relative humidity have a direct impact on mosquitoes. Monsoons create favourable conditions for mosquitoes to breed by bringing large amounts of rainfall.
  - Heavy rains form pools of water that provide ideal and secure breeding grounds for mosquitoes.
  - Higher temperature decreases the time needed for mosquitoes to mature.
  - Post-monsoon period poses more risk for the disease to spread. As the flooded areas dry up, they leave behind pools of stagnant water. Consequently, epidemics of malaria often take place.
  - Such as in Pakistan during 2006 and 2009.
Fig. 13 (Insert) shows the areas in parts of Asia that experience resistance to artemisinin, an anti-malarial drug used to treat patients suffering from malaria.

Using Fig. 13, explain how the resistance to artemisinin is a challenge in reducing the spread of malaria in the region shown. [4]

Reserve 1m for reference

- **Not cured**: Resistance to artemisinin, an anti-malarial drug, means that the malaria parasites do not die even with medication. Hence, people infected with malaria will therefore not be cured of the malaria virus.
- **Longer period of infection**: They then carry the malaria virus for a longer period of time and have greater ability to spread it to other people and places.
- **Population movement**: Hence, people resistance to the artemisinin, can spread the malaria virus across borders through expansion diffusion from Tier 1 to Tier 2. The movement of people across borders spreads and transmits the diseases to the new locations.
- **Malaria control programmes also become ineffective**: Because it is difficult to monitor the movement of people as the volume and speed of movement occurs at a large scale.
- **Malaria may also spread from Tier 1 to Tier 2 locations through uncontrolled migration and lack of coordination between countries along border districts.
(d) Fig. 14 shows the main strategies that international organisations such as the World Health Organisation (WHO) and the World Bank employ to prevent and treat malaria.

![Diagram of malaria prevention strategies]

**Fig. 14**

With reference to Fig. 14 and your own knowledge, describe the strategies that international organisations might take to reduce the spread of malaria. [3]

**Must address all 3 stages.**

- Vector control
  - Through providing funds for thermal fogging
  - Provide items such as insecticide-treated bed nets
- Medication
  - Prevent infections establishing themselves in human beings by providing anti-malarial drugs
  - Lowering taxes on and costs of anti-malarial drugs
- Case management
  - Provide training to close the gap between knowing and doing in malaria control
  - Provide screening for patients
  - Work with local governments, community groups and NGOs
  - Maintain long-term commitment to malaria control by governments and civil society groups

(e) 'LDCs are more at risk of infectious diseases than degenerative diseases.' How far do you agree with this statement? Support your answer with examples [8]

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Content not relevant to the topic.</td>
</tr>
<tr>
<td>4</td>
<td>Discussed why LDCs are more at risk of infectious diseases than degenerative diseases. Examples may be brief.</td>
</tr>
<tr>
<td>7</td>
<td>Both sides are well-explained with balanced evaluation. Good examples/evidence</td>
</tr>
<tr>
<td></td>
<td>Stating reasons for infectious diseases briefly.</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Vague or generalised statements about the reasons. Lack elaboration and examples.</td>
</tr>
<tr>
<td>3</td>
<td>Able to provide brief description of reasons why LDCs face more infectious diseases. One sided-evaluation. Lack examples.</td>
</tr>
</tbody>
</table>

Reasons why LDCs are more at risk of infectious diseases

Education
- Education refers to the process of teaching and learning, often within the context of formal institutions such as a school or university
- People who are educated are more likely to be informed on how to protect themselves from infectious diseases
- They generally also earn higher incomes that give them better access to quality medical treatment and living conditions
- LDCs have lower levels of education and hence, may be exposed to more infectious diseases due to poor knowledge of its modes of transmission or lack awareness of these diseases
- Level of education for women may also be lower, so they may lack awareness on how diseases may be spread to children or infants
- Example: of 60.7 million primary school-age children who were out of school worldwide in 2012, 30.6 million of them were from Sub-Saharan Africa, made up of many LDCs.
- Example: LDCs suffer from high rates of HIV/AIDS due to lack of education. People
did not know how to protect themselves and avoid being infected. There are also cultural practices that keep girls from knowing about sex and sexuality until marriage. For example, sex is a very private subject in Nigeria and discussion of it is often seen as inappropriate. Sexuality awareness education is therefore not conducted in schools in Nigeria.

**Poverty**
- Poverty is a state of not having enough money and material resources such as food, water, clothing and shelter
- Poverty limits the purchasing power that people have to afford basic health care
- It also means that people are more likely to be exposed to health risks because of poor quality housing and insufficient nutrition
- Children are most vulnerable to infectious diseases due to poverty. Children living in poverty have poor access to vaccination.

**Example:** people have limited provision of and access to healthcare in LDCs. For example, there is a critical shortage of doctors in India. The country has 6 doctors for every 10,000 people. Little healthcare spending in India goes to rural areas, and hence, there are few medical centres in rural areas. As a result, people usually delay receiving treatment as centres are usually far away from their homes.

**Other accepted points:**
- Living conditions (use example from malaria)
- Access to safe drinking water (cholera in Lao People Democratic Republic)

<table>
<thead>
<tr>
<th>Reasons why LDCs are at risk of degenerative diseases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degenerative diseases are those where affected tissues or organs deteriorate over time because of lifestyle choices, eating habits, bodily wear and tear or genetic causes</td>
</tr>
<tr>
<td>Some degenerative diseases such as cancer and coronary heart diseases are also strongly linked to a person's diet and lifestyle</td>
</tr>
<tr>
<td>Example: with more LDCs becoming more affluent, such as the countries with a growing middle-class such as China and Brazil, these countries are able to afford more food and may consume more meat. Such diets, coupled with lower levels of physical activity, could lead to heart disease, obesity, and diabetes</td>
</tr>
<tr>
<td>Furthermore, coupled with a lack of knowledge of how to lead healthy lifestyles, LDCs may also face more risk of such diseases</td>
</tr>
<tr>
<td>Poor lifestyle choices such as smoking in LDCs also may lead to cancer of the lung.</td>
</tr>
<tr>
<td>Example: 80% of the world's one billion smokers are from LDCs. The prevalence of smoking has been increasing in LDCs, particularly in Asia</td>
</tr>
</tbody>
</table>
READ THESE INSTRUCTIONS FIRST

Do not open this booklet until you are told to do so.

Write your Index Number on all the work you hand in.
Write in dark blue or black pen on both sides of the paper.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.

Section A
Answer Question 1.

Section B
Answer one question.

Write all answers on the Answer Paper provided.
Candidates should support their answers with the use of relevant examples.
Sketch-maps and diagrams should be drawn whenever they serve to illustrate an answer.

At the end of the examination, fasten all your work securely.
The number of marks is given in brackets [ ] at the end of each question or part question.

This document consists of 8 printed pages, 1 blank page and an Answer Cover Sheet.
Section A

This question is compulsory.

1 (a) A group of students wanted to investigate why the Mangrove Park attracts many visitors. Their investigation was conducted on a weekend morning in the month of June.

Some students conducted interviews with visitors by positioning themselves along a bridge at location A (Fig. 1A), while the rest positioned themselves at a covered rest area at location B (Fig. 1B).

(i) Identify which location, A or B, is more suitable to conduct an interview with the visitors and explain your answer. [2]

(ii) Justify a suitable sampling method for the investigation. [2]
(iii) The questionnaire consists entirely of all multiple-choice questions.

What are the advantages and limitations of having this type of questions in a questionnaire? [4]

(iv) Fig. 2 shows the questionnaire with the results of the interviews.

<table>
<thead>
<tr>
<th>Questions</th>
<th>Options</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1 Gender</td>
<td>• Male</td>
<td>• 35</td>
</tr>
<tr>
<td></td>
<td>• Female</td>
<td>• 15</td>
</tr>
<tr>
<td>Q2 What is your age-group?</td>
<td>• 20 years and under</td>
<td>• 10</td>
</tr>
<tr>
<td></td>
<td>• 21 to 30 years</td>
<td>• 15</td>
</tr>
<tr>
<td></td>
<td>• 31 to 40 years</td>
<td>• 15</td>
</tr>
<tr>
<td></td>
<td>• 41 to 50 years</td>
<td>• 5</td>
</tr>
<tr>
<td></td>
<td>• Above 50 years</td>
<td>• 5</td>
</tr>
<tr>
<td>Q3 What attracts you to visit the Mangrove Park?</td>
<td>• Nice scenery</td>
<td>• 15</td>
</tr>
<tr>
<td></td>
<td>• The mangroves</td>
<td>• 20</td>
</tr>
<tr>
<td></td>
<td>• The birds or wildlife</td>
<td>• 10</td>
</tr>
<tr>
<td></td>
<td>• Part of package tour</td>
<td>• 5</td>
</tr>
<tr>
<td>Q4 What are your suggestions to improve the facilities in the Mangrove Park?</td>
<td>• More toilets</td>
<td>• 5</td>
</tr>
<tr>
<td></td>
<td>• More benches along the walking trail</td>
<td>• 5</td>
</tr>
<tr>
<td></td>
<td>• Need more shops to sell souvenirs and drinks</td>
<td>• 16</td>
</tr>
<tr>
<td></td>
<td>• Need more dustbins</td>
<td>• 24</td>
</tr>
</tbody>
</table>

Fig. 2

Using the responses from Question 3, draw a pie-chart to show what attracts visitors to the Mangrove Park. [3]

(v) Describe some ways to improve the reliability of data collected. [3]
(vi) An increase in visitors to the Mangrove Park has had a negative impact on the area. The students wanted to investigate if this was true.

Using the results from the interview questionnaire, suggest a suitable hypothesis statement and describe two ways how the students can carry out the investigation. [3]

(b) The students also wanted to compare the wave frequencies at two locations along the coast near the Mangrove Park.

(i) Describe how the students would collect the data for the investigation. [4]

(ii) Fig. 3 shows some mangrove trees along the coast near the Mangrove Park.

![Fig. 3]

Draw a field sketch of the area shown in Fig. 3. Annotate your sketch to identify and describe how mangroves are able to adapt to their environment. [4]
Section B

Answer one question from this section.

2 (a) Study Fig. 4, which shows an excerpt of an article about the Great Barrier Reef.

*Climate change remains the most serious threat to the Great Barrier Reef. It is already affecting the Reef and is likely to have far-reaching consequences in the decades to come.*

(Adapted from https://www.ehp.qld.gov.au/state-of-the-environment.html/)

**Fig. 4**

With reference to Fig. 4,

(i) explain how climate change is a 'threat to the Great Barrier Reef'. [2]

(ii) explain why the loss of coral reefs could have 'far-reaching consequences'. [3]

(iii) describe the environmental conditions which encourage the growth of coral reefs. [3]

(b) Study Fig. 5, which shows coastal features, W and X.

**Fig. 5**

With the aid of well-labelled diagrams, describe the formation of coastal features, W and X. [3]

[Turn Over]
(c) Describe the formation of a beach, and explain how beach material and weather condition can affect the slope of a beach. [6]

(d) ‘There are more limitations than benefits of hard engineering coastal protection measures’.

To what extent do you agree with this statement? Use examples to support your answer. [8]
3 (a) Study Fig. 6, which shows some of the attractions in Phuket, Thailand and Fig. 7, which shows tourist arrivals to Phuket from 2004 to 2013.

Fig. 6

Fig. 7

(i) Using information from Fig. 6 and 7 only, explain how Phuket can offer different opportunities for tourist activities. [3]

(ii) Describe the trend of visitor arrivals to Phuket from 2004 to 2013. [3]

(iii) Account for the trend of international visitor arrivals to Phuket from 2004 to 2013. [4]

(iv) Suggest some ways to minimise negative impacts of tourism to the natural attractions in Phuket. [3]

(b) Describe two human activities that have led to the decline of both mangroves and coral reefs. [4]

(c) 'Natural disasters are the main cause of fluctuations in tourism numbers of the Less Developed Countries (LDCs).'

To what extent do you agree with this statement? Use examples to support your answer. [8]
Anglo - Chinese School
(Independent)

PRELIMINARY EXAMINATION 2018
YEAR 4 EXPRESS

ANSWER COVER SHEET

GEOGRAPHY
PAPER 1

Friday 3 August 2018 1 hour 40 minutes

Index Number: _______________________

Please indicate the Question Number attempted in the box below.

<table>
<thead>
<tr>
<th>Question No</th>
<th>Marks Obtained</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total / 50
INSTRUCTIONS TO CANDIDATES

Do not open this booklet until you are told to do so.

Write your index number on all the work you hand in.
Write in dark blue or black pen on both sides of the paper.
You may use a soft pencil for any diagrams, graphs or rough working.
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Section A
Answer one question.

Section B
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The number of marks is given in brackets [ ] at the end of each question or part question.
Section A

Answer one question from this section.

1. (a) Study Fig. 1, which shows information about selected earthquakes.

<table>
<thead>
<tr>
<th>Location</th>
<th>Year</th>
<th>Magnitude measured on Richter Scale</th>
<th>Number of deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>1964</td>
<td>9.2</td>
<td>125</td>
</tr>
<tr>
<td>Indonesia</td>
<td>2004</td>
<td>9.0</td>
<td>283,000</td>
</tr>
<tr>
<td>China</td>
<td>2008</td>
<td>8.0</td>
<td>87,000</td>
</tr>
<tr>
<td>Iran</td>
<td>1990</td>
<td>7.7</td>
<td>50,000</td>
</tr>
<tr>
<td>Taiwan</td>
<td>1999</td>
<td>7.7</td>
<td>3,000</td>
</tr>
<tr>
<td>Pakistan</td>
<td>2005</td>
<td>7.6</td>
<td>73,000</td>
</tr>
<tr>
<td>Turkey</td>
<td>1999</td>
<td>7.6</td>
<td>17,000</td>
</tr>
<tr>
<td>USA</td>
<td>1989</td>
<td>7.1</td>
<td>69</td>
</tr>
<tr>
<td>Japan</td>
<td>1995</td>
<td>6.9</td>
<td>5,500</td>
</tr>
<tr>
<td>USA</td>
<td>1994</td>
<td>6.7</td>
<td>57</td>
</tr>
<tr>
<td>Italy</td>
<td>2009</td>
<td>6.3</td>
<td>308</td>
</tr>
<tr>
<td>India</td>
<td>1993</td>
<td>6.2</td>
<td>9,500</td>
</tr>
<tr>
<td>Afghanistan</td>
<td>2002</td>
<td>6.1</td>
<td>1,000</td>
</tr>
</tbody>
</table>

Fig. 1

(i) Do earthquakes of higher magnitudes cause more deaths? Support your answer with data from Fig. 1. [3]

(ii) Suggest reasons for the variation in the number of deaths caused by earthquakes listed in Fig. 1. [5]
(b) Study Fig. 2, which provides information about the impacts of a volcanic eruption in Iceland.

Iceland's volcanic eruption benefits tourism (25th April 2010)

Iceland’s latest volcanic eruption is coming to an end and the unexpected tourist boom that lifted this country’s financial fortunes may be ending too.

Last month, the Eyjafjallajokull volcano began erupting again after almost 200 years, threatening floods and earthquakes but drawing thousands of adventurous tourists to the site where ash and red-hot lava was coming from a crater between two glaciers.

Thousands of people have made the trip to the volcano, 120 kilometres east of Reykjavik, since the eruption began on March 20th. Many people have made a small fortune taking them there, by bus, snowmobile, “superjeep” and even helicopter.

Charter airline Iceland Express says its business has risen by 20% since the eruption, and the Icelandic Tourist Board says 26 000 overseas visitors came to the country in March, a record for a quiet month when it is still winter in Iceland.

(source: © ADAPTED: http://news.yahoo.com/6/ap/20/00412/ap_am_bi_ge/eu_iceland_volcano_tourism)

Fig. 2

(i) Explain how the eruption of the Eyjafjallajokull volcano benefitted the Icelandic tourist industry. [2]

(ii) In what ways, other than tourism, may people benefit from living close to a volcano? [3]

(iii) Explain how volcanic eruptions can cause problems for people. [4]

(c) “Volcanic activity occurs at all tectonic plate margins.”

Do you consider this statement to be true? Explain your answer. [8]
2. (a) Study Fig. 3, a climate graph of a weather station located near the equator.

![Climate Graph]


**Fig. 3**

Describe the climate shown in Fig. 3. [3]
(b) Fig. 4 shows the concentration of carbon dioxide (CO₂) and the average annual surface temperature of the Earth from 1880 to 2005.

![Graph showing CO₂ concentration and average surface temperature from 1880 to 2005.]

**Key**

- **CO₂ concentration**
- **Average surface temperature**

**Fig. 4**

(i) Compare the trend in carbon dioxide concentration with the trend in the average annual surface temperature of the Earth shown in Fig. 4. [4]

(ii) Describe the causes of the increase of carbon dioxide in the atmosphere and explain how this increase could bring about changes in the surface temperature of the Earth. [5]

(c) With reference to relevant examples, describe and explain how temperatures are influenced by distance from the sea. [5]

(d) With reference to studies made, discuss the relative importance of short-term and long-term responses to a natural hazard or disaster. [8]
Section B

Answer one question from this section.

3.  (a) Fig. 5 is a map showing the life expectancy at birth for countries other than those in the Americas.


**Fig. 5**

(i) Describe the pattern of life expectancy shown in Fig. 5. [4]

(ii) Define the term 'life expectancy' and explain how it can be used as an indicator of health of a country. [3]

(b) Outline what is meant by the term 'degenerative diseases' and describe the global distribution of 'degenerative diseases'. [4]
(c) Study Fig. 6, which shows information about GNP per capita and access to clean water in ten LEDCs (Less Economically Developed Countries).

Fig. 6

(i) Describe the general relationship between GNP per capita and the percentage of the population with access to clean water. Use statistics in your answer. [2]

(ii) Explain why providing a reliable supply of clean water may increase life expectancy. [4]

(d) 'Climate change is the most important cause of global food shortage.' How far would you agree? Support your answer with relevant examples. [8]
4. (a) Study Fig. 7, which shows the number of people who are undernourished in Sub-Saharan Africa and in South and East Asia.

![Graph showing the number of people undernourished in Sub-Saharan Africa and South and East Asia over the years 1971, 1981, 1991, and 2010.]

*People are undernourished when their food intake provides less than their minimum energy requirements.

**Fig. 7**

(i) Compare the trends in Sub-Saharan Africa and South and East Asia between 1971 and 2010. Support your answer with dates and statistics from Fig. 7. [3]

(ii) Explain how food shortages can be caused by the natural environment. [4]

(iii) With reference to examples, describe the effects of food shortages on the health of the people living in Less Developed Countries. [4]
(b) Fig. 8 is a graph showing changes in global food production and global yields of food crops from 1980 to 2010.

![Graph showing global food production and yields from 1980 to 2010](image)

(Source: adapted from Ellen MacArthur Foundation, (2013), Towards the Circular Economy 2, page 22)

Fig. 8

(i) With reference to Fig. 8, describe the change in food production in India from 1980 to 2010. [3]

(ii) Explain one way in which the yield of some food crops can be increased. [3]

(c) 'Technology will solve the problem of food shortage.' How far would you agree? Support your answer with relevant examples. [8]
ANGLO-CHINESE SCHOOL
(Independent)

PRELIMINARY EXAMINATION 2018
YEAR 4 EXPRESS

GEOGRAPHY
PAPER 2

Monday 30 July 2018
1 hr 30 min

2236/02

ANSWER COVER SHEET

Index Number: ___________________________

Write the number of the question you have attempted in the box below:

<table>
<thead>
<tr>
<th>Question No</th>
<th>Marks obtained</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section A</td>
<td></td>
</tr>
<tr>
<td>Section B</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>/50</td>
</tr>
</tbody>
</table>
1 a(i) Identify which location, A or B, is more suitable to conduct an interview with the visitors and explain your answer.  
- Location B is more suitable since it is a covered area where visitors can be more comfortable to be interviewed.
- Location A is located at an open area where it is uncomfortable for visitors to be interviewed due to the narrow bridge.

(award 1 mark each for 2 correct points on location A and/or B)

(ii) Justify a suitable sampling method for the investigation.
- **systematic sampling** where the interviewees are selected according to a regular pattern example interviewing every 5th visitor.
- systematic sampling will remove biasedness.

(or random sampling where interviewees are selected randomly without any pattern)

(award 2 marks for well-elaborated 2 points on systematic or random sampling)

(iii) What are the advantages and limitations of having this type of questions in a questionnaire?

**Advantages**
- convenient for interviewees to answer since it is easier to complete due to the available options.
- easier for students to do analysis.

**Limitations**
- questionnaire do not allow interviewees to elaborate on their answers since they only have few options to choose.
- do not allow other type of options for answers.

(award 2 marks for any 2 points on advantages and 2 marks for any 2 points on limitations of closed-ended type questions)
(iv) Using the responses from Question 3, draw a pie-chart to show what attracts visitors to the Mangrove Park.

- award 2 marks for correct drawing of sectors of $108^\circ$ for nice scenery (30%), $144^\circ$ for mangroves (40%), $72^\circ$ for birds or wildlife (20%), $36^\circ$ for part of package tour (10%)
- award 1 mark for correct labelling of all the sectors
- award 1 mark for correct description of the symbols used for the 4 sectors in the legend (optional)

(v) Describe some ways to improve the reliability of data collected.

- students should conduct interview with the visitors on more days instead of just one weekend in June
- should conduct interviews with more visitors, instead of 50 visitors only
- conduct interviews at entrance of the Park or at more locations

(award 1 mark each for well-explained 3 points on ways to improve reliability)

(vi) Using the results from the interview questionnaire, suggest a suitable hypothesis statement and describe two ways how the students can carry out the investigation.

- hypothesis: With increase in visitors, there is an increase in litter (example of statement)
- students can take photographs to show the increase in litter around the area
- students can conduct perception survey with the locals asking them on their opinion if there is more litter due to increase in visitors

(award 1 mark for correct hypothesis statement and 2 marks for correct explanation of 2 ways to do the investigation, based on the hypothesis statement)
b) **Describe how the students would collect the data for the investigation.**

- Using a stopwatch, students should **count the number of waves** that break on the shore at one of the location over a period of time such as for 5 minutes
- record the number of breaking waves on a recording sheet
- repeat the process a few times to obtain the average number of waves per time period on the recording sheet
- students will then conclude if the waves is **constructive** (6 to 8 per minute) or **destructive** (10 to 14 per minute)
- students will repeat the whole process at the other location
- they will then compare between the 2 locations in terms of wave frequencies 

(award 1 mark each for any well-elaborated 4 points on the description)

(ii) **Draw a field sketch of the area shown in Fig. 3.**

Annotate your sketch to identify and describe how mangroves are able to adapt to their environment.

- award 1 mark for correct **field-sketch drawing** of the mangrove
- award 1 mark for correct **labelling of the sea and coast in the sketch**
- award 1 mark for correct labelling and **annotation of prop roots and its uses** to anchor the tree securely to the muddy coast
- award 1 mark for correct labelling and **annotation of leaves** with special salt glands to secrete excess salt

2 (a) **With reference to Fig. 4, explain how climate change is a 'threat to the Great Barrier Reef'.**

- with **increase in ocean temperature**, coral bleaching might occur
- coral bleaching occurs when water is too warm, corals will expel their microalgae living in their tissues causing corals to turn white or 'bleached', corals will soon die due to lack of nutrition

(award 2 marks for any 2 well-explained points on how climate change affects coral reefs)

(ii) **Explain why the loss of coral reefs could have 'far-reaching consequences'.**

- with loss of coral reefs, coasts will not be protected from **coastal erosion**
- and **habitat for marine lives** such as small fishes will be lost
- many people depend on coral reefs for living will lose their jobs such as tour guides for tourists on cruises to see corals

(award 3 marks for any 3 well-explained points on uses of coral reefs)
Describe the environmental conditions which encourage the growth of coral reefs. [3]

- surface temperature not exceeding 18 deg Celsius
- water should be 10 to 60 metres deep
- need clear, silt free water
- average seawater salinities of 30 to 38%
- not strong storm waves
- need water with low nutrient content

(award 3 marks for any 3 well-explained points on conditions for growth of coral reefs)

With the aid of well-labelled diagrams, describe the formation of coastal features, W and X. [3]

W is headland and X is a bay
- headlands are formed when the sea erodes a section of coast with alternating bands of hard and soft rock
- The bands of soft rock, such as sand and clay, erode more quickly than those of more resistant rock, such as chalk
- This leaves a section of land jutting out into the sea called a headland
- The areas where the soft rock has eroded away, next to the headland, are called bays

(award 1 mark for correct drawing of well-labelled diagrams on formation of headland and bay, 2 marks for well-explained 2 points on formation of headland and bay)

(c) Describe the formation of a beach, and explain how beach material and weather condition can affect the slope of a beach. [6]

Formation of a beach
- formed when deposited materials carried by waves are accumulated in a zone along the coast
- the materials on the beach vary in size from fine sand to pebbles.
How beach material affects slope of beach

- beach with finer sediments have gentler slope
- beach with larger size sediments have steeper slope

How weather condition affects slope of beach

- during calm conditions, constructive waves deposit more materials on the beach forming gentler-sloping beach
- during strong winds, destructive waves erode and remove materials from the beach forming steeper-sloping beach

(award 2 marks for well-explained formation of a beach and 2 marks for any 2 well-explained points on how weather condition and beach materials affect slope of beach)

(d)

'There are more limitations than benefits of hard engineering coastal protection measures'.

To what extent do you agree with this statement? Use examples to support your answer.

eg. Hard engineering - Seawall

- made of concrete, built parallel to the coast
- benefits: reduce erosion by absorbing wave energy and reflecting incoming waves
- benefits: more long-lasting, does not need constant maintenance
- limitations: seawall might collapse in the long run due to accumulation of eroded materials at the base of the wall
- limitations: costly to build and maintain, constant repairs have to be made to prevent breakdown and collapse
- limitations: destroys natural beauty of the beach
- eg. Seawall at Marina Bay in Singapore is expensive to build and maintain but has been effective in preventing coastal erosion

eg. Hard engineering - Breakwater

- artificial barriers built offshore, parallel to the coast or with one end attached to the coast and other end in the sea
- benefits: breakwater breaks the force of oncoming waves, thus reduce coastal erosion
- benefits: creates zone of calm water behind them, area can be used as sheltered harbor
- limitation: only areas behind the breakwaters are protected, breakwaters not able to protect the coast if the waves are too strong
- limitation: breakwaters are expensive to build and maintain
- eg. There are many breakwaters at East coast beach in Singapore to protect the coast

[Turn Over]
**Eg. Hard engineering – Gabions**

- they are rectangular wire mesh cages packed tightly with cobbles or crushed rocks, they are placed parallel to the coast to prevent erosion
- benefit: cheaper than seawall
- limitation: wire cages need constant maintenance as they are easily corroded by seawater or gets rusty
- limitation: can be unsightly at the coast or some people can be injured by the cages at the beach
- eg. Gabions along Changi beach in Singapore help to prevent short term erosion

<table>
<thead>
<tr>
<th>Level 1 (0-3 marks)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Listing of benefits and/ or limitations of hard engineering coastal protection measures, no detailed description</td>
</tr>
<tr>
<td>• No locations or examples given</td>
</tr>
<tr>
<td>• Very general answer with not much development</td>
</tr>
<tr>
<td>• No supported reasons</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Level 2 (4-6 marks)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Detailed explanations of limitations OR benefits of at least 2 types of hard engineering coastal protection measures</td>
</tr>
<tr>
<td>• Few examples of locations given</td>
</tr>
<tr>
<td>• Brief statements on whether there are more limitations or benefits of hard engineering measures</td>
</tr>
<tr>
<td>• Answer written in essay form but with poor organization and are not in proper paragraphs</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Level 3 (7-8 marks)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Detailed explanations of benefits AND limitations of at least 2 types of hard engineering coastal protection measures</td>
</tr>
<tr>
<td>• Many examples of specific and detailed locations given</td>
</tr>
<tr>
<td>• Clear statements of whether there are more limitations or benefits of hard engineering measures</td>
</tr>
<tr>
<td>• Answer written in essay form, with good organization in paragraphs, well- balanced conclusion</td>
</tr>
</tbody>
</table>
3 (i) Using information from Fig. 6 and 7 only, explain how Phuket can offer different opportunities for tourist activities.

- there are many beaches such as Patong or Karon beach and Po Bay to attract tourists who love to swim or sun tan
- there are few temples such as Wat Chalong to attract tourists who wants to learn more on the religion
- visitors interested in history can visit the Heroines Monument

(award 3 marks for any well-explained 3 tourist attractions with names from Fig. 7, max 2 marks for answer without name of places)

(ii) Describe the trend of visitor arrivals to Phuket from 2004 to 2013.

- increase in domestic arrivals by 2.2 million
- increase in international arrivals by 3.6 million
- increase in total arrivals by 3.5 million

(award 1 mark each for 3 points on increase in arrivals using data from graph)

(iii) Account for the trend of international visitor arrivals to Phuket from 2004 to 2013.

- more international visitor arrivals due to cheaper exchange rate of Thai baht that makes items cheaper in Phuket
- more budget airlines to Phuket airport, more visitors find it cheaper to travel to Phuket
- more visitors experiencing winter season in their home countries might be interested to visit Phuket to enjoy the hot climate and recreational activities at the bay and sea
- more visitors interested to see the scenery of natural attractions in Phuket such as stacks, caves and beaches

(award 4 marks for any 4 well-explained points on the reasons, with relevant examples from Phuket)

(iv) Suggest some ways to minimise negative impacts of tourism to the natural attractions in Phuket.

- more signage to remind beach goers not to litter at the beach and in the water to prevent pollution
- more control on number of boats on cruises to prevent too much water pollution from oil spills from the boats
- tour guides can keep reminding tourists not to litter or damage any marine lives

(award 3 marks for any 3 well-explained relevant points on ways to prevent negative impacts in Phuket)

[Turn Over]
Describe two human activities that have led to the decline of both mangroves and coral reefs.

- land reclamation from coastal development will increase sediments to the sea, for example when parts of the coast is reclaimed for houses, the construction process will increase sediments that will destroy corals and led to clearance of mangroves.
- water pollution from untreated sewage or chemical fertilisers washed into the sea will destroy corals and mangroves along the coast.

(award 2 marks each for well-explained 2 points on human activities that destroy both mangroves and corals.)

c) Natural disasters are the main cause of fluctuations in tourism numbers of the Less Developed Countries (LDCs).’
To what extent do you agree with this statement? Use examples to support your answer.

Diseases outbreak
- outbreak of diseases in the country may affect tourist arrival who fear getting the disease thus lowering tourist arrivals
- eg. during the SARs outbreak in 2003, fewer tourists visited Hong Kong since they fear of getting the disease.

Natural disaster
- volcanic eruption and earthquakes in a country might lower tourist arrival for safety reasons
- eg. fewer tourists visited Bali after eruption of volcano in Lombok due to the thick ash that caused the closure of Bali airport

Unfavourable political conditions
- civil unrest, riots will discourage tourists from visiting the country for fear of safety
- eg. Fewer tourists to Bangkok during the ‘red shirt, blue shirt’ protests in 2013

[Turn Over]
Level 1 (0-3 marks)
- Listing of natural disasters or other reasons for fluctuation in tourism with no detailed description
- No locations or examples given
- Very general answer with not much development
- No supported reasons

Level 2 (4-6 marks)
- Detailed explanations of how natural disasters OR other reasons cause fluctuation in tourism
- Few examples of locations given from the LDCs
- Brief statements on whether natural disaster is the main cause or other reason is the main cause
- Answer written in essay form but with poor organization and are not in proper paragraphs

Level 3 (7-8 marks)
- Detailed explanations of how natural disasters AND other reasons cause fluctuation in tourism
- Many examples of specific and detailed locations given from the LDCs
- Clear statements of whether there natural disaster is the main cause or other reasons is the main cause
- Answer written in essay form, with good organization in paragraphs
- Well-balanced conclusion
Section A

Answer one question from this section.

1 (a) Study Fig. 3, which shows information about selected earthquakes.

<table>
<thead>
<tr>
<th>Location</th>
<th>Year</th>
<th>Magnitude measured on Richter Scale</th>
<th>Number of deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>1964</td>
<td>9.2</td>
<td>125</td>
</tr>
<tr>
<td>Indonesia</td>
<td>2004</td>
<td>9.0</td>
<td>283,000</td>
</tr>
<tr>
<td>China</td>
<td>2008</td>
<td>8.0</td>
<td>187,000</td>
</tr>
<tr>
<td>Iran</td>
<td>1990</td>
<td>7.7</td>
<td>50,000</td>
</tr>
<tr>
<td>Taiwan</td>
<td>1999</td>
<td>7.7</td>
<td>3,000</td>
</tr>
<tr>
<td>Pakistan</td>
<td>2005</td>
<td>7.6</td>
<td>73,000</td>
</tr>
<tr>
<td>Turkey</td>
<td>1999</td>
<td>7.6</td>
<td>17,000</td>
</tr>
<tr>
<td>USA</td>
<td>1989</td>
<td>7.1</td>
<td>69</td>
</tr>
<tr>
<td>Japan</td>
<td>1995</td>
<td>6.9</td>
<td>5,500</td>
</tr>
<tr>
<td>USA</td>
<td>1994</td>
<td>6.7</td>
<td>57</td>
</tr>
<tr>
<td>Italy</td>
<td>2009</td>
<td>6.3</td>
<td>308</td>
</tr>
<tr>
<td>India</td>
<td>1993</td>
<td>6.2</td>
<td>9,500</td>
</tr>
<tr>
<td>Afghanistan</td>
<td>2002</td>
<td>6.1</td>
<td>1,000</td>
</tr>
</tbody>
</table>

(i) Do earthquakes of higher magnitudes cause more deaths?
Support your answer with data from Fig. 3. [3]

- Yes: earthquakes of high magnitude could cause a lot of deaths;
  - E.g. Indonesia in 2004 had a magnitude of 9.0 and killed 283000 people;
- No: no obvious link between magnitude and number of deaths caused/no obvious pattern;
  - E.g. the largest magnitude earthquake in the USA measured 9.2 and caused 125 deaths;
  - yet 9500 deaths were caused in India by a quake of lower magnitude (6.2);
  - etc.
- NB: identification of two examples without statistics but with effects max 1.
- Max. 2 no data.
- 3 @ 1 mark

(ii) Suggest reasons for the variation in the number of deaths caused by earthquakes listed in Fig. 3. [5]

Do not attribute, your reasons are suggestions – not factual, unless u know for a fact!

- Population density
  - Number of people living in the area
  - Earthquakes in sparsely populated areas are likely to affect fewer people than in densely populated areas
  - Thus, an earthquake in a city can cause more casualties and damage than one in the countryside
- time of occurrence
- Determines where people are and what they are doing
- This will affect people’s chances of survival in an earthquake
- If it occurs when most people are sleeping, there is higher chance of them being trapped in their houses and more deaths may occur

- Level of preparedness
  - Amount of preparation taken by the authorities and citizens can help make the occurrence of earthquakes more manageable
  - E.g. evacuation plans, trained rescue workers, range of action plans

- Distance from the epicentre
  - Damage is more severe when an area is closer to the epicentre

- Type of soil
  - Where sediments are loose and unconsolidated, seismic waves are amplified and structures built can be damaged due to liquefaction
  - When the ground becomes unstable and saturated soil flows like a liquid
  - E.g. Christchurch’s 2011 earthquake saw many buildings and houses being abandoned due to liquefaction

- Secondary effects
  - E.g. undersea could cause tsunami/e.g. coastal flooding (dev);

- Quality of housing/building materials;
- And ‘earthquakes proofing’
- Emergency services;
- Level of economic development/LEDC v MEDC;
- Depth of focus;
- 5 @ 1 mark or development

(b) Study Fig. 4, which provides information about the impacts of a volcanic eruption in Iceland.

---

Iceland’s volcanic eruption benefits tourism (25th April 2010)

Iceland’s latest volcanic eruption is coming to an end and the unexpected tourist boom that lifted this country’s financial fortunes may be ending too.

Last month, the Eyjafjallajokull volcano began erupting again after almost 200 years, threatening floods and earthquakes but drawing thousands of adventurous tourists to the site where ash and red-hot lava was coming from a crater between two glaciers.

Thousands of people have made the trip to the volcano, 120 kilometres east of Reykjavik, since the eruption began on March 20th. Many people have made a small fortune taking them there, by bus, snowmobile, "superjeep" and even helicopter.
Charter airline Iceland Express says its business has risen by 20% since the eruption, and the Icelandic Tourist Board says 26 000 overseas visitors came to the country in March, a record for a quiet month when it is still winter in Iceland.

(source: © ADAPTED: http://news.yahoo.com/9/ap/2010/04/12/ap_en_bi_ge/eu_iceand_volcano_tourism). Fig. 4

(i) Explain how the eruption of the Eyjafjallajökull volcano benefitted the Icelandic tourist industry. [2]

- attracted tourists/there were more tourists;
- work for people or examples of activities which create work;
- money/income into the country/more business/multiplier effect/foreign currency;
- increased awareness of Iceland/its attractions

2 [1 mark]

(ii) In what ways, other than tourism, may people benefit from living close to a volcano? [3]

- Fertile soils/high yields of crops;
- Geothermal power;
- Mining/quarrying of volcanic rocks or appropriate example;
- Health benefits e.g. hot springs/water with minerals etc.

3 [1 mark]

(iii) Explain how volcanic eruptions can cause problems for people. [4]

- death/injuries;
- ash/fumes make it difficult to breathe/breathing problems;
- destruction of property/houses/homes/buildings/cities or towns destroyed;
- high cost of rebuilding;
- need to evacuate;
- loss of crops/loss of livestock/destroys farmland/destruction of food supplies;
- disruption of road/rail communications;
- disruption/cancellation of flights/aircraft cannot fly through ash;
- work place destroyed/people out of work;
- contamination of water supply;
- visibility reduced from lack of sunlight or ash cloud etc.

5 [1 mark or development]

(c) "Volcanic activity occurs at all tectonic plate margins."

Do you consider this statement to be true? Explain your answer. [8]

- Volcanoes can be formed at either divergent or convergent plate margins but not at collision margins between two continental plates or at conservative margins.
- Explanation for this difference will be in terms of the nature of the plates (e.g. density) and whether subduction occurs.
- At divergent margins, upwelling of magma will produce volcanic landforms.
- Where ocean plates meet a continental plate or two ocean plates meet, subduction will occur with melting to produce magma which then may force its way to the surface.
- Where two ocean plates meet, volcanic arcs may be produced.
- Where an ocean and continental plate meet, the basaltic magma will be altered by the more acidic rocks of the continent producing more explosive volcanic landforms.
- But do not expect such detail for good marks.
- NOTE: the role of convection currents is needed

**Level 1 (0 – 3 marks)**
- At this level answers will be generalised or with minimal support if any given at all
- Reasoning rather weak and expression may be unclear
- A basic answer that has little development
- Answers lack examples or other evidence, or it is so sketchy that it adds little support to the answer

**Level 2 (4 – 6 marks)**
- Disagreement supported by appropriate detail
- Good reasoning and logic in parts of the answer with good expression in places
- Some examples or other evidence will be presented to support answers in at least one place in the answer

**Level 3 (7 – 8 marks)**
- Answers will be comprehensive and supported by sound knowledge
- Disagreement considered and well supported
- Reasoning is clear and logical with good expression of language
- Examples and evidence to support answers will be extensive
### Study Fig. 1, a climate graph of a weather station located near the equator.

![Climate Graph](source: K. Brooks, *Physical Geography: Process and System*; Hodder Arnold H&S; 1985; 034035951X)

**Fig. 1**

Describe the climate shown in Fig. 1.

- High average annual temperature (25-28°C)
- Small annual range of temperature (2-3°C)
- High annual precipitation (3480mm)
- Well-distributed precipitation (if every month)
- Reference to statistics/data must be made (no reference, max 2m)

- THIS IS NOT MONSOON

### Fig. 2 shows the concentration of carbon dioxide (CO2) and the average annual surface temperature of the Earth from 1880 to 2005.

![Temperature and CO2 Graph](Key: CO2 concentration, average surface temperature)

**Fig. 2**
(i) **Compare** the trend in carbon dioxide concentration with the trend in the average annual surface temperature of the Earth shown in Fig. 1.

- Both rise over the period
- Although the CO2 does so more smoothly from 290 parts per million to 370 ppm
- Surface temps rise more erratically from 13.8 to c. 14.5
- Both show a greater rate of increase after 1980
- Need to use figures and compare trends
- If two separate accounts — max 2 marks.

(ii) **Describe the causes of the increase of carbon dioxide in the atmosphere** and explain how this increase could bring about changes in the surface temperature of the Earth.

Describe causes (max 2 marks):
- Increase in deforestation
- Burning of fossil fuels
- Natural occurrence, e.g. volcanic eruptions

Explain resultant changes in surface temperature/global warming
- Couched in terms of the enhanced greenhouse effect.
- Greenhouse gases, of which CO2 is one, allow SWR (Short wave radiation) / visible light / solar radiation through
- GHG are good absorbers of LWIR (Long Wave radiation) / outgoing terrestrial radiation; heat is thus trapped and the atmosphere is warmed
- This is a normal process, but increases in GHG, resulting from human activities — the enhanced greenhouse effect — will lead to a progressive warming of the earth’s atmosphere and particularly the lower layers.
- Human activity causes GHG, e.g. CO2, to be released at a far greater rate than that of natural emissions of GHG

(c) **With reference to relevant examples, describe and explain how temperatures are influenced by distance from the sea.**

- The sea heating and cooling more slowly than land influences the temperatures of inland and coastal areas.

**Maritime effect**
- Effect that large ocean bodies have on the climate of coastal areas
- *Summer*: air over sea is cooler than air over land as land heats up faster than sea; cooler air over sea helps lower the temperature of coastal areas, making it cooler than inland areas
- *Winter*: air over sea remains warmer than air over land as sea cools slower; warmer air over sea helps increase the temperature of coastal areas, making it warmer than inland areas
- **Effect**: coastal areas experience cooler summers and warmer winters; i.e. smaller annual temperature range, than inland areas

**Continental effect**
- Effect that continental surfaces have on the climate of inland areas
- Inland areas are further from the sea and the temperatures of these areas are not influenced by the sea
- **Effect:** inland areas experience warmer summers and colder winters; i.e. larger annual temperature range, than coastal areas

e.g. Anchorage and Fairbanks (1 km vs 420 km, ATR 20°C vs 40°C)
- Answers may include a well annotated diagram.

---

(d) **With reference to studies you have made, discuss the relative importance of short-term and long-term responses to a natural hazard or disaster.**

**Level 1 (0 – 3 marks)**
- responses are likely to be descriptive accounts of some short-term and long-term responses
- Answer lacks development
- Answer lacks examples, lacks supporting evidence

**Level 2 (4 – 6 marks)**
- either a more detailed explanation of the importance of short-term and long-term responses for a named disaster, or some explicit discussion of their relative importance
- examples presented to support answer, either for short-term or long-term response

**Level 3 (7 – 8 marks)**
- expect both: more detailed explanation of the importance of short-term and long-term responses for a named disaster, and explicit discussion of their relative importance
- examples presented to support answer will be extensive

**Short-term responses**
- take place over a few hours, days and weeks
- might involve: search and rescue, provision of essential medical care; provision of emergency food and water supplies; handling status of affected area (combating the threat of disease); setting up emergency shelters; establishing communications to the outside world; calling for humanitarian aid (alerting relief agencies).

<table>
<thead>
<tr>
<th>Short-term response</th>
<th>Implementation</th>
<th>Successes</th>
<th>Limitations</th>
</tr>
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</table>
| Search and rescue casualties | People trapped under collapsed buildings are quickly located and freed | • Survivors found after being trapped for a couple of weeks without food  
• E.g. 2011, Tohoku (Japan); sniffer dogs and heat sensors deployed and many trapped were rescued | • Limited time of 72 hours to find and rescue trapped survivors as they are unlikely to survive beyond that without food and water |
<p>| Provide medical aid, food and water | Provide treatment, clean drinking | • Immediate aid provided helps survivors | • Medical supplies, food and water may not be |</p>
<table>
<thead>
<tr>
<th>Handling status of affected area</th>
<th>Set up emergency shelters</th>
<th>calling for humanitarian aid</th>
</tr>
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<tr>
<td>• Declare affected areas as 'emergency zones'</td>
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<tr>
<td>• Specialised authority assigned to provide immediate aid to people, restore emergency services</td>
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<tr>
<td>• Basic humanitarian needs taken care of, e.g., food, water, shelter</td>
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<tr>
<td>• E.g. 2002, Afyon (Turkey), Crisis Management Centre led by Ministry of Interior mobilised and coordinated relief within first few hours after the earthquake</td>
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<tr>
<td>• Some countries not experienced</td>
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<tr>
<td>• E.g. 2010, Haiti's first major earthquake since 1860; emergency relief lacked coordination and proper supervision; difficult to provide aid</td>
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<tr>
<td>• Set up tents</td>
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<tr>
<td>• Provide shelter for the homeless</td>
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<tr>
<td>• Temporary shelters provide survivors a place to carry on with their lives</td>
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<tr>
<td>• E.g. 2001, Afyon (Turkey) where tents housed homeless; helped to re-establish sense of community amongst survivors</td>
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<tr>
<td>• Living conditions may be poor; lead to people dying</td>
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<tr>
<td>• E.g. Haiti: outbreak of cholera killed almost 4000 people in the tent cities</td>
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<tr>
<td>• Local and foreign governments offer money, medical or food aid</td>
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<tr>
<td>• Financial support to rebuild devastated areas</td>
<td></td>
<td></td>
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<tr>
<td>• Can help rebuild affected area</td>
<td></td>
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<td>• E.g. 2010 Haiti: governments donated US$2.5b and pledged US$1.3b</td>
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<td>• NGOS, e.g. World Vision and the International Red Cross also moved into affected areas to help</td>
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<tr>
<td>• Aid may be late or not delivered; trucks may be looted</td>
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<td>• E.g. 2011 Turkey; trucks were looted before they reached the affected areas</td>
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- Prevent spread of diseases and dehydration
- Helps survivors cope with the disaster
- E.g. 2002, Afyon (Turkey); Turkish Red Crescent Society delivered 20,000 tents, 50,000 blankets, 3,000 heaters

- Water to survivors
- E.g. 2010, Haiti: loot and fighting broke out as people fought for food and supplies
Long-term responses
- go on for months and years after a disaster; involve rebuilding of affected areas
- might include: rebuild and improve infrastructure (e.g. long-term shelter, rebuilding destroyed houses, schools, hospitals etc); provision of healthcare; re-establishing the local economy; undertaking protective measures and educating the local community in case of a future disaster; establishing monitoring stations to warn/help predict of a future hazard; improve health options (e.g. counselling)

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<tr>
<td>Rebuilding and Improve infrastructure</td>
<td>• Rebuild and improve on infrastructure and amenities after disaster&lt;br&gt;• Stricter building codes ensures higher safety levels</td>
<td>• Authorities develop stricter building codes to ensure infrastructure restored at higher safety levels&lt;br&gt;• E.g. after 1995 Kobe earthquake, Japan spent billions developing technology to build more earthquake-resistant buildings</td>
<td>• Reinforced buildings do not protect against tsunamis; additional protection, e.g. breakwaters needed&lt;br&gt;• E.g. 2010, Chile was struck by tsunami despite having many earthquake-resistant buildings</td>
</tr>
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<td>Provision of healthcare / Improve health options</td>
<td>• Health options, e.g. long-term counselling as loss of loved ones, homes, jobs can cause long-lasting trauma&lt;br&gt;• To help injured victims or psychologically disturbed victims restore their livelihoods</td>
<td>• Identify and address problems early&lt;br&gt;• E.g. 2011, Christchurch (NZ): problems of anxiety and depression were identified and health workers were deployed</td>
<td>• Challenging to improve health conditions, e.g. Restore resilience</td>
</tr>
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<td>Compensate people who lose land and property</td>
<td>• Through insurance / direct payments to people who lost land and property</td>
<td>• Compensation helps people find alternative places to settle down&lt;br&gt;• E.g. Japanese insurance plans authorised by</td>
<td>• Compensation is often insufficient and may not cover cost of damage</td>
</tr>
<tr>
<td>Ensure affected areas recover</td>
<td>Steps taken to ensure recovery of economy</td>
<td>Government to compensate people who lose their land and property</td>
<td>Recovery of economy may take long time as huge sums of money needed to rebuild infrastructure and economy</td>
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<tr>
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<tr>
<td></td>
<td>• Steps taken to ensure recovery of economy</td>
<td>• Government stimulates economy through various measures</td>
<td>• E.g. 2011, Christchurch (NZ): direct cash payments made to individuals to allow them to buy necessities; this provides income to traders</td>
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<td></td>
<td>• E.g. repair and buildings programmes for homes and infrastructure provides employment and income for workers and traders</td>
<td>• E.g. 2008, Sichuan (China): 3 years to rebuild; US$123b to reconstruct schools, hospitals, homes</td>
</tr>
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Possible conclusion:
- short-term responses may be more important, to reduce the immediate threats to loss of life and re-establishing the local economy
- whereas long-term responses are important in a different way (long-term development) and more problematic, involving continued aid, restructuring and investment into the area, which may not be forthcoming, especially in poorer countries.
- may also discuss the importance of making adaptation integral to the long-term strategy in order to build resilience.
Section B

Answer one question from this section.

3. (a) Fig. 5 is a map showing the life expectancy at birth for countries other than those in the Americas.

![Life Expectancy Map]


Fig. 5

(i) Describe the pattern of life expectancy shown on Fig. 5. [4]

- low (50–59 years) life expectancy in much of Africa
- lowest (<50 years) in central Africa
- highest life expectancy (80–86 years) in Western Europe / Japan / Australasia
- high (70–79 years) in Southeast Asia/North Africa/E. Europe
- moderate (60-69 areas) Russia/Central Asia/India/South Asia.

Allow other valid points (e.g. anomalies)

Reference to data is required for max 4m
No reference, max 3 m

(ii) Define the term 'life expectancy' and explain why it can be used as an indicator of health of a country. [3]

- Average number of years from the time of birth that a person can expect to live
- High life expectancy is often found in DCs while low life expectancy is often found in LDCs
- High life expectancy in DC may be attributed to adequate nutritious food, proper hygiene and sanitation / low life expectancy in LDC may be attributed to lack of nutritious food, proper hygiene and sanitation
(b) Outline what is meant by the term 'degenerative diseases' and briefly describe the global distribution of 'degenerative diseases'.

- Diseases where affected tissues or organs deteriorate over time
- Because of lifestyle choices, eating habit, bodily wear and tear, or genetic causes
- Primarily in developed countries
- But also in some socio-economic groups within less developed countries

(c) Study Fig. 6, which shows information about GNP per capita and access to clean water in ten LEDCs (Less Economically Developed Countries).

![Graph showing GNP per capita vs population with access to clean water](image)

(i) Describe the general relationship between GNP per capita and the percentage of the population with access to clean water. Use statistics in your answer.

- Countries with higher GNP per capita have a higher percentage with access to clean water/positive relation;
- Comparative statistics for two countries to illustrate relationship.

(ii) Explain why providing a reliable supply of clean water may increase life expectancy.

- Reduction of water-borne disease/diarrhoea; such as typhoid/cholera, etc.;
- Less dehydration/water is needed for life/without water people die;
- Water required for cooking of food; so less malnutrition;
- Less need to carry water for large distances;
- Less time wasted so people can grow more crops;
- Better sanitation/hygiene;
- Irrigation of crops/water for livestock, etc.
<table>
<thead>
<tr>
<th>(d)</th>
<th>'Climate change is the most important cause of global food shortage.' How far would you agree? Support your answer with relevant examples.</th>
</tr>
</thead>
</table>
|     | **Introduction**  
|     | - short description of the current situation of the food shortage.  
|     | - agree or disagree with the statement  
|     | **Physical factors**  
|     | **Climate change**  
|     | - Projected that when global temp increase, some countries or regions in the world may see their current production decrease by as much as 50% - e.g. Brazil, India, Pakistan, Turkey and parts of the USA  
|     | - Shrinking of glaciers could reduce food supply over the coming decades  
|     | - Seasonal melting of glaciers provide water for irrigation during the dry season  
|     | - If glaciers shrink and recede, there will be a loss of water during the dry season -> smaller harvests  
|     | **Extreme weather events**  
|     | - Refer to weather events which may cause the loss of lives or damage to property  
|     | - Droughts, cold waves, heat waves, tropical cyclones  
|     | - Can cause crop damage or make it difficult to grow crops  
|     | **Pests**  
|     | - Major contributor to food shortage  
|     | - Wild rabbits, moles, insects  
|     | - E.g. in Liberia in NW Africa – tens of millions of caterpillars devoured all plants and food crops  
|     | **Economic factors**  
|     | **Demand from emerging economies**  
|     | - Some developing economies grow at very high rates, in particular, Brazil, Russia, India and China (BRIC)  
|     | - High increase in food demand from the rapidly growing urban middle class – depleting food inventories, esp. grain  
|     | **Soaring cost of fertilisers and transport**  
|     | - Directly affect cost of food  
|     | - Price of fertilisers increase -> cost of producing food increases  
|     | - Energy costs- partly responsible for price increase in fertilisers and transport  
|     | - Modern agr uses petroleum products to fuel farm machinery and transport farm produce  
|     | - E.g. world crude oil prices increased by 10.3% -> major wheat producer Kazakhstan had to increase the price of wheat exported to neighbouring countries such as Tajikistan  
|     | - Generally transferred to the consumer – for the poor any increase in price is very hefty  
|     | **Conversion of farmland to industrial crop production**  
|     | - Growing crops for industrial use more profitable than growing food crops - more farmers growing biofuels |
- Biofuels – fuels that derive energy from biological carbons instead of fossil fuels. E.g. corn, sugar cane, palm oil
- E.g. 25% of all food crops grown in USA became fuel for vehicles instead of food for people – enough to feed 330 mil people in one year

Food policy
- Governments may stockpile food staples to ensure sufficient food supplies during times of emergency.
- Eg. Algeria bought 800 000 tonnes of wheat in 2011 to add to its stockpile. However, this has caused several other LDCs to react and do the same. That same week, Saudi Arabia announced plans to double its stockpile and Indonesia agreed to purchase four times the usual amount. This reduced the supply of food samples worldwide and caused global prices to rise, which worsened the problem of food shortage in some LDCs.

Possible conclusion
- which factors affect food supply more?
- Compare the relative importance of the two types of factors
- Possible criteria:
  • extent of their impact on global food supply
  • e.g. in some areas such as East Africa, drought is a major cause, but food shortage worsened by economic factors such as conversion of farmland to industrial crop production
  • how the countries have managed to overcome some of these factors such as physical factors like pests by developing pest-resistant food crops. However, they are still plagued by economic factors such as soaring cost of fertilisers and transport which can be beyond their control.

Level 1 (0 – 3 marks)
- At this level answers will be generalised or with minimal support if any given at all – there will be general statements on climate change and/or food supply
- Reasoning rather weak and expression may be unclear
- A basic answer that has little development
- Answers lack examples or other evidence, or it is so sketchy that it adds little support to the answer

Level 2 (4 -6 marks)
- Disagreement or agreement will be supported by appropriate detail
- Or, both agreement and disagreement are considered, but support is patchy so that the answer is not full (i.e. includes other physical and economic factor(s))
- Good reasoning and logic in parts of the answer with good expression in places
- Some examples (1 to 2 examples) or other evidence will be presented to support answers in at least one place in the answer

Level 3 (7 – 8 marks)
- Answers will be comprehensive and supported by sound knowledge
- Both agreement and disagreement are considered and well supported
- Reasoning is clear and logical with good expression of language
- Examples (2 to 3) or other evidence to support answers will be extensive
4. (a) Study Fig. 7, which shows the number of people who are undernourished in Sub-Saharan Africa and in South and East Asia.

![Bar chart](chart.png)

*People are undernourished when their food intake provides less than their minimum energy requirements.

**Fig. 7**

(i) Compare the trends in Sub-Saharan Africa and South and East Asia between 1971 and 2010. Support your answer with dates and statistics from Fig. 7.

- Reduction of numbers in Asia but increase in Africa; c. 96 - 100 million to 250 million in Africa;
- c. 640 - 645 million to c. 310 - 315 million in Asia

NB: Reserve 1 mark for overall pattern/trend.

- Any pair from Africa and Asia can be accepted for 2 marks.

- 3 @ 1 mark
(ii) Explain how food shortages can be caused by the natural environment.

- **Drought**: crops won't grow;
- **Floodings**: crops washed away; a lot of rain drowns crops/washes them away;
- **Hurricanes/cyclones/typhoons**: destroy food;
- **Infertile soils**: no nutrients for crops to grow; soil erosion by wind;
- **Nutrients**: leaching of nutrients;
- **Pests or examples i.e. Locusts**;
- **etc.**

- 4 @ 1 mark

(iii) With reference to examples, describe the effects of food shortages on the health of the people living in Less Developed Countries.

**Health:**
- **Malnutrition:**
  - Condition in which body does not get sufficient/balanced amount of nutrients needed to maintain healthy tissue and organ functions
  - Results in death or long-term problems in individuals
  - Condition in which body does not get sufficient/balanced amount of nutrients needed to maintain healthy tissue and organ functions
  - Results in death or long-term problems in individuals
  - It is the underlying cause of child deaths associated with diarrhoea, pneumonia, malaria and measles
  - Cause of 52.5% of all deaths in young children (less than 5 years of age), about 5 million in LDCs
  - 148 million underweight children (78 m in South Asia, 36 m in Sub-Saharan Africa)
  - Heavily affected
  - Affects about 16% of people
  - Most heavily affected is Sub-Saharan Africa (e.g. 75% of people in Democratic Republic of Congo)

- **Ill-health**
  - Inadequate food consumption results in ill-health
  - Specific symptoms and consequences may arise from the lack of certain nutrients
  - E.g. Vitamin A - Visual impairment and blindness, Diarrhoeal diseases and measles; Vitamin C and D - Osteoporosis

- **Starvation**
  - Extreme hunger from a severe lack of food
  - Extreme form of malnutrition
  - Body becomes skeletal thin, organs become permanently damaged, death may result
  - Starvation is much more common in LDCs due to:
    - Greater number of people living in poverty
    - Lack or absence of resources to counter effects of natural disasters
    - Unstable political situation, e.g. rebellions, wars
    - FAO estimates 98% of people facing starvation are in LDCs
Fig. 8 is a graph showing changes in global food production and global yields of food crops from 1980 to 2010.

![Graph showing changes in global food production and global yields of food crops from 1980 to 2010.](source)

*Fig. 8*

(i) With reference to Fig. 8, briefly describe the change in food production in India from 1980 to 2010. [3]

1m: for recognition of increase,
1m: for recognition of step/steps and
1m: for some correct quantification. For example: 250-300m tonnes in 1980 and 500-750m tonnes in 2010

(ii) Explain one way in which the yield of some food crops can be increased. [3]

*Note: yield is not the same as output/production.*

Reasons for increases in yield include: increased use of fertilizers; pesticides; irrigation; adoption of high-yielding varieties.

*Accept other valid suggestions.*

*Award [1]* for identification of valid factor; [1] for its development, and [1] for a clear link to yield rather than just output.

For example:

- Yield may increase if more farmers apply more or better fertilizers [1] to their crops. This provides plants with extra nutrients [1] and means that they produce more crops off the same area of land [1].
Yields (amount produced off a given area of land) [1] may increase if farmers use pesticides more effectively [1] because pests that normally reduce the yield of that crop are reduced or eliminated [1].

(c) 'Technology will solve the problem of food shortage.' How far would you agree? Support your answer with relevant examples. [8]

**Technology as a strategy:**

**Storage (Storing food more effectively)**
- the use of refrigerated warehouse storage or refrigerated delivery trucks to keep food fresh for a longer period of time
- Crops can be distributed to places further away
- In LDCs, farmers make use of simple but effective technologies, e.g. silos (airtight structure for storing crops)

**Farming Technology (Improving farm productivity)**
- The use of HYVs, irrigation technology, chemical fertilisers and pesticides, and machinery to increase crop yields, e.g. Green Revolution
- Food can be grown in places previously unsuitable for agriculture
- Farmers have increased crop yield
- Reduced dependence on labour due to more efficient farming

- Green Revolution – resulted in the rapid increase in the productivity of agriculture through the use of science and technology.
- characterised by high-yielding varieties, fertilisers and pesticides, improved irrigation and mechanisation.
  - **High-yielding varieties (HYVs):** improved strains of crops such as rice, wheat and other cereals that have an increased growth rate; developed through cross-breeding of selected varieties, they have increased resistance to pests and diseases or the ability to grow within a shorter growing season; these varieties require more water and nutrients to sustain their growth; can grow within a shorter growing season so that there can be more harvests in a year; ‘Wonder Rice’ has a growing season of 100 days as compared to the growth duration of 120 days for the non-HYVs; this rice enabled farmers to produce twice as much grain as traditional varieties; this increase in food productivity meant that there will be more food available to feed the rising population and help to alleviate world hunger and malnutrition.
  - **Irrigation:** possible for water to be made available to places which were once too dry for farming, increasing the amount of arable land worldwide; e.g. Great Man-made River in the North African country of Libya has made it possible to grow crops in the Sahara Desert (it is a network of underground pipes, canals, wells, reservoirs and tunnels that draws water from underground aquifers deep in the Sahara Desert). Irrigation methods such as flood irrigation enable water to be delivered to a whole surface, such as rice fields, thus, improvement in irrigation may help to increase the total amount of food produced in the world since more land is now made suitable for the growing of crops, reducing shortage of food.
Biotechnology (Modifying the characteristics of food crops)
- The science of modifying living organisms such as plants and animals
- When used in the production of food, it is known as genetic modification
- GM crops have a higher yield than non-GM crops. This helps farmers earn a higher income and helps countries to be more self-sufficient in food production.
- Food can be grown in places previously unsuitable for agriculture.

Why do shortages still occur?
- Physical (Extreme weather events, climate change and pests)
- Political (Civil unrest and poor governance)
- Economic (Demand from emerging economies, the soaring cost of fertilisers and transport, and the conversion of farmland to produce biofuel crops)
- Social (Lack of accessibility, inadequate logistics of food distribution and storage, and rapid population growth)

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- Generally transferred to the consumer – for the poor any increase in price is very hefty

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Food policy
- Governments may stockpile food staples to ensure sufficient food supplies during times of emergency.
- Eg. Algeria bought 800 000 tonnes of wheat in 2011 to add to it stockpile. However this has caused several other LDCs to react and do the same. That same week, Saudi Arabia announced plans to double its stockpile and Indonesia agreed to purchase four times the usual amount. This reduced the supply of food samples worldwide and caused global prices to rise, which worsened the problem of food shortage in some LDCs.
- Social (Lack of accessibility, inadequate logistics of food distribution and storage, and rapid population growth)

Other Strategies to overcome food shortage:
- Agricultural: Make farming more sustainable, Increase the efficiency of harvest methods, Maximise the use of farmland on a global scale
- Social: Support local farmers, Control population growth
- Political: Not everyone has equal access to food due to unequal food distribution. Better governance at national and international levels is required

Possible conclusion
- There is much potential for technology to address the problem of food shortage – through increasing the rate of food production through biotechnology and improved farming methods. Food also has longer shelf life through advancement in storage facilities, increasing the amount of food for consumption. However, technology has limitations in solving the problem of food shortage.
- First, world population keeps on growing, especially in the LDCs. The rate of food production may not be able to keep up with the rate of population growth.
- Second, although food production has increased, not everyone has equal access to food due to inequality in SES, and poorer segments of society will have less purchasing power to buy sufficient and nutritious food.
- Third, while technology helps increase food production, damage has been done to the environment, esp in land and water resources. This will make it difficult to maintain the current rate of food production in the long run if land and water resources continue to deteriorate.
Thus, despite the use of technology to increase food supply, other strategies are needed, e.g. lower birth rates, better management of land and water resources and sustainable farming techniques.

Level 1 (0 – 3 marks)
- At this level answers will be generalised or with minimal support if any given at all
- Reasoning rather weak and expression may be unclear
- A basic answer that has little development
- Answers lack examples or other evidence, or it is so sketchy that it adds little support to the answer

Level 2 (4 – 6 marks)
- Disagreement or agreement (technology will solve / will not solve) will be supported by appropriate detail
- Or, both agreement and disagreement (other considerations) are considered, but support is patchy so that the answer is not full
- Good reasoning and logic in parts of the answer with good expression in places
- Some examples or other evidence will be presented to support answers in at least one place in the answer

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- Answers will be comprehensive and supported by sound knowledge
- Both agreement and disagreement are considered and well supported
- Reasoning is clear and logical with good expression of language
- Examples or other evidence to support answers will be extensive
GEOGRAPHY

Paper 1

Additional Materials: Answer Paper
Insert

2236/01

29 August 2018
1 hour 40 minutes

READ THESE INSTRUCTIONS FIRST

Write your name, class and register number in the spaces provided on the work you hand in.
Write in dark blue or black ink on both sides of the paper.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue, correction fluid or correction tape.

Section A
Answer all parts of Question 1.

Section B
Answer one question.

Write all answers on the Answer Paper provided.
Candidates should support their answers with the use of relevant examples.
Sketch maps and diagrams should be drawn whenever they serve to illustrate an answer.
Insert contains Photograph A and Fig. 1 for Question 1, Photographs B, C and D for Question 2, and Photographs E, F and Fig. 3 for Question 3.

At the end of the examination, fasten your work for each section together.
Submit your work for Section A and Section B separately.
The number of marks is given in brackets [ ] at the end of each question or part question.
Section A

This question is compulsory.

1 A group of students carried out a fieldwork investigation on a length of coastline. Photograph A (Insert) shows the area of the coast where the students conducted their investigation. Fig. 1 (Insert) shows the aerial view of the same stretch of coast with the students' position marked 'X'.

(a) The students wanted to find out how wind conditions can influence the distance travelled by the coastal sediments along the coast during the process of longshore drift. They decided to work in small groups and carried out the investigation over a span of five days during their school holiday. Each group was responsible for collecting the data for each day at X.

The results from their investigation are shown in Table 1.

<table>
<thead>
<tr>
<th>Day</th>
<th>Time</th>
<th>Prevailing wind direction</th>
<th>Sustained wind speed (km/h)</th>
<th>Distance travelled by orange within 10 minutes (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>10:00</td>
<td>SW</td>
<td>38.4</td>
<td>7.0</td>
</tr>
<tr>
<td>2</td>
<td>09:50</td>
<td>SW</td>
<td>40.5</td>
<td>9.5</td>
</tr>
<tr>
<td>3</td>
<td>18:00</td>
<td>S</td>
<td>39.6</td>
<td>1.4</td>
</tr>
<tr>
<td>4</td>
<td>10:40</td>
<td>SW</td>
<td>41.4</td>
<td>9.7</td>
</tr>
<tr>
<td>5</td>
<td>16:30</td>
<td>S</td>
<td>35.6</td>
<td>0.6</td>
</tr>
</tbody>
</table>

Table 1

(i) Outline how the students collected the data shown in Table 1.  

(ii) To what extent does the data shown in Table 1 support the hypothesis 'The faster the wind speed, the greater the distance travelled by the sediments along the coast.'?

(iii) The teacher commented that there are flaws in their investigation which will compromise the validity of their conclusion.

Identify the flaws in their investigation and explain why the validity of the students' conclusion may be compromised.

(b) On the last day of their fieldwork, the students decided to extend their investigation to find out the opinions of the locals from the nearby town about the environmental impact of tourism development.

They devised a bi-polar survey, shown on Fig. 2, which asked locals to give each statement a score ranging from -3 to +3. They obtained 100 completed surveys, and the results of which are shown on Fig. 2.
### Results of bi-polar survey

<table>
<thead>
<tr>
<th>Negative aspects</th>
<th>-3</th>
<th>-2</th>
<th>-1</th>
<th>0</th>
<th>+1</th>
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<th>+3</th>
<th>Positive aspects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Much litter</td>
<td>8</td>
<td>13</td>
<td>36</td>
<td>20</td>
<td>14</td>
<td>8</td>
<td>1</td>
<td>Little litter</td>
</tr>
<tr>
<td>High level of noise</td>
<td>30</td>
<td>25</td>
<td>16</td>
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<td>10</td>
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<td>0</td>
<td>0</td>
<td>Low traffic count</td>
</tr>
<tr>
<td>Unpleasant surroundings</td>
<td>0</td>
<td>1</td>
<td>3</td>
<td>15</td>
<td>26</td>
<td>27</td>
<td>28</td>
<td>Pleasant surroundings</td>
</tr>
<tr>
<td>Poorly maintained infrastructures</td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>5</td>
<td>14</td>
<td>32</td>
<td>44</td>
<td>Well-maintained infrastructures</td>
</tr>
</tbody>
</table>

**Fig. 2**

(i) What is the main positive environmental impact of tourism? [1]

(ii) The students concluded that tourism development has a negative impact on the local environment. Comment on the validity of their conclusion. [4]

(iii) Suggest the advantages and disadvantages of using bi-polar surveys. [3]

(c) Explain how the students would collect and present data to answer the guiding question ‘How does the age group of tourists affect the type of accommodation they stay in?’ [6]
Section B

Answer one question from this section.

2  (a) Study Photographs B and C (Insert), which show part of a coastline during low and high tide respectively.
   
   (i) Describe the features of the coastal environment shown in Photograph B. [3]
   
   (ii) Use Photographs B and C to help you suggest how wave action and tide conditions at the coastline can account for the formation of the coastal landforms shown. [4]

   (b) Study Photograph D (Insert), which shows an aerial view of a coastline.

   Identify the coastal features X and Y, and compare the coastal processes occurring at both features on Photograph D. [5]

   (c) Using example(s), explain how governments can manage coastal areas in a sustainable manner. [5]

   (d) 'Human activities will only bring about irreversible impact to the global coral reef ecosystem.'

   To what extent do you agree with this statement? Use examples to support your answer. [8]
3 (a) Study Photographs E and F (Insert). Photograph E shows a coastal feature during low tide and Photograph F is an aerial view of the same feature during high tide. Point X shows the location where Photograph E was taken.

(i) Describe the features of the coastal environment shown in Photographs E and F. [3]

(ii) Use Photographs E and F to suggest how the wind and wave conditions can account for the formation of the coastal landform shown. [4]

(b) Study Fig. 3 (Insert), which shows information about China's tourist arrival rates to Nepal. Account for the number of China's tourist arrival to Nepal from 2007 to 2016 as shown in Fig. 3. [5]

(c) Using example(s), explain how governments can minimise leakages from tourist revenues to facilitate sustainable tourism. [5]

(d) 'Tourism will only bring about irreversible impact to the environment.'

To what extent do you agree with this statement? Use examples to support your answer. [8]

---End of paper---
READ THESE INSTRUCTIONS FIRST

This Insert contains Photograph A and Fig. 1 for Question 1, Photographs B, C and D for Question 2, and Photographs E, F and Fig. 3 for Question 3.
Photograph A for Question 1

Site of fieldwork investigation

Fig. 1 for Question 1
Photograph B for Question 2

Coastline during low tide

Photograph C for Question 2

Coastline during high tide
Photograph D for Question 2

Aerial view of a coastline
Photograph E for Question 3
Coastal feature during low tide

Photograph F for Question 3
Fig. 3 for Question 3

China tourist arrival to Nepal

Number of Chinese tourists to Nepal

Proportion of Chinese tourists among all international tourists to Nepal (%)


A magnitude-7.8 earthquake hit Nepal in April 2015.
GEOGRAPHY

2236/02

Paper 2

24 August 2018

1 hour 30 minutes

Additional Materials: Answer Paper

Insert

READ THESE INSTRUCTIONS FIRST

Write your name, class and register number in the spaces provided on the work you hand in.
Write in dark blue or black ink on both sides of the paper.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue, correction fluid or correction tape.

Section A
Answer one question.

Section B
Answer one question.

Write all answers on the Answer Paper provided.
Candidates should support their answers with the use of relevant examples.
Sketch maps and diagrams should be drawn whenever they serve to illustrate an answer.
The Insert contains Fig. 3 for Question 1, Figs. 4 and 5 for Question 2, and Fig. 10 for Question 4.

At the end of the examination, submit answers for Sections A and B separately and fasten each part securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.
Answer one question from this section.

1 (a) Study Fig. 1, which shows tectonic hazards in the Bay of Naples, Italy. Fig. 2 shows eight measures that are implemented to protect the people who are living around the Bay of Naples from tectonic hazards.

Fig. 1

Use the information in Fig. 1 to justify the importance of the measures implemented in Fig. 2.
1 (b) Use examples to explain why climate change is a cause of concern. [5]

(c) Study Fig. 3 (Insert), which shows the location of Anchorage and Mount McKinley. Mount McKinley has the highest mountain peak in North America.

(i) With reference to Fig. 3, compare the temperature characteristics between Anchorage and Mount McKinley. [3]

(ii) With reference to Fig. 3, suggest how physical factors can bring about the temperature characteristics mentioned in (c) (i). [4]

(d) 'Climate-related hazards bring about more damages to coastal areas than tectonic hazards.'

To what extent do you agree to the statement? Use examples to support your answer. [8]
2 (a) Study Figs. 4 and 5 (Insert), which show how tsunami waves approach coastlines without and with an offshore breakwater respectively.

Use the information in Figs. 4 and 5 to discuss the effectiveness of offshore breakwater in protecting coastal properties and inhabitants from tsunamis. [5]

(b) Use examples to explain why people continue to live near volcanoes. [5]

(c) Study Fig. 6, which shows information about the eruptions of Mount Etna, an active volcano in Sicily, Italy.

![Eruptions of Mount Etna](image)

Fig. 6

(i) With reference to Fig. 6, compare the lava flows of 1923 and 1983. [3]

(ii) Explain the possible environmental impacts from the eruptions of Mount Etna. [4]

(d) 'Immediate rescue efforts are more important than preparedness measures in reducing casualties caused by earthquakes.'

To what extent do you agree to the statement? Use examples to support your answer. [8]
Section B

Answer one question from this section.

3 (a) Study Fig. 7, which shows a map of the urban settlement of Dhaka, Bangladesh.

(i) Use Fig. 7 to describe the locations where water standpipes are built. [3]

(ii) Suggest how the living environment in Fig. 7 can have impacts on the health of the people. [4]

(b) Discuss the effectiveness of developing countries in managing the spread of endemic diseases such as malaria. [5]
The Sahel region of Africa experiences semi-arid conditions marked by high temperatures and very little rainfall throughout the year. Countries in this region often experience widespread famine.

Study Fig. 8, which shows countries in the Sahel region of Africa and the contributing factor(s) that led to the widespread famine.

![Map showing the Sahel region and countries affected by drought and war](image)

**Fig. 8**

Explain how physical and human factors can impact food security in the semi-arid zones shown in Fig. 8. [5]

(d) 'Government intervention is the most effective strategy to overcome the problem of food shortages.'

How far do you agree with this statement? Use examples to support your answer. [8]
(a) Type-2 diabetes occurs when the body produces insufficient amounts of insulin. Study Fig. 9, which shows the estimated number of people diagnosed with Type-2 diabetes in 2000 and that projected in 2030.

![Graph showing estimated number of people with diabetes by age group and economic development.]

Fig. 9

(i) With reference to Fig. 9, describe how the number of people diagnosed with Type-2 diabetes vary with age group and level of economic development. [3]

(ii) Explain why governments of developing countries should be concerned about the growing number of diabetes cases. [4]

(b) Discuss how technological advancements have influenced the pace at which infectious diseases are transmitted. [5]

(c) Study Fig. 10 (Insert), which shows the global urbanisation rates from 1900 to 2050 (projected) and the photograph of a typical urban area.

Use Fig. 10 to suggest how the change in global urbanisation rates can have impacts on the health of urban dwellers. [5]

(d) 'Social stigma is the main factor that prevents HIV/AIDS from being contained in developed countries.'

How far do you agree with this statement? Use examples to support your answer. [8]

---End of paper---
GEOGRAPHY

Paper 2

INSERT

2236/02
24 August 2018
1 hour 30 minutes

READ THESE INSTRUCTIONS FIRST

The Insert contains Fig. 3 for Question 1, Figs. 4 and 5 for Question 2, and Fig. 10 for Question 4.
Fig. 3 for Question 1

Locations of Anchorage and Mt. McKinley
Fig. 4 for Question 2
Tsunami wave heights at a coast without breakwater

Fig. 5 for Question 2
Tsunami wave heights at a coast with breakwater
Fig. 10 for Question 4

Global Urbanisation Rates

- 1900: 10%
- 2000: 50%
- 2050: 75%

Photograph of a typical urban area
Section A

This question is compulsory.

1 A group of students carried out a fieldwork investigation on a length of coastline. Photograph A (Insert) shows the area of the coast where the students conducted their investigation. Fig. 1 (Insert) shows the aerial view of the same stretch of coast with the students' position marked 'X'.

(a) The students wanted to find out how wind conditions can influence the distance travelled by the coastal sediments along the coast during the process of longshore drift. They decided to work in small groups and carried out the investigation over a span of five days during their school holiday. Each group was responsible for collecting the data for each day at X.

The results from their investigation are shown in Table 1.

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<td>16:30</td>
<td>S</td>
<td>35.6</td>
<td>0.6</td>
</tr>
</tbody>
</table>

Table 1

(i) Outline how the students collected the data shown in Table 1. [4]

- The students recorded the time of data collection every day.
- The students used a wind vane to record the direction where the wind is blowing from.
- The students also used an anemometer to measure the wind speed.
- Using a ranging pole, the students mark out the start point where they will throw the orange into the swash zone.

(ii) To what extent does the data shown in Table 1 support the hypothesis 'The faster the wind speed, the greater the distance travelled by the sediments along the coast.'? [3]
The hypothesis is accepted to a large extent as the distance travelled by the orange is the longest when the sustained wind speed is highest.

- This is observed on days 2 and 4 where the orange was transported for the longest distance of 9.5m and 9.7m along the coast within 10 minutes when the sustained wind speed is highest at more than 40km/h.

- There is an anomaly where the orange is transported for a short distance of only 1.4m when the sustained wind speed is relatively high at 39.6km/h.

(iii) The teacher commented that there are flaws in their investigation which will compromise the validity of their conclusion.

Identify the flaws in their investigation and explain why the validity of the students' conclusion may be compromised. [4]

- The students carried out their investigation at different timings every day. [1m] This may affect the reliability of data collected as the wind and wave conditions at the data collection site may vary according to the time of the day. [1m]

- The students took into account the distance travelled by the orange when the prevailing winds and waves are approaching the coast from the South, parallel to the coastline. [1m] As the transportation of the sediments through longshore drift is most significant when the waves approach the coast at an oblique angle, the distance travelled by the orange will vary significantly when the prevailing winds and waves approach the coast from the South-west (at an oblique angle) and from the South (at an angle parallel to the coastline). [1m]

(b) On the last day of their fieldwork, the students decided to extend their investigation to find out the opinions of the locals from the nearby town about the environmental impact of tourism development.

They devised a bi-polar survey, shown on Fig. 2, which asked locals to give each statement a score ranging from -3 to +3. They obtained 100 completed surveys, and the results of which are shown on Fig. 2.

Results of bi-polar survey

<table>
<thead>
<tr>
<th>Negative aspects</th>
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<th>-2</th>
<th>-1</th>
<th>0</th>
<th>+1</th>
<th>+2</th>
<th>+3</th>
<th>Positive aspects</th>
</tr>
</thead>
<tbody>
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<td>Much litter</td>
<td>8</td>
<td>13</td>
<td>36</td>
<td>20</td>
<td>14</td>
<td>8</td>
<td>1</td>
<td>Little litter</td>
</tr>
<tr>
<td>High level of noise</td>
<td>30</td>
<td>25</td>
<td>16</td>
<td>27</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>Low level of noise</td>
</tr>
<tr>
<td>High traffic count</td>
<td>41</td>
<td>26</td>
<td>23</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>Low traffic count</td>
</tr>
<tr>
<td>Unpleasant surroundings</td>
<td>0</td>
<td>1</td>
<td>3</td>
<td>15</td>
<td>26</td>
<td>27</td>
<td>28</td>
<td>Pleasant surroundings</td>
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<td>5</td>
<td>5</td>
<td>14</td>
<td>32</td>
<td>44</td>
<td>Well-maintained infrastructures</td>
</tr>
</tbody>
</table>

Fig. 2
(i) What is the main positive environmental impact of tourism? [1]

- The main positive environmental impact of tourism is the presence of well-maintained infrastructures.

(ii) The students concluded that tourism development has a negative impact on the local environment. Comment on the validity of their conclusion. [4]

The conclusion is valid
- Three out of five majority of the environmental aspects registered negative scores.
- The tallied scores for the environmental aspects such as the amount of litter, the level of noise, and the traffic count are all negative at -53, -154, and -198.

The conclusion is invalid
- Despite having a majority of negative scores, many of the locals felt that the tourists brought about positive impact to two out of five environmental aspects.
- The highest score of positive 205 is accounted for the level of maintenance of infrastructures, while the pleasantness of surrounding registered a positive score of 159.

(iii) Suggest the advantages and disadvantages of using bi-polar surveys. [3]

Advantages
- Bi-polar surveys allow for a range of responses from the respondents to provide greater accuracy in terms of their perception towards the given aspect.
- The use of bi-polar surveys would allow a series of factors to be considered about a particular subject, thereby allowing the data analysis to be extensive.

Disadvantages
- Some of the statements within the bi-polar survey may be difficult for the respondents to understand as they may not have the geographical understanding about context of the investigation that frames the bi-polar survey.

Accept other plausible answers.

(c) Explain how the students would collect and present data to answer the guiding question 'How does the age group of tourists affect the type of accommodation they stay in?' [6]

- Conduct an online research about the type of accommodation available at the nearby town, and categorise them accordingly.
- Devise a questionnaire to survey 100 tourists with the questions "Are you a tourist?"; "Please select your age group"; "Which type of accommodation are you staying in?".
- Decide on the location to conduct the questionnaire survey and avoid choosing locations where there is a concentration of people of a certain age group.
- Decide on the time to conduct the questionnaire survey when most tourists will be out on the streets.
- Systematic sampling method where they would interview every 5th tourist who passes by them OR
  Random sampling method where they would generate at least 100 random numbers using a dice, and interview the tourists according to the numbers generated.
- Collate the responses and present the data onto a series of pie charts according to the age group
Section B

Answer one question from this section.

2 (a) Study Photographs B and C (Insert), which show part of a coastline during low and high tide respectively.

(i) Describe the features of the coastal environment shown in Photograph B. [3]

- Long stretch of steep and near-vertical cliff face along the coastline
- Gently-sloping shore platform (wave-cut platform) that extends from the base of the cliff towards the sea
- Large accumulation of fine sediment at the base of cliff on the middle foreground of Photograph B

(ii) Use Photographs B and C to help you suggest how wave action and tide conditions at the coastline can account for the formation of the coastal landforms shown. [4]

- The strong destructive waves approaching the coast can facilitate the erosional process of hydraulic action and abrasion. [1m] As the waves break violently on the coast, air can be compressed within the rock joints, and sediments can be hurled against the exposed coastal rock. This weakens and breaks down the rock over time, leaving behind a steep cliff face as seen in the Photographs B and C. [1m]

- The high tide conditions allow the erosional processes to take place at the base of the cliff. [1m] As the waves erode and undercut the base of the cliff, the overhanging cliff may collapse over time and retreat inland, leaving behind a steep and exposed cliff face, as well as a shore platform that may be exposed during low tide conditions. [1m]

(b) Study Photograph D (Insert), which shows an aerial view of a coastline.

Identify the coastal features X and Y, and compare the coastal processes occurring at both features on Photograph D. [5]

- X – Headland
- Y – Bay

- Both features experience the process of wave refraction, by which the waves change direction as they approach the coast. [1m] Through wave refraction, the waves will converge on the headland and diverge when they approach the bay. [1m]

- The headland (Feature X) is experiencing the process of erosion as the waves that converge give rise to increased wave height and greater erosive energy, [1m] while the bay (Feature Y) is formed through the process of deposition as the waves that diverge decreased in wave height and wave energy is reduced and spread out. [1m]
(c) Using example(s), explain how governments can manage coastal areas in a sustainable manner.

- Governments can manage coastal areas by implementing policies to limit damaging activities such as destruction of coral reefs and mangroves to make way for coastal development. [1m] Through such policy implementation, the natural features of the coast can be retained and little deterioration will be observed in the long run. [1m]

- One example would be limiting the damage to grasses planted to stabilise sand dunes on Port Philip in Melbourne, Australia. To encourage the growth of vegetation on sand dunes, the local authorities built fences, access paths, and walkovers to prevent beachcombers from trampling on the grass that are anchored to the sand dunes.

- Governments can implement laws and policies to minimise the threat of natural hazards in coastal areas. They can restrict developments on low-lying areas or build coastal defence measures in areas that are prone to natural hazards such as storm surges and tsunamis. [1m] Through such measures, the damages brought about by natural hazards can be greatly reduced and the quality of the environment can be restored and not be compromised for present and future generations. [1m]

(d) 'Human activities will only bring about irreversible impact to the global coral reef ecosystem.'

To what extent do you agree with this statement? Use examples to support your answer. [8]

<table>
<thead>
<tr>
<th>Agree:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>The impact of human activities on the global coral reef ecosystem are irreversible.</td>
<td></td>
</tr>
<tr>
<td>Coastal development such as reclamation and extension of land areas can cause coral reefs to be suffocated by the sediments that were deposited onto the seabed.</td>
<td></td>
</tr>
<tr>
<td>For instance, land reclamation which increased Singapore's land area by 17% has buried over 60 per cent of its coral reefs.</td>
<td></td>
</tr>
<tr>
<td>The expansion of coastal resorts and urban housing can increase the discharge of sewage waste into the waters. The pollutants suspended in the sea may stress the coral reefs and lead to their eventual death.</td>
<td></td>
</tr>
<tr>
<td>The development of coastal areas on a large scale is putting pressure on the global coral reef ecosystems.</td>
<td></td>
</tr>
<tr>
<td>In addition, agricultural activities which are heavily reliant on the use of pesticides and fertilizers can pose a threat to the survival of coral reef habitats when the top soil is washed into the river systems and out to sea. The polluted waters can increase the stress levels for the coral reefs which in turn poses immediate devastating impact on these corals.</td>
<td></td>
</tr>
<tr>
<td>The global coral reef ecosystems are also vulnerable to pressures from economic activities such as the overcollection of corals for sale and destructive fishing methods, which disrupts the coral ecosystem, making them more vulnerable to threats.</td>
<td></td>
</tr>
<tr>
<td>Disagree: The impact of human activities on the global coral reef ecosystem can be reversed.</td>
<td></td>
</tr>
<tr>
<td>-------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>• Despite the human activities that may impose significant impact on the global coral reef ecosystems, there are multiple efforts taken by various countries to protect the existing coral reef ecosystems around the world.</td>
<td></td>
</tr>
<tr>
<td>• Governments have introduced the imposition of fines for fishermen who practice destructive fishing methods such as bottom trawling, cyanide fishing and dynamite blasting.</td>
<td></td>
</tr>
<tr>
<td>• In response to the warning issued by the European Union to regulate its fishing activities, the Philippines produced a new fisheries code that called for stricter measures against illegal methods and commercial overfishing in 2014.</td>
<td></td>
</tr>
<tr>
<td>• Governments and local communities may also introduce coral regrowth programmes to replant reefs with coral grown in offshore nurseries. Baby corals may be attached to underwater scaffolding for several years until they are ready to be attached to a denuded reef.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Conclusion: Stating and justifying your stand</th>
</tr>
</thead>
<tbody>
<tr>
<td>• In conclusion, I agree with this statement to a large extent as human activity is the main cause of threat to around 60% of the Earth's coral reefs.</td>
</tr>
<tr>
<td>• With the scale of destruction far outweighing the rate of coral replanting efforts around the world, it is predicted that all corals will be threatened by 2050, with 75 percent facing high to critical threat levels.</td>
</tr>
</tbody>
</table>
3 (a) Study Photographs E and F (Insert). Photograph E shows a coastal feature during low tide and Photograph F is an aerial view of the same feature during high tide. Point X shows the location where Photograph E was taken.

(i) Describe the features of the coastal environment shown in Photographs E and F. [3]

- Long narrow ridge of sand that extends from the mainland where coastline changes abruptly
- The other end is connected to an offshore island
- Exposed above the water surface during low tide

(ii) Use Photographs E and F to suggest how the wind and wave conditions can account for the formation of the coastal landform shown. [4]

- The prevailing wind blowing from the North-west direction [1m] facilitates the longshore drift process which transports sediments southwards. As the spit continues to extend seawards towards the south, it connects with the offshore island to form a tombolo. [1m]

- The presence of constructive waves facilitates the transportation of sediments through longshore drift as sediments are transported with a stronger swash and a weaker backwash. [1m] This process enables the sediments to be transported southwards towards the offshore island, forming a tombolo overtime. [1m]

(b) Study Fig. 3, which shows information about the China’s tourist arrival rates to Nepal.

Account for the number of China’s tourist arrival to Nepal from 2007 to 2016 as shown in Fig. 3. [5]

- China tourist arrival rates to Nepal have observed a general increase from around 30,000 tourists in 2007 to 110,000 tourists in 2016. [1m]
- This general increase can be explained by the rapid economic development of China which increased the disposable income of the citizens. [1m] With an increased number of people within the affluent middle class, this has allowed more people to have the financial capability to travel to locations such as Nepal. [1m]
- The decline in tourist arrival in 2009 can be explained with the 2008 financial crisis that affected China’s economic development. [1m] As the disposable income of the citizens is lowered, this lowers their inclination to travel as the citizens cut back on their spending on leisure and recreation activities such as travelling. [1m]
- The decline in tourist arrival in 2015 can be explained by the 2015 Nepal earthquake that deterred tourists from visiting Nepal due to safety concerns. [1m] This is especially so when the earthquake has resulted in the destruction of tourist infrastructures and disruption of essential tourist services. [1m]

(c) Using example(s), explain how governments can minimise leakages from tourist revenues to facilitate sustainable tourism. [5]

- Countries can adopt the strategy of training locals to perform skilled tourism jobs in order to minimise the loss of job opportunities for locals to better qualified foreign workers. [1m] With more locals hired in the tourism industry,
this will help to increase their income while minimising the leakages from tourist revenues to foreign-owned companies. With a regular and viable stream of income from tourism, the locals will be motivated to better care for the sites that tourists visit. [1m]

- Countries can also adopt the strategy of encouraging locals to provide homestay accommodations where tourists can pay the locals directly for their accommodation. [1m]

- One example is the introduction of community-based tourism in Candirejo Village near Borobudur in Central Java, Indonesia. With the support of the government, the villagers set up a cooperative in 2003 to develop homestay accommodations, develop organic farms, and organise local transport for tourists, which significantly increased the income of locals by an average of 12.5%, while reducing the leakages.

(d) 'Tourism will only bring about irreversible impact to the environment.'

To what extent do you agree with this statement? Use examples to support your answer.

<table>
<thead>
<tr>
<th>Agree:</th>
<th>Tourism can bring about irreversible impact to the environment as the high influx of tourists to various destinations and the increase of inconsiderate tourist behaviour such as littering may pollute the environment and cause long term destruction to habitats.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>For instance, the Wider Caribbean Region receives 63,000 port calls from ships each year. Of the 82,000 tons of garbage generated, about 77% comes from cruise vessels. On average, passengers on a cruise ship each account for 3.5 kilograms of garbage daily. Such high volumes of waste generated can lead to long term degradation to the environment as many islands in the Caribbean have limited space on land to treat the waste accumulated. This results in the waste sometimes being disposed into the Caribbean Sea by ships, polluting the waters.</td>
</tr>
<tr>
<td></td>
<td>With a lack of strong political willpower to ensure that measures are implemented to facilitate proper waste disposal, as well as to manage the influx of high volumes of tourists, the degradation of the environment can accelerate and impacts may subsequently be deemed as irreversible.</td>
</tr>
<tr>
<td></td>
<td>In addition, with the increase of international and domestic tourism due to various factors such as higher disposable income of tourists and the increased availability and affordability of air travel, this drastically increases the carbon footprint of tourists.</td>
</tr>
</tbody>
</table>
### Disagree:

**The impact of tourism on the environment can be reversed**

- Despite the possible negative impact that tourism may bring to the environment, the increase in global tourism can facilitate the protection and conservation of the environment and the habitats.
- Revenue from entrance fees to national parks and diving sites, or even levies on nearby accommodations can be used to fund various conservation efforts that will be beneficial to the environment.
- For instance, in Kenya, the survival of animals in the country’s nature reserves and national parks relies on funding received from international tourists who want to see these animals in the wild. According to estimates by Kenyan tourist authorities, a single lion can generate US$7000 a year in tourist revenue and a herd of elephants around US$600,000 a year. The money raised from wildlife tourism becomes a way to continue to preserve the animals and their habitats.
- A well-protected environment attracts more tourists to visit it and previous tourists to return. The repeated, steady arrival of tourists will continue to benefit the locals economically. In turn, the income from tourism motivates locals to care properly for the sites that tourists visit, ensuring a regular and viable stream of income from tourism in the future.

### Conclusion

- In conclusion, tourism do not only bring about irreversible impact to the environment as there have been significant efforts by the local authorities to promote forms of sustainable tourism or ecotourism, and to ensure that tourist numbers and behaviour are properly managed.
- Furthermore, the United Nations World Tourism Organization (UNWTO) also recommended measures to combat tourism-related emissions, such as encouraging travellers to avoid long-haul flights and incentivising tourism operators to improve their energy and carbon efficiency.
- Even though such efforts can significantly reduce the negative impact that tourism can bring to the environment, it requires the close cooperation of the different stakeholders such as the visitors, the local communities, the planning authorities, as well as the tour operators.

---End of paper---
Section A

Answer one question from this section.

1 (a) Study Fig. 1, which shows tectonic hazards in the Bay of Naples, Italy. Fig. 2 shows eight measures that are implemented to protect the people who are living around the Bay of Naples from tectonic hazards.

Use the information in Fig. 1 to justify the importance of the measures implemented in Fig. 2.

- As the area in the Bay of Naples is highly populated with at least 3 million inhabitants, it is critical for the presence of different modes of evacuation via road, rail and ship. This enables the inhabitants to evacuate quickly and efficiently in the event of a volcanic eruption.
- Different modes of evacuation are helpful in diverting the crowd, which can help to reduce stampedes and chaos when the people evacuate when a tectonic hazard occurs. This again contributes to the reduction of casualties and deaths.
- As it is possible for the Bay of Naples to experience tectonic hazards, volcanic eruptions, earthquakes and even tsunamis, the range of measures are necessary to respond to the different tectonic hazards that can hit the area.
- Measures such as ‘twinning’ with other towns of Italy is important, especially when there are up to 6 dormant volcanoes at Campi Flegrei, which can subject the area to highly explosive volcanic eruptions. Thus, it is necessary for the people to evacuate quickly to neighbouring Italian towns as the lava flows and ash clouds can be extensive and affect large numbers of inhabitants.
- There were historical records of towns (Pompeii and Herculaneum in AD79) being buried or devastated by catastrophic volcanic eruptions. This necessitates the demarcation of the highly risky red boundary and relocation of inhabitants to other safer zones to prevent the calamity of high death tolls if Mount Vesuvius erupts again.

1 (b) Use examples to explain why climate change is a cause of concern.

- Climate change can bring about sea level rise, which can cause the coast to retreat landwards and frequent coastal flooding to be experienced during high tides.
- This can cause coastal inhabitants who are living at the coastal margins to incur costs to repair or rebuild their homes when they are inundated by the seawater.
- Farmlands located close to the coastal areas can be subject to saltwater intrusion with the rising sea levels, which damages crop yields and possibly threaten these farmlands to become non-arable lands due to the high salt content.
- Climate change can also trigger increased frequency and intensity of extreme weather events, which can be threatening to human lives and properties.
- For instance, the 2003 European heat wave saw record high temperature that soared to
more than 20% above the average summer temperature. This was disastrous to the then unprepared European population, which took away more than 30,000 lives from severe dehydration and heat-related stress.

(c) Study Fig. 3 (Insert), which shows the location of Anchorage and Mount McKinley. Mount McKinley has the highest mountain peak in North America.

(i) With reference to Fig. 3, compare the temperature characteristics between Anchorage and Mount McKinley.

<table>
<thead>
<tr>
<th>Similarity</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Both Anchorage and Mount McKinley are expected to have low annual mean temperatures of less than 10°C.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Differences</th>
</tr>
</thead>
<tbody>
<tr>
<td>- The annual temperature range of Anchorage will be significantly smaller than that at Mount McKinley.</td>
</tr>
<tr>
<td>- Mount McKinley is expected to register a much lower annual mean temperature than Anchorage.</td>
</tr>
</tbody>
</table>

(ii) With reference to Fig. 3, suggest how physical factors can bring about the temperature characteristics mentioned in (c) (i).
Distance from sea
• Due to its coastal location, Anchorage experiences the maritime effect in which summer and winter temperatures are milder due to the temperature regulatory effect of the Pacific Ocean.
• The higher specific heat capacity of the Pacific Ocean enables it to retain and lose heat at a slower rate, relative to an inland location where Mount McKinley is located. Thus, this contributes to the smaller annual temperature range of Anchorage.

Altitude
• As Mount McKinley is located at more than 6,000 m above sea level, the environmental lapse rate sets in, where temperature dips at a rate of 6.5°C with every 1,000 m increase in altitude.
• The less dense air at higher altitudes makes it less able to absorb as much longwave radiation, resulting in the increasingly lowered temperature at higher altitudes. Thus, Mount McKinley's mean annual temperature is expected to be more than 39°C lower than that at Anchorage.
(d) ‘Climate-related hazards bring about more damages to coastal areas than tectonic hazards.’

To what extent do you agree to the statement? Use examples to support your answer.

| Agree with the statement | Climate-related hazards can bring more damages to coastal areas since atmospheric phenomena such as tropical cyclones can develop on an annual basis and frequently hit coastal areas in subtropical locations.

The cyclone season typically spans across the summer and fall months when sea surface temperature at subtropical locations are as warm as 26.5°C or above. When these cyclones make their landfalls, coastal areas will be hit by storm surges with wave heights of several metres. They then experience flooding and are deposited with large amounts of sediments and debris. For instance, about 20 cyclones typically enter the boundary of the Philippines every June to September. Such storms frequently make their landfall at the coastal locations of Eastern Visayas, Bicol region, and Luzon. From 2010 to 2015, there were more than 20 destructive tropical cyclones that entered the Philippines. This clearly exhibits how coastal areas can be repeatedly damaged by storm surges, even before the previous deposits of sediments and debris are cleared from the beaches.

On the other hand, tectonic hazards such as high-magnitude offshore earthquakes that trigger tsunamis do not occur as frequently. From 2004 to 2017, there were about 20 tsunamis that were triggered by tectonic hazards. The towering height of tsunami waves ranged between 2.5 and 38 metres, bringing about inundation of the coastal areas that extend up to several kilometres inland. |
| Disagree with the statement: | However, tectonic hazards can bring more damages to coastal areas than climate-related hazards. Coastal locations that are vulnerable to tectonic hazards span across a large area of the world, as long as they are in close proximity to plate boundaries. On the other hand, tropical cyclones are largely limited to specific regions since they tend to hit coastal areas in the subtropical locations.

In the 2004 Indian Ocean earthquake-tsunami, the high energy tsunami waves radiated from the epicentre in Banda Aceh and travelled extensively long distances, attacking the coastal areas of up to 12 countries that were in Asia and Africa. Coastal areas that were devastated by sedimentation and flooding involved countries included India, Myanmar, the Maldives, South Africa, Somalia, and even Kenya. The high energy tsunami waves caused huge debris such as vessels and boats to be swept into coastal areas. In extreme cases, tectonic hazards are capable of altering the shape of the coastline and/or sink some coastal strips of lands. For instance, the magnitude 9.0 earthquake-tsunami in Tohoku, Japan, led to the shift of main island of Japan by 2.4 metres.

On the other hand, the impacts caused by climate-related hazards experienced at coastal areas tend to be localised or hit several coastal areas that are in the vicinity of the affected countries. Although cyclones frequently occur during the summer and fall months of countries in subtropical locations, coastal areas that may be devastated by inundation and sedimentation caused by storm surges will only be confined to either the northern or southern hemisphere. The scale at which coastal locations can be devastated by climate-related hazards is clearly smaller than those caused by tectonic hazards. |
| Conclusion | Thus, it can be observed that although tectonic hazards may not occur as frequently as climate-related hazards, the devastation experienced at these coastal areas can be more widespread and impactful. |
be worse off since the scale at which coastal lands are larger, and even span across both hemispheres. Tsunami waves travel at a speed of 800 km/h in the deep waters, which is at least four times greater than the speed at which the strong winds of cyclones are travelling at. The greater power and energy of tsunami waves naturally translate to a wider area of coastal lands being attacked by these waves in the form of flooding and sedimentation.
2 (a) Study Figs. 4 and 5 (Insert), which show how tsunami waves approach coastlines, without and with an offshore breakwater respectively.

Use the information in Figs. 4 and 5 to discuss the effectiveness of offshore breakwater in protecting coastal properties and inhabitants from tsunamis. [5]

Effective
- The presence of the offshore breakwater can protect more coastal inhabitants as there is an additional 8 minutes for the coastal inhabitants to evacuate to higher grounds.
- This can effectively reduce the number of people who are swept off or drowned by the overtopping tsunami waves.
- The presence of the offshore breakwater can significantly reduce tsunami height from 13.7 m to 8.0 m. The reduced tsunami height can effectively reduce death tolls as fewer people will lose their lives to drowning or get swept out into the open sea.

Ineffective
- With a run-up height of 10.0 m, the tsunami waves can still reach far inland, sweeping off properties and uprooting vegetation that are along its track.
- This makes the offshore breakwater an ineffective measure as coastal inhabitants who did not successfully evacuate to higher grounds within the 36 minutes will still drown or be swept out into the open sea.

(b) Use examples to explain why people continue to live near volcanoes. [5]

- Farming communities continue to live near volcanoes to tap on increased economic revenue from the sale of surplus crops that are grown on the nutrient-rich volcanic soils.
- In Java and Bali of Indonesia, the fertile volcanic soils can support the cultivation of crops such as tea, coffee and rice.
- The high crop yields enable the farmers to sell them to the local market or be exported for revenue.
- The scenic beauty offered by volcanic areas make them popular tourist destinations.
- For example, the Roman town of Pompeii, Italy, which sits in the vicinity of Mount Vesuvius welcomes almost 3 million visitors annually. The locals can enjoy increased incomes when the visitors utilise services rendered by locals who live near the volcano.

2 (c) Study Fig. 6, which shows information about the eruptions of Mount Etna, an active volcano in Sicily, Italy.

(i) With reference to Fig. 6, compare the lava flows of 1923 and 1983. [3]
Differences
- In 1923, the lava flows were flowing from the spot height of 2,153 metres towards the northeast area of Fig. 6, whereas the 1983 flows were flowing from around the spot height of 3,340 metres towards the southwest area of Fig. 6.

Similarities
- The lava flows of 1923 and 1983 were similar as both episodes of lava flows travelled beyond the demarcated national park boundary of Mount Etna.
- Both episodes of the 1923 and 1983 flows originated from the crater(s) on the upper flanks of Mount Etna, instead of the minor craters on the lower flanks of the volcano.

(ii) Explain the possible environmental impacts from the eruptions of Mount Etna. [4]

- The volcanic eruptions spewed out large amounts of ash particles and other fine glass shards, which can remain suspended in the atmosphere for prolonged periods.
- This brings about air pollution and reduced visibility for extended periods of time.
- Volcanic gases such as sulfur dioxide, carbon dioxide and carbon dioxide that are emitted during volcanic eruptions can contribute towards global warming. The increased amounts of greenhouse gases are capable of trapping more longwave radiation, bringing about the enhanced greenhouse effect.
- In the process, lava haze (laze) is produced, air pollution is generated as the laze steam is high in hydrochloric acid gas and minute volcanic particles.
2 (d) 'Immediate rescue efforts are more important than preparedness measures in reducing casualties caused by earthquakes.'

To what extent do you agree to the statement? Use examples to support your answer. [8]

<table>
<thead>
<tr>
<th>Agree with the statement:</th>
<th>Immediate rescue efforts can be more important than preparedness measures as the former aims to extricate as many survivors from beneath the rubble and offer immediate medical attention within the Golden 72 Hours. Immediate rescue efforts are usually executed by trained local and international rescue squads. They are equipped with heat sensors, sniff dogs and excavation tools that aim to quickly and effectively comb earthquake-hit areas for survivors who are trapped beneath the rubble. This is especially critical within the Golden 72 Hours since these survivors are likely to be wounded or deprived of air, food and water. Appropriate counselling can also be given to traumatised survivors and at times help them to better manage their emotions from the loss of their loved ones. This is important in reducing further casualties when traumatised or agitated survivors engage in irrational behaviours that may threaten their lives. Even though preparedness measures may be in place, the people may not be able to react well to the earthquake and will fail to apply what they have learnt from emergency drills to evacuate efficiently or seek safe shelters. Less developed countries that may face constraints in trained rescue workers and advanced technology to facilitate the extrication of survivors from the rubble, they are still able to effectively reduce casualties by gaining manpower and technological support offered by developed countries that offer assistance to such earthquake-hit countries.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disagree with the statement:</td>
<td>However, preparedness measures can be more important in reducing casualties as they prepare the people and buildings for earthquakes. Earthquake-resistant technology in buildings can minimise building collapses, which subsequently reduces the number of people who are trapped beneath the rubble. Despite the magnitude 9.0 earthquake that struck Japan in 2011, none of its skyscrapers or buildings collapsed. This does not necessitate the deployment of search and rescue teams to extricate people from collapsed buildings. Although important in reducing casualties, these preparedness measures may still fail in their ways. This may be especially so when populations experience record-setting catastrophic earthquakes. The shock and panic may result in delayed responses to the earthquake, which can bring about mayhem. This may increase the probability of stampedes when people rush to evacuate out of the buildings, which instead increase the casualties in the earthquake. During these circumstances, there is an urgency to rope in search and rescue teams to locate survivors and enable them to seek medical attention.</td>
</tr>
<tr>
<td>Conclusion</td>
<td>Hence, search and rescue teams can in fact be more important than preparedness measures in reducing casualties. This is especially for developing countries that lack in monetary and financial resources to develop earthquake-proof buildings, and/ or lack of political willpower to implement strict land use regulations to prevent developments in highly risky lands.</td>
</tr>
</tbody>
</table>
Section B

Answer one question from this section.

3 (a) Study Fig. 7, which shows a map of the urban settlement of Dhaka, Bangladesh.

(i) Use Fig. 7 to describe the locations where water standpipes are built. [3]

- The four water standpipes are all built at the junctions of unmade mud roads.
- The water standpipes are well spaced out in Fig. 7 as the nearest water standpipe is usually located 60 m in radius or less from the area of self-built houses.
- Some of these water standpipes are less than 20 metres away from some shops.

(ii) Suggest how the living environment in Fig. 7 can have impacts on the health of the people. [4]

- The people may be vulnerable to water-borne diseases such as cholera.
- With many of the self-built houses located next to and alongside the marshy land, the pools of stagnant waters can promote the breeding of mosquitoes.
- This can make the dwellers of these self-built houses to be vulnerable to mosquito-borne diseases such as malaria, dengue fever and chikungunya.
- Upon contracting these diseases, they can suffer from fever, drop in platelet counts, vomiting, etc. Under severe cases, they can suffer from complications that result in deaths.

(b) Discuss the effectiveness of developing countries in managing the spread of endemic diseases such as malaria. [5]

Effective
- Developing countries can better manage the spread of endemic diseases as they are recurring on a regular basis.
- The government and relevant authorities can effectively coordinate and allocate relevant resources to reduce the populations of infected Anopheles mosquitoes, which are the vectors that transmit malaria.
- This can effectively contain the spread of malaria as the population of infected female Anopheles mosquitoes can be controlled by measures such as thermal fogging and draining puddles of still water.

Ineffective
- With climate change altering rainfall patterns, developing countries may find it increasingly challenging to control the breeding of Anopheles mosquitoes at puddles of stagnant water left behind by storms and flooding rains.
- The problem is further worsened when the warmer temperature increases the lifespan of mosquitoes and increases the chances of infection as the warmer air incubates viruses faster in mosquitoes.
3 (c) The Sahel region of Africa experiences semi-arid conditions marked by high temperatures and very little rainfall throughout the year. Countries in this region often experience widespread famine.
Study Fig. 8, which shows countries in the Sahel region of Africa and the contributing factor(s) that led to the widespread famine.

Explain how physical and human factors can impact food security in the semi-arid zones shown in Fig. 8. [5]

<table>
<thead>
<tr>
<th>Physical factors</th>
<th>Human factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Main Sahel countries such as Mali, Niger and Chad can experience serious food insecurity as they lie in the semi-arid zone, which could mean that they have very little arable land as these countries receive very low levels of annual precipitation.</td>
<td>• Countries such as Sudan, Ethiopia and Somalia, which are located in the eastern Sahel zone are expected to be worst off and suffer from flagrant food security.</td>
</tr>
<tr>
<td>• This is further aggravated by droughts that bring about very poor harvests as prolonged dryness lead to the withering of crops before they are even harvested.</td>
<td>• During wars, national food supply can become very low when landmines planted on farmlands are triggered. Such explosions incinerate the food crops, bringing about a reduction or halt in food supply.</td>
</tr>
<tr>
<td>• For fear of their own safety, the people are not keen to continue with agricultural activities even after the war as they are wary of fields that have yet to be demined. This again leads to meagre amounts of agricultural output.</td>
<td>• For fear of their own safety, the people are not keen to continue with agricultural activities even after the war as they are wary of fields that have yet to be demined. This again leads to meagre amounts of agricultural output.</td>
</tr>
</tbody>
</table>
3. (d) ‘Government intervention is the most effective strategy to overcome the problem of food shortages.’

How far do you agree with this statement? Use examples to support your answer. [8]

<table>
<thead>
<tr>
<th>Agree with the statement:</th>
<th>Government intervention is the most effective strategy to overcome food shortages as they are able to make changes to current agricultural policies and allocate monetary resources to import more food to intensify the level of food production and ensure that there is sufficient food available for its people.Countries that practise stockpiling can have their governments intervene by drawing supplies from food reserves. Staples such as rice and wheat can be distributed to the population via food rationing, which is effective in temporarily and almost immediately alleviating food shortages as the people are able to gain access to staples. For instance, Singapore’s government stockpiles a three-month supply of rice and two months’ worth of imports in government warehouses for up to a year. Such a measure can be effective in helping its people ride over reduced food supplies caused by a cut in the amount of imports available for its people. However, the perishable nature of food can make such a measure ineffective if they were to rot before being distributed to the people. This brings about food loss, which can aggravate the food shortage situation.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disagree with the statement:</td>
<td>There are also other measures such as technological advances that can be effective in overcoming food shortages. Such a measure target the intensification of food production and with increased food supplies, it may cushion against the hike in food prices.Crop yields can be boosted when countries invest in farming technology in the form of chemical usage, irrigation and the use of large machineries such as combined harvesters. This can be effective in raising the plots of arable lands since the application of irrigation technology now makes it possible for cultivation of crops in semi-arid lands. For example, in the North African continent of Libya, the Great Man-Made River project has made it possible for crop cultivation in the Sahara Desert by ensuring a reliable and regular supply of water to prevent the withering of crops. This has boosted crop yields and is effective in overcoming food shortages since this buffers against continued rise in food prices. This then helps the low income groups to be able to purchase sufficient food to meet their daily recommended calorie intake. Developing countries may not be able to afford the hefty costs involved in setting up such farms, making such a measure ineffective in overcoming food shortages as adopting of farming technologies is beyond their reach. Crop yields continue to persist at low levels as the crops may have withered before they are harvested. With the limited food supplies, the people may have to face upward pressure on food prices, causing the low income groups to purchase increasingly smaller quantities of food for the entire household. Over time, this can aggravate the food shortage situation.</td>
</tr>
<tr>
<td>Conclusion</td>
<td>To be effective in overcoming food shortages, measures have to target the establishment of an equilibrium between the demand and supply of food. This calls for a variety of measures that range from political, social and technological measures to ensure that food supply is able to keep up with the pace of increased demand for food. In addition, the rate of growth in the global population can be dampened so that other the increased crop yields can then be sufficient to feed the people.</td>
</tr>
</tbody>
</table>

4. (a) Type-2 diabetes occurs when the body produces insufficient amounts of insulin. Study Fig. 9, which shows the estimated number of people diagnosed with Type-2 diabetes in 2000 and
that projected in 2030.

(i) With reference to Fig. 9, describe how the number of people diagnosed with Type-2 diabetes vary with age group and level of economic development.

- It is evident that across all age groups, there are significantly more people suffering from diabetes in countries with lower economic development.
- In 2000, the estimated number of people with diabetes in the 20-44 and 45-64 years old age group in developing countries was about 4 to 5 times more than that in the developed countries.
- Low economic development brings about the premature onset of diabetes, as observed by the substantially higher number of people aged 20-64 years diagnosed with diabetes in 2000 and 2030.
- In 2000 and 2030, countries with high economic development, the elderly (aged 65+) are most vulnerable to diabetes. However, the middle-aged (45-64 years old) are most vulnerable in countries with lower economic development.

(ii) Explain why governments of developing countries should be concerned about the growing number of diabetes cases.

- The premature onset of diabetes in the 20-44 years old age group is an area of concern as the people are suffering from diabetes during the phase of life when they are the most economically productive.
- This would mean that the large number of people who suffer from diabetes have to constantly take leave from school/ work to seek medical treatments and/or procedures, which brings about a dip in national productivity.
- The unhealthy population can cause resources from other sectors (e.g. defence, education, tourism, etc.) to be diverted to healthcare instead, slowing down the economic growth of these developing countries.
- Over time, this can cause developing countries to lose its appeal to foreign investments, which concomitantly results in the dip in national income and further strains the national budget.

(b) Discuss how technological advancements have influenced the pace at which infectious diseases are transmitted.
Accelerate the pace of transmission of diseases:
- Technological advancements in the form of aircraft technology has increased the porosity of national borders and greatly reduced travelling time.
- This can accelerate the pace at which infectious diseases are transmitted, especially via air travel where people are able to travel out of their national boundaries and not show any symptoms of illnesses only until they have returned to their country of origin.
- During this process, these people may have transmitted the disease to more people along the way, especially if such diseases are air-borne.

Slow down the pace of transmission of diseases
- The advent of technology can also greatly slow down the pace at which diseases are transmitted and enable infectious diseases to be contained within a short period of time.
- With technology such as geographic information and remote sensing systems to speed up contact tracing, pathogen carriers can be quickly quarantined to prevent them from coming into contact and infecting more people.
4 (c) Study Fig. 10 (insert), which shows the global urbanisation rates from 1990 to 2050 (projected) and the photograph of a typical urban area.

Use Fig. 10 to suggest how the change in global urbanisation rates can have impacts on the health of urban dwellers.

- The rapid growth in global urbanisation rates from 10% in 1990 to a projected 75% in 2050 (increased five-fold within a century) can have detrimental impacts on the health of urban dwellers.

- They may become increasingly prone to obesity and obesity-related diseases/degenerative diseases as their lifestyles are made up of high calorie intake and low physical activity.

- Frequent use of motor vehicles in urban areas and lack of safe, open spaces to exercise can further limit the level of physical activities among urban dwellers, which further promotes the accumulation of fats in their bodies, resulting in burgeoning numbers of overweight or obese urban dwellers.

- The ease in access to globalised brands of fast foods and highly sweetened beverages such as McDonald’s and Coca Cola, which tend to be high in calorie content, can bring about the premature onset of diabetes and coronary heart diseases among the urban dwellers.

- Engaging in physical activities like watching movies such as Spiderman involve little exertion, causing excess fats to be accumulated in the bodies of many urban dwellers and increase their vulnerability to obesity-related diseases.
(d) 'Social stigma is the main factor that prevents HIV/AIDS from being contained in developed countries.'

How far do you agree with this statement? Use examples to support your answer.  

| Agree with the statement | Social stigma is the main factor that prevents the containing of HIV/AIDS in developed countries as HIV-positive carriers are not transparent about their medical conditions for fear of being rejected by the society. Thus, they continue with their daily activities, which may in the process proliferate the spread of HIV/AIDS.   

In order to avoid being ostracized by the society, potential HIV-positive carriers in developed countries refrain from being tested and avoid the receipt of medical treatment. This can potentially lead to the spread of HIV/AIDS as they continue to lead their lives like a normal person. For instance, HIV-positive carriers may get married and possibly transmit the virus to their spouses during sexual contact. The spread of the disease continues to be proliferated when infected women are unaware and fall to undergo HIV-testing when they become pregnant. This can lead to a further spread of HIV/AIDS when the pregnant mothers transmit to their children during pregnancy, childbirth or breastfeeding. This makes it an uphill task to contain the spread of the disease since HIV-positive carriers are afraid of being discriminated by medical professionals who refuse to treat these patients with antiretroviral therapy and in the process the disease can continue to spread to more people. |
|---|---|
| Disagree with the statement | The fast-paced and hectic lifestyle in developed countries may drive some groups of people to be involved in vices such as drug abuse and alcoholism, which increases their risks to coming into contact with infected drug abusers and/or commercial sex workers.   

In developed countries such as United States of America (USA), one third of the 1.2 million people who is diagnosed with HIV/AIDS are involved in drug abuse. When people are involved in intravenous drug abuse, they can become infected with HIV/AIDS when they share needles with an infected HIV/AIDS drug abuser. This can lead to a rapid spread of HIV/AIDS among the ring of drug abusers.   

Furthermore, people who are involved in binge alcoholism are likely to experience clouded judgments and possibly have multiple sexual partners and engage in unprotected sex. This increases their vulnerability to be infected with HIV/AIDS when they become infected upon having sexual contact with an infected sex worker. This can accelerate the spread of HIV/AIDS among the clients of infected commercial sexual workers. It is challenging to contain HIV/AIDS in developed countries as people who engage in risky lifestyle behaviours can promote the spread among drug abusers, commercial sex workers and their clients. |
| Conclusion | It is indeed agreeable that social stigma is one of the main factors that prevents HIV/AIDS from being contained in developed countries. The fear of facing disapproval and rejection by the society upon being diagnosed as HIV-positive carriers drives these people to keep mum about their medical conditions. Trained medical professionals in countries such as USA and United Kingdom shun treating HIV patients, which makes it even more challenging to contain HIV/AIDS. Despite advances in medical technology and knowledge in developed countries, prejudice and social stigma towards HIV/AIDS patients is undeniably the main factor that prevents HIV/AIDS from being contained. |
Section A

This question is compulsory

1 Omara Spit located in North Island, New Zealand is a popular place for tourism. The area is rich in bird wildlife, especially seasonal migratory birds, and the coast offers many opportunities for beach recreation.

A group of students conducted a one day coastal and tourism fieldwork.

Fig. 1a (Insert 1) shows the topographical map of the area. Omara spit is located between Easting 35 and 39 and Northing 31 and 33. Fig. 1b (Insert 1) is a satellite photograph of Omara Spit.

(a) (i) From the map and photograph evidence, identify the direction of the prevailing wind and longshore drift that has led to the formation of Omara Spit. [2]

(ii) Explain how the students can determine the direction of longshore drift along Matarangi Beach on Omara Spit. [3]

(b) Recognising that Omara Spit has a number of sites for bird watching, the students wanted to find out if the influx of tourists to the areas disturbs or affects the bird population. Photograph A shows bird watching activity in the area.

Form a hypothesis for the investigation. [1]

Birdwatching at Omara Spit

![Birdwatching at Omara Spit](image)

Photograph A
To investigate the hypothesis, the students counted the number of visitors and birds at each site at three different times in the day.

Table 1 shows the visitor count and bird count for the different sites.

**Visitor and Bird count at Omara Spit**

<table>
<thead>
<tr>
<th>Time of Count</th>
<th>Site 1</th>
<th>Site 2</th>
<th>Site 3</th>
<th>Site 4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No of visitors</td>
<td>No of birds</td>
<td>No of visitors</td>
<td>No of birds</td>
</tr>
<tr>
<td>11.30 am</td>
<td>20</td>
<td>100</td>
<td>100</td>
<td>200</td>
</tr>
<tr>
<td>1.30 pm</td>
<td>10</td>
<td>120</td>
<td>50</td>
<td>205</td>
</tr>
<tr>
<td>3.30 pm</td>
<td>40</td>
<td>120</td>
<td>60</td>
<td>210</td>
</tr>
</tbody>
</table>

Table 1

(i) Comment on the time intervals chosen for the counts.  [2]

(ii) Describe how the students could present the information for Sites 1 and 4 in one graph to compare the data collected.  [3]

(iii) Analyse the data from Table 1, what conclusion might the students draw to answer their hypothesis?  [3]

(iv) What factors might affect the validity of the students' conclusion?  [2]

(d) The students wanted to develop a profile of visitors to the bird watching sites on Omara Spit. They decided to conduct in-depth interviews with a number of visitors at the sites.

Explain why it would be important to consider these issues in their questionnaire:

(i) Age group  

(ii) If they had visited the area before  

(iii) If they had done bird watching before  [3]

(e) Students wanted to investigate if tourism has influenced the traffic condition along the main street.

Describe how the students could collect the data and how the information could be presented graphically to show the impact of tourism.  [6]
Section B

Answer one question from this section

2 (a) (i) Study Photograph B which shows an area where coastal erosion is taking place in Iceland. On Insert 2, annotate the diagram of Photograph B to give evidence that coastal erosion has occurred in the area. [5]

Reynisfjara coastline in Iceland

Photograph B

(ii) Explain why coastal erosion is much more rapid on some coasts than others. [4]

(iii) Describe two processes of erosion that may affect this area. [4]
(b) Study Photograph C which shows sea defences along a coast in England.

Sea Defences in England

Photograph C

Suggest how the sea defences shown in Photograph C help to protect the coastline. [4]

(c) 'The conservation of coastal ecosystems outweighs the economic benefits of removing them for coastal development.' How far do you agree with this statement? [8]
Fig. 2 shows the percentage change in world tourism from 2015 to 2017.

**Percentage Change in International Tourist Arrivals**

(i) Describe the changes in international tourism arrivals from 2015 to 2017. [4]

(ii) Explain why world tourism is growing and yet some regions experience negative growth. [6]
Fig. 3 shows the National Parks for safari holidays and a photograph of the coastal resort of Mombasa in Kenya, Africa.

Location of National Parks in Kenya

The coastal resort of Mombasa

Fig. 3

(i) Describe the beach at the coastal resort of Mombasa seen in the photograph and explain how it is formed. [4]

(ii) Describe the distribution of National Parks in Kenya. [3]

(c) Assess the role that groups of people play to ensure that National Parks created in many countries achieve sustainable tourism. [8]

THE END
Satellite image photograph of Omara Spit. New Zealand

Fig. 1b
READ THESE INSTRUCTIONS FIRST

Write your name, class and index number on all the work you hand in.
Write in dark blue or black pen on both sides of the paper.
Do not use staples, paper clips, glue or correction fluid.

Section A
Answer one question

Section B
Answer one question

Write all answers on the Answer paper provided
Candidates should support their answers with the use of relevant examples.
Sketch maps and diagrams should be drawn whenever they serve to illustrate an answer.

On the Insert, write your name and index number in the spaces provided and attach it to your answer paper at the end of the examination.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question
Section A

Choose one question from this section

1. The San Francisco Bay Area in California, USA is an area which expert geologists warn will experience an imminent earthquake of high magnitude.
   
   Fig. 1 shows the numerous faults in the area and the percentage probability of a major earthquake occurring along the various faults. Fig. 2 shows the predicted ground shaking and damage that will occur in the event of a major earthquake.

Faults and Percentage Probability of Earthquake in the next 30 Years

Fig. 1
Predicted Shaking and Damage from a major earthquake in the area

Fig. 2

(a) (i) Using Fig. 1 and Fig. 2, describe the distribution of predicted shaking and damage in the San Francisco Bay Area from a major earthquake. [5]

(ii) Explain the reasons why expert geologists are warning of an imminent earthquake in the San Francisco Bay Area in California, USA. [4]
Fig. 3 shows information about the most powerful earthquake in each year from 2003 to 2012.

<table>
<thead>
<tr>
<th>Year</th>
<th>Magnitude (Richter Scale)</th>
<th>Number of Deaths</th>
<th>Depth of Focus (km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>8.3</td>
<td>0</td>
<td>27</td>
</tr>
<tr>
<td>2004</td>
<td>9.1</td>
<td>227,898</td>
<td>30</td>
</tr>
<tr>
<td>2005</td>
<td>8.6</td>
<td>1313</td>
<td>30</td>
</tr>
<tr>
<td>2006</td>
<td>8.3</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>2007</td>
<td>8.5</td>
<td>25</td>
<td>34</td>
</tr>
<tr>
<td>2008</td>
<td>7.9</td>
<td>87,587</td>
<td>19</td>
</tr>
<tr>
<td>2009</td>
<td>8.1</td>
<td>192</td>
<td>18</td>
</tr>
<tr>
<td>2010</td>
<td>8.8</td>
<td>547</td>
<td>35</td>
</tr>
<tr>
<td>2011</td>
<td>9.0</td>
<td>20,896</td>
<td>29</td>
</tr>
<tr>
<td>2012</td>
<td>8.6</td>
<td>0</td>
<td>23</td>
</tr>
</tbody>
</table>

Fig. 3

Fig. 4 describes the depth of earthquake focus

<table>
<thead>
<tr>
<th>Depth of Focus (km)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 50km</td>
<td>shallow</td>
</tr>
<tr>
<td>50.1 - 300km</td>
<td>medium</td>
</tr>
<tr>
<td>300.1 - 670km</td>
<td>deep</td>
</tr>
</tbody>
</table>

Fig. 4

(i) With reference to Fig. 3 and Fig. 4, compare the earthquakes and variation of deaths from 2003 to 2012 as shown in Fig. 3.

(ii) Besides the information given in Fig. 3, what are the likely reasons for the variation in number of deaths?

(c) ‘Temperature of a city throughout the year is solely influenced by how far the city is located from the equator.’ Discuss how far you agree. Give evidence to support your answer.
Study Fig. 5 which shows an area affected by an earthquake in 2010, and Fig. 6 which shows an area affected by volcanic eruption in 2006.

Fig. 5

Fig. 6

Compare the immediate effects from the natural disasters shown in Fig. 5 and Fig. 6.

[4]
(b) Study Fig. 7 which shows a map of how global surface temperature might change by 2070.

Global Surface Temperature

Fig. 7

(i) Describe the variation in temperature changes in the world by 2070. [4]

(ii) Explain the major causes for the projected significant increase in global temperatures by 2070. [5]
Fig. 8 shows the path of Hurricane Katrina which hit USA in 2005 and Fig. 9 shows a satellite image of the hurricane and the changes in weather conditions as the hurricane approaches a city.

![Path of Hurricane Katrina](image1)

**Fig. 8**

![Satellite image of Hurricane Katrina](image2)

**Fig. 9**

Using Fig. 8 and Fig. 9, describe the path of Hurricane Katrina from 26 August to 29 August and the changes in weather conditions as the hurricane sweeps over a city like New Orleans. [4]

(d) 'The hazards associated with tropical cyclones can be effectively mitigated.' How far do you agree with the statement? Explain your answer. [8]
Section B

Choose one question from this section

3 (a) Fig. 10 shows the trend in crop yield in the various regions, Fig. 11 shows world population growth from 2012 to 2050 and Fig. 12 shows the world hunger map for 2013.

![Cereal Yields Graph](image)

**Cereal Yields (in metric tons per hectare)**

![Population Growth Graph](image)

**Projected Population Growth (in billions)**

*Note: "SSA" = Sub-Saharan Africa, including Sudan, "LAC" = Latin America and Caribbean, "N America" = North America, "N Africa" = Rest of Africa.*

Sources: [http://low.yr6/ML](http://low.yr6/ML)


Fig. 10

Fig. 11
World Hunger Map

(i) Use information from Fig. 10 and Fig. 11 to explain the distribution of countries with more than 15% of total population who are malnourished in 2013 as shown in Fig. 12. [6]

(ii) With reference to Fig. 10, what are the possible reasons for the difference in the trend of crop yield in Asia and Africa? [4]

(b) Explain the correlation between a country's development, economic wealth and life expectancy. [5]

(c) What is the difference between infectious and degenerative diseases? [2]

(d) 'Malaria is an infectious disease that can be prevented.' With reference to examples, discuss if this statement is true. [8]
Fig. 13 shows the relationship between HIV infection in the world and income per person.

![Gapminder HIV Chart 2009](image)

**Fig. 13**

(a) (i) Describe the distribution of the number of people aged 15 - 49 years living with HIV in the world in 2009. [4]

(ii) Account for the relationship between percentages of adults aged 15 - 49 years infected with HIV and income per person. [3]

(b) Over 70% of the world's 40 million people living with HIV/AIDS are in Africa. Explain why HIV/AIDS has a profound effect on Africa's social and economic development. [6]

(c) Why is there a re-emergence of malaria in some parts of the world where malaria had been eradicated? [4]

(d) 'The main challenge in controlling the spread of HIV/AIDS in Southern Africa is the reluctance to be tested for the disease.' Do you consider this statement to be true? Explain your answer. [8]

THE END
## Marking Scheme Geography Paper 1 Prelims 2018

### Section A

**This question is compulsory**

1. Omara Spit located in North Island, New Zealand is a popular place for tourism. The area is rich in bird wildlife, especially seasonal migratory birds, and the coast offers many opportunities for beach recreation.

   A group of students conducted a one day coastal and tourism fieldwork.

   Fig. 1a (Insert) shows the topographical map of the area. Omara spit is located between Easting 35 and 39 and Northing 31 and 33. Fig. 1b (Insert) is a satellite photograph of Omara Spit.

   **(a) (i)** From map and photograph evidence, identify the direction of the prevailing wind and longshore drift that has led to the formation of Omara Spit.  

   **Answer:**  
   Prevailing wind is from the northeast and longshore drift is towards west.

   **(ii)** Explain how the students can determine the direction of longshore drift along Matarangi Beach on Omara Spit.  

   **Answer:**  
   - At water's edge, stick the first pole into the sand  
   - throw an orange into the sea from the first pole & observe the travelling path of the orange for 10 minutes  
   - Stick the second pole into the sand where the orange finally lands after it is being moved by series of swash & backwash  
   - Determine the direction of LSD by noting the position of the second pole from the first pole  

   **(b)** Recognising that Omara Spit has a number of sites for bird watching, the students wanted to find out if the influx of tourists to the areas disturbs or affects the bird population. Photograph A shows bird watching activity in the area.

   Form a hypothesis for the investigation.

   **Birdwatching at Omara Spit**
Photograph A

Answer:

The larger the number of tourists, the fewer the birds.

(c) To investigate the hypothesis, the students counted the number of visitors and birds at each site at three different times in the day.

Table 1 shows the visitor count and bird count for the different sites

Visitor and Bird count at Omara Spit

<table>
<thead>
<tr>
<th>Time of Count</th>
<th>Site 1</th>
<th>Site 2</th>
<th>Site 3</th>
<th>Site 4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No of visitors</td>
<td>No of birds</td>
<td>No of visitors</td>
<td>No of birds</td>
</tr>
<tr>
<td>11.30 am</td>
<td>20</td>
<td>100</td>
<td>100</td>
<td>200</td>
</tr>
<tr>
<td>1.30 pm</td>
<td>10</td>
<td>120</td>
<td>50</td>
<td>205</td>
</tr>
<tr>
<td>3.30 pm</td>
<td>40</td>
<td>120</td>
<td>60</td>
<td>210</td>
</tr>
</tbody>
</table>

Table 1

(i) Comment on the time intervals chosen for the counts. [2]

Answer:
Counts taken over 4 hours - late morning to mid afternoon. Birds and tourists may visit the place early in the morning and late evening. Duration of count not sufficient - should spread out over longer period.

Intervals of 2 hours is reasonable or 2 hour interval is systematic.
<table>
<thead>
<tr>
<th>(ii)</th>
<th>Describe how the students could present the information for Sites 1 and 4 in one graph to compare the data collected.</th>
<th>[3]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Answer:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Comparative line graph or Group bar graph</td>
<td></td>
</tr>
<tr>
<td></td>
<td>use legend to show symbol for Site 1: tourist count and Site 1: bird count and Site 4: tourist count and Site 4: bird count (1m)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Y axis – number of counts (1m)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>X axis – time (1m)</td>
<td></td>
</tr>
<tr>
<td>(iii)</td>
<td>Analyse the data from Table 1, what conclusion might the students draw to answer their hypothesis?</td>
<td>[3]</td>
</tr>
<tr>
<td></td>
<td>Answer:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No relationship between number of tourists and birds</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Site 2 has most number of tourist &amp; birds</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Number of tourist doesn't affect bird</td>
<td></td>
</tr>
<tr>
<td></td>
<td>11.30 am - 100 tourist and double the number of birds at 200</td>
<td></td>
</tr>
<tr>
<td></td>
<td>At 1.30 pm - half the number of tourists to 50 and birds increase to 205</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Site 1 – in the afternoon when number of birds remain the same at 120 birds, the number of tourists range from 10 to 40</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Site 3 – in the morning 25 tourist visited the area and bird count was lowest at 105 birds. When number of tourist remains the same at 15 people the number of birds fell from 150 to 70.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Site 4 – number of birds are the least but number of tourists is roughly the same as site 1 &amp; 3</td>
<td></td>
</tr>
<tr>
<td>(iv)</td>
<td>What factors might affect the validity of the students' conclusion?</td>
<td>[2]</td>
</tr>
<tr>
<td></td>
<td>Any 2 factors that are well explained.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Students only did tourist and bird count on one day – insufficient days to draw conclusion</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Investigation was done from late morning to mid-afternoon. Not a good spread across the day as tourists and bird watching may be done in the early morning and evening when it is not so hot or when bird population &amp; tourist numbers are different</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Migratory birds fly in at different seasons, students need to conduct investigation when birds have flown in to get accurate assessment on number of birds and tourist</td>
<td></td>
</tr>
</tbody>
</table>
| (d) | The students wanted to develop a profile of visitors to the bird watching sites on Omara Spit. They decided to conduct in-depth interviews with a number of visitors at the sites. Explain why it would be important for students to consider these issues in the questionnaire:

(i) Age group
(ii) If they have visited the area before
(iii) If they have done bird watching before |

| Answer: |

(i) Age range gives information on which age group like such outdoor activities as bird watching.

(ii) If they have visited area before shows if they are new comer or first time visitor to the area or frequent visitor who return to bird watch. Or it can tell they are probably locals from the area n they go often to bird watch.

(iii) Question on if they have done bird watching before will give students an idea if visitors to the area are avid birdwatchers & bird watching is a hobby or past time for these people or it is a first time experience to bird watch in the area – novice |

| (e) | Students wanted to investigate if tourism has influenced traffic condition along the main street. Describe how the students could collect the data and how the information could be presented graphically to show the impact of tourism. |

| Answer: |

Traffic condition
Do a traffic count
Select a fixed location on the busiest section of the main street.
Students can select several points along the street.
Should carry out at different times of the day – morning, afternoon and evening.
Count the number of cars passing through the point student is standing for a duration e.g over one hour or 2 hours.
Should carry this investigation during peak tourist season and off peak season to compare the impact of tourism on traffic |
Information can be present on bar graph for both peak and off peak tourist season to show impact of tourism on traffic. Y axis number of cars, X axis time. Compare the information obtained on the number of cars for the peak and off peak season to show the impact of tourists in the area.

Section B

Answer One question from this section

2 (a) (i) Study Photograph B which shows an area where coastal erosion is taking place in Iceland. On the insert, annotate the diagram of Photograph B to give evidence that coastal erosion has occurred in the area. [5]

Answer: one mark per point annotated on diagram
Uneven coastline – different rate of erosion
Steep Cliffs – formed from coastal erosion
Caves/hollows at base of cliffs carved out by waves
Rock debris at the base of cliff
Rocky platform I the foreground

Reynisfjara coastline in Iceland
<table>
<thead>
<tr>
<th></th>
<th>Explain why coastal erosion is much more rapid on some coasts than others.</th>
</tr>
</thead>
</table>
| **Answer:** (3m) | Coast is exposed to strong wind and waves 
Destructive waves 
Steep coastal gradient less friction 
Geology of rocks – lines of weakness that speed up hydraulic action, softer rocks with rock minerals that can easily dissolve in water 

Why other coast are slower (1m) 
Coral or mangrove ecosystem not destroyed can protect coast from destructive waves 
Coastal protection measures implemented to protect sections of coast |
|   | Describe two processes of erosion that may affect this area. |

[4]

[4]
<table>
<thead>
<tr>
<th>Question</th>
<th>Response</th>
</tr>
</thead>
</table>
| **Answer:** | **Hydraulic Action (2m):** Force of water surging into cracks or lines of weaknesses. Trapped air is compressed, waves retreat, air expands. Repeated compression and expansion of air will force cracks open. And break them down.  
**Abrasion or Corrosion (2m):** Waves carry load are hurl against the coast. The rocks that are thrown against the coast will carve out or chisel away the coast, breaking them down. |
| (b) | Study Photograph C which shows sea defences along a coast in England. |

### Photograph C

Suggest how the sea defences shown in Fig 3 help to protect the coastline.  

**Answer:** 2 marks sea wall, 2 marks tetrapods  

- **Seawall:** concrete wall build along the coast absorb wave energy. Serves as a barrier protecting the coast, wall will reflect the waves away from the coast, preventing the sea water from eroding the coast.  
- **Rip raps or tetrapods**
| (c) | Interlocking structures placed at the base of the sea wall prevent the waves which are reflected from the sea wall from eroding the beach in front or eroding the base of the sea wall causing the sea wall to weaken and collapse. |
| [8] | The conservation of coastal ecosystems outweighs the economic benefits of removing them for coastal development. |

How far do you agree with this statement?

Answer:

Conservation of coastal ecosystems like mangroves and corals are protected from being destroyed.

Mangrove and coral ecosystems protect the coast from wave erosion.

Coral reefs, mangroves and other ecosystems are important for fisheries and fish nurseries, which provide people with a key source of protein as well as livelihood opportunities.

Coastal ecosystems and their services have economic as well as social value. They directly contribute to a number of economic sectors, including tourism, commercial fisheries.

Many countries clear mangroves and coral reefs from their coastline to make way for coastal development such as construction of settlements, manufacturing industries, sea ports for shipping and trade to take place.

Level 1: (0-3 marks)
At this level, answer lacks detail and may be general in nature. Answer will be generalised or with minimal support if any given at all. A basic answer that has little development. Reasoning rather weak and expression may be unclear. Answers lack examples or other evidence, or is sketchy that it adds little support to the answer.

Level 2: (4-6 marks)
Disagreement/ Negative impacts OR Agreement/Positive impacts will be supported by appropriate detail. The content will lack balance and some relevant detail. Or. Both sides are considered, but support is patchy so that answer is not full. Good reasoning and logic in parts of the answer with good expression in places. Assessment may be given but may be general in nature. Some examples or other
evidence 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. There will be assessment of both views, both point of views are considered and well supported. There is an assessment of the extent to which strategies are successful or effective. Reasoning is clear and logical with good expression of language. Examples to support answer can be found in most places in the answer. Examples or other evidence to support answers will be extensive.

3 (a)  
Fig. 2 shows the percentage change in world tourism from 2015 to 2017

Percentage Change in International Tourist Arrivals

<table>
<thead>
<tr>
<th>International Tourist Arrivals</th>
<th>(% change)</th>
</tr>
</thead>
<tbody>
<tr>
<td>World</td>
<td>Europe</td>
</tr>
<tr>
<td>3.9</td>
<td>7</td>
</tr>
<tr>
<td>2.4</td>
<td>6</td>
</tr>
</tbody>
</table>

Source: World Tourism Organization (UNWTO) ©

Fig 2

(i) Describe the changes in international tourism arrivals from 2015 to 2017 years.

Answer:

All regions of the world show an increase in international tourists from 2015 to 2017.

Middle East is the only region with a negative decrease in % growth of -2.4% in 2015-2016.

Asia & the Pacific and Americas has dipped in the % increase.
<table>
<thead>
<tr>
<th>(ii)</th>
<th>Explain why world tourism is growing and yet some regions experience negative or slow growth.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Why world tourism is growing</td>
</tr>
<tr>
<td></td>
<td>Economic growth – increase in income, disposable income</td>
</tr>
<tr>
<td></td>
<td>a) Rise in disposable incomes more money spent on leisure as people become more affluent</td>
</tr>
<tr>
<td></td>
<td>b) Leisure time – no work commitments/time for relaxation</td>
</tr>
<tr>
<td></td>
<td>c) Changing Lifestyle:</td>
</tr>
<tr>
<td></td>
<td>lifestyle – the way a person chooses to live</td>
</tr>
<tr>
<td></td>
<td>For the Young - fast paced lifestyle &amp; work - stress of modern living – reason for people to travel &amp; relax</td>
</tr>
<tr>
<td></td>
<td>Transport Technology:</td>
</tr>
<tr>
<td></td>
<td>1) Long-haul fuel efficient aeroplanes such as Airbus A380 or Boeing 747 planes. Bigger capacity passenger planes – carry up to 500-800 passengers per plane.</td>
</tr>
<tr>
<td></td>
<td>2) Short haul budget airlines to new regional destinations at low cost.</td>
</tr>
<tr>
<td></td>
<td>3) Information Communication Technology:</td>
</tr>
<tr>
<td></td>
<td>Convenience of Internet online booking of airlines &amp; holidays.</td>
</tr>
<tr>
<td></td>
<td>Why negative or slow growth</td>
</tr>
<tr>
<td></td>
<td>Economic – strong currency in a country – expensive to visit. Strong US dollar</td>
</tr>
</tbody>
</table>

(b) | Fig. 3 shows the National Parks for safari holidays and the coastal resort of Mombasa in Kenya, Africa. |

Location of National Parks in Kenya
A map showing Kenya with the following legend:

Legend:
National Parks of Kenya (dark green)

The coastal resort of Mombasa

Fig. 3

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>(i)</td>
<td>Describe the beach at the coastal resort of Mombasa seen in Fig 5 and explain how it is formed.</td>
</tr>
<tr>
<td></td>
<td>[4]</td>
</tr>
<tr>
<td>Answer:</td>
<td></td>
</tr>
<tr>
<td>Wide sandy beach</td>
<td></td>
</tr>
<tr>
<td>Gentle gradient from back shore to edge of sea</td>
<td></td>
</tr>
<tr>
<td>Constructive waves approach shallow seabed, Friction slows down and loses energy Wave breaks Swash carries sediments up the coast deposit sediments</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(ii) Describe the distribution National Parks in Kenya.</td>
</tr>
<tr>
<td>---</td>
<td>------------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td>Answer:</td>
</tr>
<tr>
<td></td>
<td>National parks located throughout Kenya</td>
</tr>
<tr>
<td></td>
<td>North – next to Lake Turkana</td>
</tr>
<tr>
<td></td>
<td>Central are around Mt Kenya region</td>
</tr>
<tr>
<td></td>
<td>Larger National Parks in the south of Kenya</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>(c) Assess the role that groups of people play to ensure that National Parks created in many countries achieve sustainable tourism.</th>
<th>[8]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1) GOVERNMENT set up National Parks or developed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Govt – implement &amp; enforce laws that prohibit hunting, poaching &amp; deforestation in National Parks</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2) BUSINESSES – Tour companies must limit the number of tourists they take into National Parks.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tour operators must include education – share with tourists the value of flora &amp; fauna. Educational tours in their itinerary</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Business tour operators do not enforce visitor quota because they want to earn more income - reluctant to enforce correct behaviour on tourists</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3) TOURISTS to co-operate &amp; abide by rules, laws &amp; regulations about protecting environment and not littering.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tourists must realise that they play a big role to protect the environment</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4) Local Communities can work with Foreign Investors to develop eco-friendly lodges /accommodations</td>
<td></td>
</tr>
</tbody>
</table>

Level 1: (0-3 marks)
At this level, answer lacks detail and may be general in nature. Answer will be generalised or with minimal support if any given at all. A basic answer that has little development. Reasoning rather weak and expression may be unclear. Answers lack examples or other evidence, or is sketchy that it adds little support to the answer.

Level 2: (4-6 marks)
Disagreement/ Negative impacts OR
Agreement/Positive impacts will be supported by appropriate detail. The content will lack balance and some relevant detail. Or. Both sides are considered, but support is patchy so that answer is not full. Good reasoning and logic in parts of the answer with good expression in places. Assessment may be given but may be general in nature. Some examples or other evidence 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. There will be assessment of both views, both point of views are considered and well supported. There is an assessment of the extent to which strategies are successful or effective. Reasoning is clear and logical with good expression of language. Examples to support answer can be found in most places in the answer. Examples or other evidence to support answers will be extensive.
The San Francisco Bay Area in California, USA is an area which expert geologists warn will experience an imminent earthquake of high magnitude. Fig. 1 shows the numerous faults in the area and the percentage probability of a major earthquake occurring along the various faults. Fig. 2 shows the predicted ground shaking and damage that will occur in the event of a major earthquake.

Faults and Percentage Probability of Earthquake in the next 30 Years

Fig. 1
Predicted Shaking and Damage from a major earthquake in the area

Fig. 2

(a) (i) Using Fig. 1 and Fig. 2, describe the distribution of predicted shaking and damage in the San Francisco Bay Area from a major earthquake.

Answer:
The Hayward Fault running from NW to SE has the highest percentage of 33% probability of earthquake. It is the same region predicted to have most severe shaking.

There is a 22% probability of a major earthquake along San Andreas Fault. That region is also predicted to have a moderate to slightly severe shaking. Faults towards

Faults in the northeast area of the Bay area such as Concord Fault & Greenville fault with a 16% chance of earthquake is predicted to have slight greater than moderate shaking and damage.
The north of the San Francisco Bay region is expected to experience moderate shaking.

(ii) Explain the reasons why expert geologists are warning of an imminent earthquake in the San Francisco Bay Area in California, USA.

Answer:
The Pacific Plate and the North American plate are sliding past each other.
Friction results in building of stress in the crust.
Energy released in a form of seismic waves will result in vibrations of the earth and predicted severe earthquake in the region.

(b) Fig. 3 shows information about the most powerful earthquake in each year from 2003 to 2012.

<table>
<thead>
<tr>
<th>Year</th>
<th>Magnitude (Richter Scale)</th>
<th>Number of Deaths</th>
<th>Depth of Focus (km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>8.3</td>
<td>0</td>
<td>27</td>
</tr>
<tr>
<td>2004</td>
<td>9.1</td>
<td>227 898</td>
<td>30</td>
</tr>
<tr>
<td>2005</td>
<td>8.6</td>
<td>1313</td>
<td>30</td>
</tr>
<tr>
<td>2006</td>
<td>8.3</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>2007</td>
<td>8.5</td>
<td>25</td>
<td>34</td>
</tr>
<tr>
<td>2008</td>
<td>7.9</td>
<td>87 587</td>
<td>19</td>
</tr>
<tr>
<td>2009</td>
<td>8.1</td>
<td>192</td>
<td>18</td>
</tr>
<tr>
<td>2010</td>
<td>8.8</td>
<td>547</td>
<td>35</td>
</tr>
<tr>
<td>2011</td>
<td>9.0</td>
<td>20 896</td>
<td>29</td>
</tr>
<tr>
<td>2012</td>
<td>8.6</td>
<td>0</td>
<td>23</td>
</tr>
</tbody>
</table>

Fig. 4 describes the depth of earthquake focus.

<table>
<thead>
<tr>
<th>Depth of Focus (km)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 50km</td>
<td>shallow</td>
</tr>
<tr>
<td>50.1 - 300km</td>
<td>medium</td>
</tr>
<tr>
<td>300.1 - 670km</td>
<td>deep</td>
</tr>
</tbody>
</table>

(i) With reference to Fig. 3 and Fig. 4, compare the earthquakes and variation of deaths from 2003 to 2012 as shown in Fig 3.

Answer:
From 2003 to 2012 – earthquakes with magnitude 8 and above. All earthquakes had shallow focus.
Some major earthquakes of 8.3 and 8.6 magnitude results in 0 deaths while
In 2008, a 7.9 magnitude, lowest magnitude among the earthquakes resulted in second highest number of deaths at 87 587.
Earthquakes of magnitude 9 and above caused large number of deaths

All earthquake focus are classified as shallow from 2003 to 2012, a slightly deeper earthquake of 30 km deep resulted in the highest death toll in 2004. There seems to be no relationship between depth of focus and the number of deaths in earthquakes

(ii) Besides the information given in Fig. 3 what are the likely reasons for the variation in number of deaths.

Answer:
Population density – higher the population density, the higher the casualties or death rate
Constructing earthquake proof buildings which will not collapse so easily during major earthquakes will prevent high number of deaths.

(c) "Temperature of a city throughout the year is largely influenced by how far the city is located from the equator. Discuss how far you agree. Give evidence to support your answer.

Answer:
Apply factor of latitude

Other factors affecting temperature
Altitude
Distance from the sea

Level 1: (0-3marks)
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Level 2: (4-6 marks)
Explain one other factor supported by appropriate detail. The content will lack balance and some relevant detail. Or. Both sides are considered, but support is patchy so that answer is not full. Good reasoning and logic in parts of the answer with good expression in places. Assessment may be given but may be general in nature. Some examples or other evidence will be presented to support answers in at least one place in the answer.

Level 3: (7-8marks)
Explain 2 factors: At this level answers will be comprehensive and supported by sound knowledge. There will be assessment of both views, both point of views are considered and well supported. There is an assessment of the extent to which strategies are successful or effective. Reasoning is clear and logical with good expression of language. Examples to support answer can be found in most places.
in the answer. Examples or other evidence to support answers will be extensive.

2 (a) Study Fig. 5 which shows an area affected by an earthquake in 2010, and Fig. 6 which shows an area affected by volcanic eruption in 2006.

Fig. 5

Compare the immediate effects from the natural disasters shown in Fig. 5 and Fig. 6.
Answer:

Both large scale or wide spread destruction seen in the area. Earthquakes destroy buildings, cause them to collapse into a rubble while volcanic eruption houses are buried by lahar or volcanic ash or lava.

(b) Study Fig. 7 which shows a map of how global surface temperature might change by 2070.

![Fig. 7](image)

(i) Describe the variation in temperature changes in the world by 2070. [4]

Answer:

The arctic and Antarctic more serious warming
Antarctica increase by +3 and Arctic increase by +4

Continents in the tropics like South America, Africa and South Asia also has large increase of temperature - +4

Rest of continents in temperate regions increase by +3 e.g. Australia, Europe, North America and Asia

(ii) Explain the major causes for the projected significant increase in global temperatures by 2070. [5]

Answer:

Role of Human/Anthropogenic Causes

- Burning of fossil fuel
- Urbanisation
- Agriculture
- Industries

Level 1: (0-3 marks)
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expression of language. Examples to support answer can be found in
most places in the answer. Examples or other evidence to support
answers will be extensive.

(c) Fig. 8 shows the path of Hurricane Katrina which hit USA in 2005 and
Fig. 9 shows a satellite image of the hurricane the changes in
weather conditions as the hurricane approaches a city.
Using Fig 8 and Fig 9, describe the path of Hurricane Katrina from 26 August to 29 August and the changes in weather conditions as the hurricane sweeps over a city like New Orleans.

Answer:

From 26 Aug, hurricane move south west before turning to head north towards New Orleans in USA.
Before hurricane arrives
Temperature and pressure falls, wind picks up speed and there is intermittent rain bands.

In the eye of the hurricane
Wind & rainfall dies down
Pressure falls to its lowest and temperature rises

After the eye has passed over the city
Wind becomes very strong again. Rain is heavy again

Pressure and temperature starts to rise again as the hurricane moves away.

(d) 'The hazards associated with tropical cyclones can be effectively mitigated.'

How far do you agree with the statement? Explain your answer.

Answer:

Mitigation measures
Land use zoning
Sea wall
Tropical storm tracking and warning
Building of stronger houses to withstand tropical storms

Why not always effective especially in LDC?
Lack of financial resources to build sea walls or having tropical storm warning systems
Poor evacuation plans in many LDCs.

Path of tropical storms might suddenly change & hit another town or city not under instructions to evacuate
Large cities with huge population take time to evacuate
There might be people who are reluctant to evacuate

Level 1: (0-3 marks)
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Section B

Choose one question from this section

3 (a) Fig. 10 shows trend in crop yield in the various regions, Fig. 11 shows world population growth from 2012 to 2050 and Fig. 12 shows the world hunger map for 2013.
Cereal Yields (in metric tons per hectare)

Fig. 10
Projected Population Growth (in billions)


Fig. 11
World Hunger Map
<table>
<thead>
<tr>
<th>(i) Use information from Fig. 10 and Fig. 11 to explain the distribution of countries with more than 15% of total population who are malnourished in 2013 as shown in Fig. 12.</th>
</tr>
</thead>
</table>
| **Answer:**  
High % of population with more than 15% undernourished are largely seen in the continent of Africa  
India and Mongolia have 15% to 24% of undernourished and some countries in South-east Asia  
High Population in Asia and Africa. Asia has the largest population of 4.1 billion in 2012 while Africa has nearly 1 billion in population. This creates demand for food, yet these countries do not produce sufficient food for its population  
The growing of cereal is also very low in Africa. Shows low productivity in this region.  
The increase in food production for Asia is at 3.9 million metric tons/ha of cereal production |
| (ii) With reference to Fig. 10, what are the possible reasons for the difference in the trend of crop yield in Asia and Africa? |
| **Answer:**  
Possible reasons –  
Adoption of HYV and technology in food production in Asia has led to increase productivity  
Africa – Environmental reasons – prolonged drought in Africa – crop failure |
| (b) Explain the correlation between a country’s development, economic wealth & life expectancy. |
| **Answer:**  
DC higher average life expectancy |
| Better living conditions - less spread of infectious disease therefore longer life span |
| Greater economic wealth – can afford better food and better health care in these countries |
| Poor countries – people live in slums |
| Spread of infectious disease like Malaria and HIV kills lots of people in these poor countries |

(c) What is the difference between infectious and degenerative diseases?

- Infectious disease – virus and bacteria spread disease
- Degenerative disease - gradual breakdown of physiological function with age or due to genetic causes and lifestyle choice.

(d) 'Malaria is an infectious disease that can be prevented.'
With reference to examples discuss if this statement is true.

**Answer:**
Thermal fogging – clear breeding grounds
Anti-malaria medication
Use of chemically treated mosquito nets
Ensure clean living environment with no stagnant water.

**Difficult in preventing:**
- Poverty:
  - Slums – ideal breeding ground
  - Climate change – global warming
  - Rainy season – accumulation of stagnant water – breeding ground for mosquitoes

**Level 1:** (0-3 marks)
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Fig. 13 shows the relationship between HIV infection in the world and income per person.

![Gapminder HIV Chart 2009](chart.png)

**Fig 13**

<table>
<thead>
<tr>
<th>(a)</th>
<th>(i)</th>
<th>Describe the distribution of the number of people aged 15-49 years living with HIV in the world in 2009.</th>
</tr>
</thead>
</table>

**Answer:**

Large number of HIV are living in Africa. In Asia – 3 countries with more HIV + adults. In North and South America, USA and Brazil has larger number of HIV. Russia has more HIV sufferers. Rest of Europe has lesser population that are HIV positive.
<table>
<thead>
<tr>
<th>(ii)</th>
<th>Account for the relationship between percentages of adults aged 15-49 years infected with HIV and income per person.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Answer:</strong></td>
</tr>
<tr>
<td></td>
<td>Poverty – women enter sex trade – spread HIV in the young adults</td>
</tr>
<tr>
<td></td>
<td>Not enough money to get tested and treated for HIV continue to spread the disease through their life style or job.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(b)</th>
<th>Over 70% of the world's 40 million people living with HIV/AIDS are in Africa. Explain why HIV/AIDS has a profound effect on Africa's social and economic development.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Answer:</strong></td>
</tr>
<tr>
<td></td>
<td>Orphan crisis – large number of orphans whose parents have died are left abandoned</td>
</tr>
<tr>
<td></td>
<td>Social stigma in society – outcast of those with HIV</td>
</tr>
<tr>
<td></td>
<td>People fall sick easily, cant work and earn an income</td>
</tr>
<tr>
<td></td>
<td>shortage of workforce, foreign investors avoid investing in countries with shortage of work force</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(c)</th>
<th>Why is there a re-emergence of malaria in some parts of the world where malaria where it had been eradicated?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Answer:</strong></td>
</tr>
<tr>
<td></td>
<td>Resistance to anti-malaria drugs</td>
</tr>
<tr>
<td></td>
<td>Climate change</td>
</tr>
<tr>
<td></td>
<td>Air travel – increase mobility, disease introduced by carriers into a new country</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(d)</th>
<th>The main challenge in controlling the spread of HIV/AIDS in Southern Africa is the reluctance to be tested for the disease.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Do you consider this statement to be true? Explain your answer.</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Answer:</strong></td>
</tr>
<tr>
<td></td>
<td>Agree:</td>
</tr>
<tr>
<td></td>
<td>Social Stigma</td>
</tr>
<tr>
<td></td>
<td>Become outcast from community</td>
</tr>
<tr>
<td></td>
<td>Fatalistic approach</td>
</tr>
<tr>
<td></td>
<td>Not enough money for medical testing and treatment</td>
</tr>
<tr>
<td></td>
<td>Ignorance about how deadly the disease can be to one's health</td>
</tr>
<tr>
<td></td>
<td>Other point of view</td>
</tr>
<tr>
<td></td>
<td>Lifestyle choice</td>
</tr>
<tr>
<td></td>
<td>Mobility</td>
</tr>
<tr>
<td></td>
<td>Poverty still drives women into sex trade</td>
</tr>
</tbody>
</table>


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GEOGRAPHY
Paper 1
17th August 2018
1 hour 40 minutes

Secondary 4 Express
Setter: Mr Loo Wen Bin
Vetter: Mr Jason Ting

READ THESE INSTRUCTIONS FIRST

This Cover Page contains Fig. 4 for Question 1.

At the end of the examination, attach this Cover Page in front of your answer scripts.

<table>
<thead>
<tr>
<th>Q1</th>
<th>(a)</th>
<th>(b)</th>
<th>(c)</th>
<th>/ 25</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q2 / Q3</td>
<td>(a)(i)</td>
<td>(a)(ii)</td>
<td>(b)</td>
<td>(c)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TOTAL</th>
<th>/ 50</th>
</tr>
</thead>
</table>

PARENT'S SIGNATURE

This document consists of 2 printed pages.
Fig. 4 for Question 1

Pedestrian volume at Tokyo DisneySea

Number of pedestrians

Attraction
GEOGRAPHY
Paper 1
Secondary 4 Express
Setter: Mr Loo Wen Bin
Vetter: Mr Jason Ting
Additional Materials: Writing Paper
Insert
Cover Page

READ THESE INSTRUCTIONS FIRST
Write your name, class and index number on all the work you hand in.
Write in dark blue or black pen only on both sides of the paper.
Do not use staples, paper clips, highlighters, glue or correction fluid/tape.

Section A
Answer Question 1.

Section B
Answer one question.

Write all answers on the writing paper provided.
Candidates are encouraged to support their answers with the use of relevant examples.
Sketch maps and diagrams should be drawn whenever they serve to illustrate an answer.

At the end of the examination, fasten all your work securely together.
The number of marks is given in the brackets [ ] at the end of each question or part question.
Section A

This question is compulsory.

1 (a) A group of students carried out fieldwork at Tokyo DisneySea, a theme park in Tokyo, Japan, based on famous characters from Disney.

The students decided to consider the guiding question 'How does the distance of origin from Tokyo DisneySea influence the number of visitors?'. They used secondary data to answer this guiding question.

Students considered two methods to present the percentage of visitors from each region. Fig. 1 is a pie chart showing the percentage of visitors from each region. Fig. 2 (Insert) is a map with flow lines showing the percentage of visitors from each region.

Origin of visitors to Tokyo DisneySea

[Diagram of a pie chart showing the percentage of visitors from different regions: Kanto (12%), Chubu (7%), Kinki (7%), Tohoku (3%), Other regions (7%), Overseas (3%)]

Fig. 1

(i) Suggest one possible source of secondary data the students might have used and explain why it is useful for them to consider secondary data for this study. [2]

(ii) Using Fig. 1, calculate the percentage of tourists to Tokyo DisneySea from Kanto. [1]

(iii) Which method used to show origin of visitors is preferable for this study? Suggest reasons for your answer. [2]

(iv) From studying the information in Figs. 1 and 2, what conclusions might the students draw about the guiding question 'How does the distance of origin from Tokyo DisneySea influence the number of visitors?'. [4]
(b) The students examined whether some attractions of Tokyo DisneySea are more popular than others. Fig. 3 (Insert) shows a tourist map and an event schedule of Tokyo DisneySea. They chose to conduct their fieldwork at three sectors of the theme park, which are Mediterranean Harbour, Mysterious Island, and Lost River Delta.

They counted the number of visitors at these attractions on a particular day at two timings, 0830hrs and 1230hrs. Table 1 shows data collected on visitor numbers in Tokyo DisneySea.

### Table 1

Results of fieldwork

<table>
<thead>
<tr>
<th>Pedestrian volume at Tokyo DisneySea</th>
<th>0830hrs</th>
<th>1230hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mediterranean Harbour</td>
<td>75</td>
<td>36</td>
</tr>
<tr>
<td>Mysterious Island</td>
<td>96</td>
<td>130</td>
</tr>
<tr>
<td>Lost River Delta</td>
<td>124</td>
<td>165</td>
</tr>
</tbody>
</table>

(i) Describe how students can collect the data shown in Table 1. [4]

(ii) The students decided to present the data shown in Table 1 using a graph. Using Fig. 4 (Cover Page), present the results appropriately. [3]

(iii) Students used the data in Table 1 and concluded that 'Mediterranean Harbour is the least popular attraction in Tokyo DisneySea'. However, during the review of their fieldwork, they felt that this conclusion might not be reliable.

With the help of Fig. 3, suggest one reason why this is so and suggest one way to make the data collection process more reliable. [2]

(c) (i) The students learnt from their Geography lessons that a theme park caters to tourists of different age groups and wanted to investigate how this is so.

Suggest a hypothesis the students could test in Tokyo DisneySea. [1]

(ii) Describe how you would collect data for this investigation, and explain how you would present and use the data to test the hypothesis suggested in (c)(i). [6]
Section B

Answer one question from this section.

2 (a) Study Fig. 5, which shows a map of Smith and Ross Islands.

Map of Smith and Ross Islands

![Map of Smith and Ross Islands](image)

(i) Using Fig. 5, name and describe the characteristics of landform W. [3]

(ii) With reference to Fig. 5, explain how landform W, named in (a)(i), may have been formed. [5]

(b) Explain how the media can promote tourism. [4]
(c) Study Fig. 6, which shows aspects of sustainable tourism in Costa Rica, a small state in Central America.

Fig. 6

Explain how sustainable tourism in Costa Rica may benefit both the economy and the environment. [5]

(d) 'All tourists want to go to destinations with rich culture.'

Do you consider this statement to be true? Explain your answer. [8]
3 (a) Study Fig. 7 and Fig. 8 (Insert). Fig. 7 shows the characteristics of waves located at points X and Y. Fig. 8 shows a satellite image of Swanage, a coastal area in United Kingdom, where points X and Y can be found.

Characteristics of waves

![Diagram of waves](image)

Wave located at X

Wave located at Y

Fig. 7

(i) Using Fig. 7, compare the difference in wave characteristics at points X and Y. [3]

(ii) With the help of Fig. 8, account for the difference in wave characteristics at points X and Y as described in (a)(i). [5]

(b) Explain the impact to coastal communities if mangroves were to be cleared. [4]

(c) Study Photograph A (Insert), which shows groynes along a coastline.

Describe the features of the groynes shown on Photograph A and assess the usefulness of groynes as a means of protecting the coastline. [5]

(d) ‘Coastal areas are always endangered by human activities.’

Do you consider this statement to be true? Explain your answer. [8]

End of Paper
GEOGRAPHY
Paper 1

INSERT

Secondary 4 Express

Setter: Mr Loo Wen Bin
Vetter: Mr Jason Ting

READ THESE INSTRUCTIONS FIRST
This Insert contains Figs. 2 and 3 for Question 1, and Fig. 8 and Photograph A for Question 3.
Fig. 2 for Question 1

Movement of visitors to Tokyo DisneySea, from region of origin
Tourist Information of Tokyo DisneySea

Opening hours of Tokyo DisneySea: 0800hrs to 2200hrs

Special Events* in Tokyo DisneySea (June 2018)

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Venue</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000-1030 &amp; 1400-1430</td>
<td>New show at Dockside Stage</td>
<td>Mediterranean Harbour</td>
</tr>
<tr>
<td>2030 - 2100</td>
<td>Celebrate! Tokyo DisneySea! (Spectacular fireworks display daily)</td>
<td>Best views from Mediterranean Harbour and Mysterious Island and Mediterranean Harbour</td>
</tr>
</tbody>
</table>
Fig. 8 for Question 3
Satellite image of Swanage

Photograph A for Question 3
Groynes along a coastline
GEOGRAPHY

Secondary 4 Express

Setter: Mrs Wong PL
Vetters: Mr Loo WB & Mr Jason Ting

Additional Materials: Answer Paper
1 Insert
1 Cover Page

READ THESE INSTRUCTIONS FIRST
Write your name, class and index number on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid/tape.

Section A
Answer one question.

Section B
Answer one question.

Candidates should support their answers with the use of relevant examples.
Sketch maps and diagrams should be drawn whenever they serve to illustrate an answer.

At the end of the examination, fasten all your work securely together.
The number of marks is given in the brackets [ ] at the end of each or part question.

This document consists of 9 printed pages.
Section A

Answer one question from this section.

1 (a) Study Fig. 1 which shows temperature data for City A and City B.

<table>
<thead>
<tr>
<th>Months</th>
<th>J</th>
<th>F</th>
<th>M</th>
<th>A</th>
<th>M</th>
<th>J</th>
<th>J</th>
<th>A</th>
<th>S</th>
<th>O</th>
<th>N</th>
<th>D</th>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature (°C)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>City A Latitude: 51° N</td>
<td>4</td>
<td>4.5</td>
<td>6.5</td>
<td>9</td>
<td>12.5</td>
<td>15.5</td>
<td>17.5</td>
<td>17</td>
<td>16</td>
<td>11</td>
<td>7.5</td>
<td>5</td>
</tr>
<tr>
<td>City B Latitude: 1° N</td>
<td>26.5</td>
<td>27</td>
<td>27.5</td>
<td>28</td>
<td>28</td>
<td>28</td>
<td>28</td>
<td>27.5</td>
<td>27.5</td>
<td>27.5</td>
<td>26</td>
<td>26.5</td>
</tr>
</tbody>
</table>

Fig. 1

(i) Describe the differences in temperature between City A and City B. [4]

(ii) Account for the differences in temperatures between City A and City B in January and July. [4]

(b) Explain why the temperature at the top of mountains differ from that at the foot of the mountain. [5]
(c) Study Figs. 2A and 2B, which show different pressure systems over Asia in January and July.

<table>
<thead>
<tr>
<th>Pressure system in January</th>
<th>Pressure system in July</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Diagram of pressure systems" /></td>
<td><img src="image" alt="Diagram of pressure systems" /></td>
</tr>
</tbody>
</table>

Key

- Pressure in millibars
- Wind direction

Explain how and why the pressure systems are different in January and July. [4]

(d) 'The conditions that give rise to the formation of convectional rain and relief rain are the same.'

To what extent do you consider this statement to be true? Give evidence to support your answer. [8]
2  (a) Study Fig. 3 which shows a relief map of Hawaii, a volcanic island.

Hawaii, a volcanic island

Fig. 3

Describe the relief of Hawaii as shown on the map. [4]

(b) Study Photograph A (Insert), which shows part of Mauna Loa, a shield volcano in Hawaii.

Describe the features of the volcanic landscape in Photograph A. [4]
(c) Study Fig. 4 which shows a news report on the volcanic activity of Mt Kilauea, Hawaii, on 6 June 2018.

6 June 2018
Updates From Kilauea: Dozens More Homes Destroyed

Since the eruption of the Kilauea volcano in May 3 2018 on the Big Island, it has belched out about 250 million cubic meters of lava, making it one of the largest eruptions in decades in Hawaii. Kilauea has been flinging out lava and ash, destroying 577 homes and forcing over 2,000 people to evacuate. Over the past week, the lava erupting from Hawaii’s Kilauea volcano advanced through two small residential subdivisions along Kapoho Bay, reaching the Pacific Ocean, and wiping out nearly a hundred homes. Kapoho Bay used to be a scenic bay dotted with beach homes, lush greens and turquoise waters. Civil defence officials said that the lava has now filled in Kapoho Bay, "what used to be the bay is now all lava bed, new land, almost a mile out into the ocean."

Fig. 4

With reference to Fig. 4, describe the effects of the Kilauea eruption on the environment and the lives of the people living in this region. [4]

(d) Describe the successes and limitations of the Kyoto Protocol that attempts to reduce greenhouse gas emissions. [5]

(e) ‘The main cause of recent global climate change is largely due to natural factors rather than anthropogenic factors.’

To what extent do you consider this statement to be true? Give evidence to support your answer. [8]
Section B

Answer one question from this section.

3 (a) Study Fig. 5, which shows access to clean water in some developed and less developed countries.

Access to clean water in 1990 and 2004

<table>
<thead>
<tr>
<th>Country</th>
<th>1990</th>
<th>2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>UK</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>South Africa</td>
<td>80</td>
<td>80</td>
</tr>
<tr>
<td>Kenya</td>
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<td>60</td>
</tr>
<tr>
<td>Nigeria</td>
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<tr>
<td>Côte d'Ivoire</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Congo</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Ethiopia</td>
<td>20</td>
<td>20</td>
</tr>
</tbody>
</table>

Fig. 5

With reference to Fig. 5, describe the changes in access to clean water between 1990 and 2004 for the various developed countries and less developed countries. [4]

(b) Study Fig. 6 (Insert), which shows the effects of a lack of sanitation.

With reference to Fig. 6 and with information you have studied, explain how access to better sanitation can improve the level of health in less developed countries. [5]

(c) Study Fig. 7 (Insert) which shows how Zika spread around the world and a report on the spread of Zika in 2015 in Brazil. Zika is an infectious disease caused by mosquito bites.

With reference to Fig. 7, describe and comment on the spread of the Zika virus. [4]
(d) Explain the economic impacts of infectious diseases like malaria and Zika.

(e) "The main challenge in controlling the spread of malaria is the ease in population movement."

To what extent do you consider this statement to be true? Give evidence to support your answer.
4 (a) Study Fig. 8 (Insert), which shows the changes in HIV/AIDS prevalence in Africa between 1986 and 2001.

With reference to Fig. 8 (Insert), describe the extent of spread of HIV/AIDS in Africa between 1986 and 2001. [4]

(b) Explain the social factors that can contribute to the spread of HIV/AIDS in Africa. [4]

(c) Study Figs. 9A and 9B, which show consumption of food in USA and India respectively in 2011.

![Fig. 9A](image1)

USA

- Others: 6%
- Sugar & Fats: 37%
- Meat: 27%
- Cereals: 22%
- Fruits & Vegetables: 8%

Average daily calories intake per person per day: 3641 kcal

![Fig. 9B](image2)

INDIA

- Others: 7%
- Sugar & Fats: 39%
- Meat: 9%
- Cereals: 58%
- Fruits & Vegetables: 7%

Average daily calorie intake per person per day: 2458 kcal
Use information from Figs. 9A and 9B to describe and account for the differences in the food consumption pattern in USA and India in 2011.

(d) Study Fig. 10 (Insert), which shows the relationship between food and oil prices between 2000 and 2011. Fig. 11 (Insert), shows the comparison between US grain production used to make ethanol for cars and the number of people the grains could feed.

Using information from Figs. 10 and 11 (Insert), suggest difficulties in achieving food security in less developed countries (LDCs).

(e) 'Political and economic strategies are the most important in overcoming the problem of food shortage.'

To what extent do you consider this statement to be true? Give evidence to support your answer.

End of Paper
GEOGRAPHY

Paper 2

INSERT

Secondary 4 Express

Setter: Mrs Wong PL
Vetters: Mr Loo WB & Mr Jason Ting

2236/02

23 August 2018

1 hour 30 minutes

READ THESE INSTRUCTIONS FIRST

This Insert contains Photograph A for Question 2, Fig. 6 and Fig. 7 for Question 3 and Fig. 8, Fig. 10 and Fig. 11 for Question 4.
A volcanic landscape in Hawaii

Fig. 6 for Question 3

Lack of Sanitation and Effects Around the World

- 500 million people are at risk of trachoma
- 146 million are threatened by blindness
- 6 million are visually impaired
- 1.1 billion people lack access to improved drinking water
- 1.6 million people die every year from diarrheal diseases
- 240 million people are infected with schistosomiasis
- 2.6 billion people lack simple "improved latrines"
- 90% are children under 5
- 133 million people suffer from high intensity intestinal helminths infections
- Due to inadequate drinking water, sanitation and hygiene
Fig. 7 for Question 3

Report on the spread of Zika in Brazil

March 2, 2015. Between February and April 2015, almost 7,000 cases of this strange illness (Zika) were reported, though in most situations they were mild.

May 7, 2015. The cases were confirmed as Zika a few months later. Brazil made a statement that Zika virus was spreading in the country — the first time it was transmitted locally in the Americas. The very same day, the WHO declared an alert to Zika virus infection.
Fig. 8 for Question 4

- 1986:
  - Uganda
  - Ethiopia
  - Mali
  - Cameroon
  - Central African Republic
  - Angola
  - Zambia
  - South Africa

- 2001:
  - 20-39%
  - 10-20%
  - 5-10%
  - 1-5%
  - 0-1%
  - Data unavailable
  - Outside region

Source: UN AIDS
World Food and Oil Prices
2000 to 2011

Food Price Index
Average Oil Price

Correlations: 93.9%

Fig. 10 for Question 4

US grain feeding cars

<table>
<thead>
<tr>
<th>Million tonnes of US grain used to make ethanol for cars</th>
<th>Millions of people the grain could feed</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>350</td>
</tr>
<tr>
<td>80</td>
<td>300</td>
</tr>
<tr>
<td>60</td>
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<td>20</td>
<td>150</td>
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<tr>
<td></td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>0</td>
</tr>
</tbody>
</table>

Fig. 11 for Question 4

SOURCE: EARTH POLICY INSTITUTE, USDA, UN
Section A

This question is compulsory.

1 (a) A group of students carried out fieldwork at Tokyo DisneySea, a theme park in Tokyo, Japan, based on famous characters from Disney.

The students decided to consider the guiding question 'How does the distance of origin from Tokyo DisneySea influence the number of visitors?'. They used secondary data to answer this guiding question.

Students considered two methods to present the percentage of visitors from each region. Fig. 1 is a pie chart showing the percentage of visitors from each region. Fig. 2 (Insert) is a map with flow lines showing the percentage of visitors from each region.

Origin of visitors to Tokyo DisneySea

![Pie Chart]

Fig. 1

(i) Suggest one possible source of secondary data the students might have used and explain why it is useful for them to consider secondary data for this study. [2]

Reserve 1m for suggest:
- Internet sources
- DisneySea company performance report
- Newspaper report

Reserve 1m for explain:
- Such data are difficult to collect in a student's project.
- More reliable data on origin of visitors as such study is done by companies with more resources.

(ii) Using Fig. 1, calculate the percentage of tourists to Tokyo DisneySea from Kanto. [1]

- 68% (0m for no units)

(iii) Which method used to show origin of visitors is preferable for this study? Suggest reasons for your answer. [2]

Reasons for choosing flow line map:
- A flow line map provides spatial reference, where the distance of origin from DisneySea is clearly visible, OR
- This answers the guiding question more directly than the pie chart.
Reasons for choosing pie chart:
- A very useful visual representation; easy for comparison of data
- A pie chart shows the data as a percentage of a whole, which the flow line map does not.

(iv) From studying the information in Figs. 1 and 2, what conclusions might the students draw about the guiding question ‘How does the distance of origin from Tokyo DisneySea influence the number of visitors?’

Reserve 1m for relationship:
- The shorter the distance of origin from Tokyo DisneySea, the greater the percentage of visitors visiting Tokyo DisneySea (the reverse is true too).

Reserve 3m for supporting information with reference to Figs. 1 and 2:
- From Fig. 1, 97% of visitors visiting Tokyo DisneySea are domestic tourists. Only 3% of visitors come from overseas.
- From Fig. 2, 68% of visitors come from Kanto, the region which Tokyo DisneySea is situated within.
- The next nearest region, Chubu, has 12% of visitors in DisneySea and Kinki, further away, has 7% of visitors in DisneySea.
- A possible anomaly is Tohoku, which has only 3% of visitors in DisneySea despite being the second nearest region to the theme park.

(b) The students examined whether some attractions of Tokyo DisneySea are more popular than others. Fig. 3 (insert) shows a tourist map and an event schedule of Tokyo DisneySea. They chose to conduct their fieldwork at three sectors of the theme park, which are Mediterranean Harbour, Mysterious Island, and Lost River Delta.

They counted the number of visitors at these attractions on a particular day at two timings, 0830hrs and 1230hrs. Table 1 shows data collected on visitor numbers in Tokyo DisneySea.

<table>
<thead>
<tr>
<th>Table 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Results of fieldwork</td>
</tr>
</tbody>
</table>

Pedestrian volume at Tokyo DisneySea  
Date / Day: 16th June 2018 / Saturday  
Duration of each conduct: 5 minutes

<table>
<thead>
<tr>
<th>Attraction</th>
<th>0830hrs</th>
<th>1230hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mediterranean Harbour</td>
<td>75</td>
<td>36</td>
</tr>
<tr>
<td>Mysterious Island</td>
<td>96</td>
<td>130</td>
</tr>
<tr>
<td>Lost River Delta</td>
<td>124</td>
<td>165</td>
</tr>
</tbody>
</table>

(i) Describe how students can collect the data shown in Table 1. [4]

1m each, max 4m:
- Select an appropriate site to observe and count the number of visitors for the three attractions.
- An appropriate site can be the entry or exit of the attractions, or a road/bridge where visitors will pass by.
- Observe and count for 5 minutes.
- Using either the pocket tally counter or a traditional tally method.
- Ensure all counts are conducted for all selected sites at the same time (i.e. 0830hrs and 1230hrs) on the same day (i.e. 16th June 2018).
(ii) The students decided to present the data shown in Table 1 using a graph. Using Fig. 4 (Cover Page), present the results appropriately.

0.5m for each bar correctly drawn:

![Bar Graph]

(iii) Students used the data in Table 1 and concluded that 'Mediterranean Harbour is the least popular attraction in Tokyo DisneySea'. However, during the review of their fieldwork, they felt that this conclusion might not be reliable.

With the help of Fig. 3, suggest one reason why this is so and suggest one way to make the data collection process more reliable.

Reserve 1m for suggest one reason:
- From Fig. 3, there are 4 other attractions where pedestrian flow is not calculated. They might have more/less pedestrian volume as compared to Mediterranean Harbour.
- From Fig. 3, there are timings where special events are held in Mediterranean Harbour, which are different from the timings students counted the number of pedestrians. These events may affect pedestrian volume.

Only accept answers using Fig. 3 as support

Reserve 1m for suggest one way:
- Conduct a pedestrian count at all 7 attractions.
- Conduct a pedestrian count at more timings to ensure reliability of conclusion (i.e. 1430, 2030...).

(c) (i) The students learnt from their Geography lessons that a theme park caters to tourists of different age groups and wanted to investigate how this is so.

Suggest a hypothesis the students could test in Tokyo DisneySea.

- Tokyo DisneySea has different types of attractions that cater to tourists of different age groups.

The focus of the question is to investigate how a theme park caters to different tourists. Students should include an element of 'how' (i.e. attractions, facilities, characters...) in their hypothesis.
(ii) Describe how you would collect data for this investigation, and explain how you would present and use the data to test the hypothesis suggested in (c)(i).

1m each, max 3m for **data collection method:**
- Students can use a survey questionnaire to collect data.
- They should design a short questionnaire with appropriate questions such as 'What is your favourite attraction/facility/character in Tokyo DisneySea?'.
- Age is a compulsory question in this case.
- Questions can be mainly closed questions so that it is easier for the visitors to respond and easier to analyse results.

1m each, max 2m for **considerations when collecting data:**
- Students should use a stratified sampling according to age.
- The strata can include youths below 25, working adults from 26 – 50, and senior citizens above the age of 50.
- Since age is a sensitive yet relevant question for this study, age can be asked in terms of a range (i.e. below 25, 25-50, above 50).

1m each, max 2m for **presenting data and forming conclusion:**
- The data collected can be presented appropriately in a comparative bar graph or pie chart comparing the favourite attraction for visitors of different age groups.
- If the data shows that people of different age groups come to Tokyo DisneySea due to different attractions, the hypothesis is proven valid.

Section B
Answer one question from this section.

2 (a) Study Fig. 5, which shows a map of Smith and Ross Islands.

(i) Using Fig. 5, name and describe the characteristics of landform W.

Reserve 1m for naming: W is a tombolo.
1m each, max 2m:
- W is roughly 500m long.
- It is a narrow strip of sand.
- It joins Smith and Ross Islands together.
(ii) With reference to Fig. 5, explain how landform W, named in (a)(i), may have been formed. [5]

- Landform W is formed by longshore drift in the southeast direction.
- The abrupt bend in coastline of Smith Island allows longshore drift to continue southeast.
- When wave energy is lower, sediments are deposited in the sea and over time, the sediments accumulate and rise above the water as a spit.
- When the spit extends off Smith Island and connects with Ross Island, a tombolo is formed.

(b) Explain how the media can promote tourism. [4]

- Media reports about a country can influence tourists' decisions to visit.
- Media can come in the form of online crowdsourcing platforms like TripAdvisor or travel writers.
- On one hand, positive reviews such as friendliness of locals, interesting culture, and attractive scenery can encourage tourists to visit.
- On the other hand, negative reviews such as violence, disease outbreaks, and natural disasters can deter tourists from visiting.
- Media also allows tourists to be more aware of destinations previously not considered as tourist destinations.

(c) Study Fig. 6, which shows aspects of sustainable tourism in Costa Rica, a small state in Central America.

30% of Costa Rica is protected area.
93% of electricity is generated from renewable resources.
Locals are trained as hotel operators, tour guides, and park rangers.
Non-governmental organisations research on and anticipate future environmental issues.
"Most popular destination" for ecotourism awarded by TripAdvisor.
Government certifies hotels according to their standards of eco-friendliness.

Sustainable tourism in Costa Rica

Fig. 6

Explain how sustainable tourism in Costa Rica may benefit both the economy and the environment. [5]
1m each, max 3m for positive economic impacts:
- If locals are trained in the tourism industry, this can bring employment opportunities to the locals in tourism-related jobs such as hotel operators, guides, and park rangers.
- These employment opportunities will then bring an increase in individual income and tourism company profits in Costa Rica.
- Since more tourists will know Costa Rica as a popular ecotourism destination as recommended by TripAdvisor, this will bring in more tourism revenue through travelling and consuming services in Costa Rica.
- If there is an increase in tourist arrivals due to accolades awarded by TripAdvisor, the local authorities would then have to further develop their infrastructure and facilities, which allow tourism to operate on a larger scale and these infrastructure can be used by locals too.

1m each, max 3m for positive environmental impacts:
- 30% of Costa Rica is protected area. This means that fragile natural environments are being conserved so that the habitats will not be destroyed.
- If NGOs can help to anticipate future environmental issues of Costa Rica, tourism can continue to be sustainable where needs of visitors and locals can be addressed without further harm to the environment.
- If electricity is mainly generated using renewable resources, this will reduce the carbon footprint of tourism in Costa Rica and reduce the rate of GHG emissions.

1m each for general benefits in terms of sustainable tourism (applies to both economy and environment)
- If the government certifies hotels according to their level of eco-friendliness, visitors can patronise a hotel based on their environmental efforts so as to support the environmental conservation of a tourist place.
- If hotels adhere to environmental guidelines and continue to use energy generated through renewable resources, this can prevent a depletion/shortage of resources.

(d) 'All tourists want to go to destinations with rich culture.'
Do you consider this statement to be true? Explain your answer. [8]

Candidates MUST include the following type of material:

Places with rich culture (e.g. heritage tourism)
- Tourists travel to places to experience the rich cultures of different places.
- One example of such tourism includes heritage tourism, where people travel to experience the different cultures and history of places. This can take the form of museums, festivals, and national monuments.
- Some places are very unique that United Nations Educational, Scientific and Cultural Organisation (UNESCO) has declared them World Heritage Sites.
- One such example is Alhambra in Granada, Spain, where it acts as historical evidence of the presence of the Moorish empire in Andalusia, Southern Spain.
- (Other types of tourism include film-induced and pilgrimage tourism)
Candidates may include the following types of material:

**Places of conflict**
- Another type of destination tourists go to is a place of conflict, where wars, battles, manmade tragedies or unfavourable political situations have occurred. This is also known as dark tourism.
- Dark tourism sites can include battlefields, museums, memorials, or places of mass death events. Survivors, relatives and friends of those affected, or simply people interested to know more about an event take part in dark tourism.
- An example of such a site is the ruins of Pompeii, Italy, where the entire ancient city was engulfed by a volcanic eruption of Mt Vesuvius.

**Places with good facilities**
- Another type of destination tourists go to is a place with good facilities, where it offers a wide range of activities and functions with specialised buildings.
- One example is MICE tourism, which refers to Meetings, Incentives, Conventions, and Events. Places offering MICE tourism have venues hosting large-scale events with supporting infrastructure like hotels and retail shops. Business travellers and international event organisers usually partake in such tourism.
- For example, Singapore is popular for MICE as it is located along international air routes and is also associated with other forms of tourism. It is named the leading convention city in Asia Pacific for more than 10 years. Having large infrastructure such as Marina Bay Sands and the Singapore Sports Hub, it plays host to a range of MICE activities, such as the Youth Olympic Games in 2010.

A full answer does not need to include all the above points. Candidates at each level will show the following characteristics:

**Level 1 (0 - 3 marks)**
At this level answers will be generalised or with minimal support if any stand were given at all. Reasoning is rather weak and expression may be unclear. A basic answer that has little development. Answers lack example or evidence, or it is sketchy that it adds little support to the answer.

L1/1 – Listing of different types of tourism only
L1/2 – Listing of different types of tourism with description that is not elaborate/accurate
L1/3 – Description of different types of tourism with no place-specific examples

**Level 2 (4 - 6 marks)**
Discussion of the given factor will be supported by appropriate detail. Or, both agreement and disagreement are considered, but support is patchy so that the answer is not full. Good reasoning and logic in parts of the answer with good expression in places. Some examples or evidence will be presented to support answers in at least one place.

L2/4 – Description of given factor (i.e. place with rich culture) with example
L2/5 – Description of given factor and one other factor with 1 example
L2/6 – Description of given factor and one other factor with 2 examples

**Level 3 (7 marks)**
At this level, answers will be comprehensive and supported by sound knowledge. The different factors which contribute to the growth in international tourism are considered and well supported. Reasoning is clear and logical with good expression of language. Examples or other evidence to support answers are extensive.
L3/7 – Description of 3 factors with 3 examples

**Level 3 (8 marks)**
L3/7 + conclusion to explain stand to the statement.

**Sample conclusion**
In conclusion, I do not agree with the statement. If tourism is an interaction between the different characteristics of tourist profiles and tourist destinations, different types of tourists will choose to go to different types of tourist destinations. A place with rich culture only attracts a particular type of tourists. Different tourist destinations have unique place characteristics that appeal to tourists of various profiles. Relatedly, the purpose of travel, which is different according to tourist profiles, also affects the types of tourist destinations tourists visit.

3. (a) Study Fig. 7 and Fig. 8 (Insert). Fig. 7 shows the characteristics of waves located at points X and Y. Fig. 8 shows a satellite image of Swanage, a coastal area in United Kingdom, where points X and Y can be found.

![Characteristics of waves](image)

**Fig. 7**

(i) Using Fig. 7, compare the difference in wave characteristics at points X and Y. [3]

1m each, max 3m:
- The wave at X has a longer wavelength than the wave at Y by 5 m.
- The wave at Y has a taller wave height than the wave at X by 0.9 m.
- The wave at Y is steeper than the wave at X.
- The wave at Y has a higher wave frequency than the wave at X.

(ii) With the help of Fig. 8, account for the difference in wave characteristics at points X and Y as described in (a)(i). [5]

1m each, max 5m:
- The wave characteristics and coastal processes at points X and Y differ due to wave refraction, where waves change direction as they approach an indented coastline.
- X is a bay while Y is a headland.
- Wave energy will converge at Y, resulting in higher wave energy, therefore having a steeper wave.
- This means that more erosion will occur at Y.
• Wave energy will diverge at X, resulting in lower wave energy, therefore having a gentler wave.
• This means that more deposition will occur at X.

(b) Explain the impact to coastal communities if mangroves were to be cleared.

1m each, max 4m:
• The coastal area will be exposed to threats of erosion – the property of coastal communities might be under threat of undermining by tides and waves.
• The coastal communities may face dangers from coastal hazards such as tsunamis and storm surges.
• The coastal communities will lose a food source as mangroves are breeding ground for marine biodiversity.
• This can adversely affect the livelihoods of fishermen as there will be less fish to catch.
• The coastal communities will lose raw materials for building and daily living as mangroves provide wood for fuel and construction.
• The water quality of the coast will deteriorate since mangroves act as natural filters to purify water.

(c) Study Photograph A (Insert), which shows groynes along a coastline.

Describe the features of the groynes shown on Photograph A and assess the usefulness of groynes as a means of protecting the coastline.

1m each, max 2m for description:
• The groynes are a series of low walls spaced apart.
• Constructed at right angles to the coast.

1m each, max 2m for usefulness:
• It is useful in protecting the coastline as it interrupts longshore drift and absorbs wave energy.
• This means that sediments will be deposited on the updrift side of the groyne instead of being transported away from longshore drift.

1m each, max 2m for limitations:
• However, it is unsightly to build; it spoils the natural beauty of the beach.
• The downdrift side is not protected by the groyne – this means longshore drift will still erode away the sediments on the downdrift side.

(d) 'Coastal areas are always endangered by human activities.'

Do you consider this statement to be true? Explain your answer.

Candidates may include the following types of material:

Climate change (endangering)
• Coastal areas might be endangered by climate change.
• The rapid changes in sea temperatures and sea levels may make it less conducive for corals to grow; if these changes take place faster than the ability of corals to adjust, coral bleaching may occur. When sea temperatures increase, corals expel the algae and turn white. Corals will starve to death in the long term.
• An example is the Great Barrier Reef. The northern sector closest to the Equator is severely bleached. The corals will die soon if the effects are not reversed.
• Furthermore, mangroves will have trouble colonising areas further inland as they will be competing for space with human activities.
• For example, in the Gulf of Thailand, more than 5 metres of shoreline disappears yearly but the mangroves cannot migrate further inland due to human uses.

Coastal development (endangering)
• Coastal areas are also endangered by coastal development. Land is reclaimed for housing, industry, and recreational uses.
• This results in clearing of corals and mangroves, where the coasts become more vulnerable to wave action. Coastal waters are also polluted due to human activities.
• For example, Singapore experienced rapid urbanisation since 1960s. A significant part of the mangroves in Lower Seletar and Kranji regions were cleared for land reclamation.
• Land reclamation also took place in Okinawa, Japan, where coral reefs are suffocated by the sediments.

Encouraging the growth of coral reefs (not endangering)
• However, human action can also benefit coastal areas.
• Measures can be taken to encourage the growth of coral reefs in coastal areas, for instance.
• For example, Maldives has been implementing a coral-growing programme since 1996 to curb beach erosions on many islands. Manmade structures with solar-generated electricity were used to speed up coral growth.
• While the main motivation might be to use corals to reduce coastal erosion, such actions are also benign in sustaining and improving the quality of coastal areas.

A full answer does not need to include all the above points.
Candidates at each level will show the following characteristics:

Level 1 (0 - 3 marks)
At this level answers will be generalised or with minimal support if any stand were given at all. Reasoning is rather weak and expression may be unclear. A basic answer that has little development. Answers lack example or evidence, or it is sketchy that it adds little support to the answer.

L1/1 – Listing of factors only
L1/2 – Listing of factors with description that is not elaborate/accurate
L1/3 – Description of factors with no place-specific examples

Level 2 (4 - 6 marks)
Discussion of one human activity will be supported by appropriate detail. Or, both agreement and disagreement are considered, but support is patchy so that the answer is not full. Good reasoning and logic in parts of the answer with good expression in places. Some examples or evidence will be presented to support answers in at least one place.

L2/4 – Description of one human activity endangering/benefitting coastal areas with example
L2/5 – Description of two human activities with 1 example
L2/6 – Description of three human activities with 2 examples
**Level 3 (7 marks)**  
At this level, answers will be comprehensive and supported by sound knowledge. The different human activities that endanger or benefit coral reef ecosystems are considered and well supported. Reasoning is clear and logical with good expression of language. Examples or other evidence to support answers are extensive.

L3/7 – Description of 3 activities with 3 examples

**Level 3 (8 marks)**  
L3/7 + conclusion to explain stand to the statement.

**Sample conclusion**  
In conclusion, I do not agree with the statement. While there are many human activities that threaten coastal areas, human activities can also actively seek to improve the state of coastal areas. Maldives is an example which uses coral reefs as recreation and tourism but actively also improves the well-being of these organisms. The case of Maldives shows that human uses of the coast does not have to be mutually exclusive from benefiting the natural ecosystems as well.

End of Paper
GEOGRAPHY
Secondary 4 Express

SETTER: Mrs Wong PL
VETTERS: Mr Loo WB & Mr Jason Ting

Additional Materials: Answer Paper
1 Insert
1 Cover Page

READ THESE INSTRUCTIONS FIRST
Write your name, class and index number on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid/tape.

Section A
Answer one question.

Section B
Answer one question.

Candidates should support their answers with the use of relevant examples.
Sketch maps and diagrams should be drawn whenever they serve to illustrate an answer.

At the end of the examination, fasten all your work securely together.
The number of marks is given in the brackets [ ] at the end of each or part question.
Section A

Answer one question from this section.

1 (a) Study Fig. 1 which shows temperature data for City A and City B.

<table>
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<th>Months</th>
<th>J</th>
<th>F</th>
<th>M</th>
<th>A</th>
<th>M</th>
<th>J</th>
<th>J</th>
<th>A</th>
<th>S</th>
<th>O</th>
<th>N</th>
<th>D</th>
</tr>
</thead>
<tbody>
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<td>6.5</td>
<td>9</td>
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<td>17.5</td>
<td>17</td>
<td>16</td>
<td>11</td>
<td>7.5</td>
<td>5</td>
</tr>
<tr>
<td>City B Latitude: 1° N</td>
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<td>27</td>
<td>27.5</td>
<td>28</td>
<td>28</td>
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<td>27.5</td>
<td>27.5</td>
<td>27.5</td>
<td>26</td>
<td>26.5</td>
</tr>
</tbody>
</table>

Fig. 1

(i) Describe the differences in temperature between City A and City B.

- City A has lower mean annual temperature than City B.
- City A’s mean annual temperature is 10.5°C while City B is 27.3°C.
- City A’s annual temperature range is higher than that of City B.
- City A’s annual temperature range is 13.5°C while City B’s annual temperature range is 2°C.

2m – mean annual temperature + self-generated data
2m – annual temperature range + self-generated data

(ii) Account for the differences in temperatures between City A and City B in January and July.

- City A is at a higher latitude than City B.
- Thus, the higher the latitudes, the lower the temperatures and the lower the latitudes, the higher the temperature.
- The angle of incidence at A which is at a higher latitude is smaller than the angle of incidence at B.
- Thus, heat is spread over a larger area, thus, temperature is lower than at B.
- Also, at A, the sun rays have to pass through a thicker layer of atmosphere. Thus, more heat will be absorbed, thus lowering temperature.
- City A will experience 4 seasons, thus there will be a greater annual temperature range between summer and winter.

4@1m
At least one explanation each for mean annual temperature and annual temperature range.
(b) Explain why the temperature at the top of mountains differ from that at the foot of the mountain.

- Mountain top (higher altitude) experiences lower temperatures than at the foot of the mountain (lower altitude).
- Sun’s solar energy enters the atmosphere and reaches the earth’s surface in the form of shortwave radiation.
- About 45% of shortwave radiation is directly absorbed by the earth’s surface, heating it up. The warm surface then emits heat in the form of longwave radiation.
- At higher altitudes, you are further away from the earth’s surface which is directly heated by the sun.
- Thus, at higher altitude, the temperature is lower than at lower altitude.
- Air is less dense at higher altitudes.
- Air contains less water vapour and dust particles, thus, air absorbs less heat, resulting in lower temperatures at higher altitudes.

3m – using shortwave and longwave radiation to explain why mountain top has lower temperature than at the coast.
2m – using denser air at lower altitudes and why

(c) Study Figs. 2A and 2B, which show different pressure systems over Asia in January and July.

![Pressure system in January](image1)

![Pressure system in July](image2)

Key:

- Pressure in millibars
- Wind direction
Explain how and why the pressure systems are different in January and July.

- In January, in the northern hemisphere, it is experiencing winter.
- Thus, the lower temperatures in Central Asia results in higher pressure in Central Asia.
- In Central Asia, the continental effect results in very low temperatures in the interior of Central Asia, thus resulting in a high pressure belt in Central Asia, with very high pressure of less than 1035.
- In July, in the northern hemisphere, it is experiencing summer.
- Thus, Asia, which is in the northern hemisphere experience higher temperatures, which result in lower pressure, especially over the north eastern part of India.

2m – describe pressure in January over Asia and Australia and reason
2m – describe pressure in July over Asia and Australia and reason
Award 1 mark if students can state the continental effect in either January or July.

(d) ‘The conditions that give rise to the formation of convective rain and relief rain are the same.’

To what extent do you consider this statement to be true? Give evidence to support your answer.

Candidates may provide information about some of the following points.

Formation of convective rain
- Air near the land surface is intensely heated up.
- Heated air expands and rises.
- Rising air cools.
- Cooling results in the condensation of large amounts of water vapour.
- Cumulo-nimbus clouds are formed.
- This results in heavy convectional rain, which may be accompanied by thunder and lightning.

Example
Mainly in equatorial countries like Singapore and Malaysia. Rain in the late afternoon and/or early evening.

Formation of relief rain
- Winds from the sea blow inland.
- When wind comes in contact with highland, they are forced to rise.
- As the air rises up the highlands, it cools.
- Condensation takes place and rain falls on the windward side.
- By the time air moves over the highland, it has almost lost its moisture.
- The leeward / rain-shadow side has little or no rain.

Examples:
The Death Valley, California, USA – very dry
Found on the leeward side of the Sierra Nevada where the air is very dry.
Possible conclusion
- For any rain formation, it always involves warm air rising, then cools and condenses to form clouds and when rain drops are heavy enough they will fall as rain.
- However, the conditions for forming convectional rain and relief rain are different.
- For convectional rain to form, the air is heated by contact with the warm ground.
- While for relief rain to form, the air needs to blow towards a mountain, and since the air cannot blow through the mountain, it is forced to rise.

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

Candidate at each level will show the following characteristics:

**Level 1 (0-3m)**
At this level, answers will be generalized or with minimal support if any given at all. Reasoning rather weak and expression may be unclear.
A basic answer that has little development.
Answers lack examples or other evidence, or it is so sketchy that it adds little support to the answer.
L1/1 - 1 statement on convectional rain or relief rain
L1/2 - 2 statements on convectional rain and/or relief rain
L1/3 - 3 statements on convectional rain and/or relief rain

**Level 2 (4-6m)**
At this level, answers will have disagreement or agreement and supported by appropriate detail.
Both agreement and disagreement are considered, but support is patchy so that the answer is not full.
Good reasoning and logic in parts of the answer with good expression in places.
Some examples or other evidence will be presented to support answers in at least one place in answer.
L2/4 - explanation of one type of rain with 1 located example
L2/5 - explanation of one type of rain with 1 located example and some simple description of another type of rain
L2/6 - explanation of 2 types of rain with 2 located examples

**Level 3 (7-8m)**
At this level, answers will be comprehensive and supported by sound knowledge.
Both agreement and disagreement are considered and well supported.
Reasoning is clear and logical with good expression of language.
Examples or other evidence to support answers will be extensive.
L3/7 - Explanation of 2 types of rain + stating clearly the conditions
L3/8 - L3/7+ stating if the conditions for formation of the 2 types of rain are the same and in what way they are different
2 (a) Study Fig. 3 which shows a relief map of Hawaii, a volcanic island.

Hawaii, a volcanic island

Contour Interval: 300m

Mauna Kea

Mauna Loa

Fig. 3

Describe the relief of Hawaii as shown on the map.

- Hawaii is dominated by 4 main peaks.
- The highest part of Hawaii is in the central part known as Mauna Loa.
- There are 2 main volcanoes in the central part of Hawaii, namely Mauna Loa and Mauna Kea.
- Mauna Loa is 4000m asl while Mauna Kea is 3000m.
- The eastern coast of Hawaii has more gentle slopes as seen by the broader contour lines. / The western coast of Mauna Loa is steeper than the eastern coast.
- The slope of Mauna Loa is not symmetrical, the base is quite wide.
(b) Study Photograph A (Insert), which shows part of Mauna Loa, a shield volcano in Hawaii.

Describe the features of the volcanic landscape in Photograph A.

- The whole area is relatively gentle.
- There is active lava flow as seen by the red hot lava flow.
- There is smoke coming out from underneath the ground.
- The hardened lava is black in colour.
- The area shows a few big craters in the background.
- There are many fissures and fractures found on the surface of the landscape.

(c) Study Fig. 4 which shows a news report on the volcanic activity of Mt Kilauea, Hawaii, on 6 June 2018.

6 June 2018

Updates From Kilauea: Dozens More Homes Destroyed

Since the eruption of the Kilauea volcano in May 3 2018 on the Big Island, it has belched out about 250 million cubic meters of lava, making it one of the largest eruptions in decades in Hawaii.

Kilauea has been flinging out lava and ash, destroying 577 homes and forcing over 2,000 people to evacuate.

Over the past week, the lava erupting from Hawaii's Kilauea volcano advanced through two small residential subdivisions along Kapoho Bay, reaching the Pacific Ocean, and wiping out nearly a hundred homes. Kapoho Bay used to be a scenic bay dotted with beach homes, lush greens and turquoise waters.

Civil defense officials said that the lava has now filled in Kapoho Bay, "what used to be the bay is now all lava bed, new land, almost a mile out into the ocean."

Fig. 4
With reference to Fig. 4, describe the effects of the Kilauea eruption on the environment and the lives of the people living in this region. [4]

- Lava flow through the residential areas and destroy homes. The lava with high temperatures of between 500° C to 1400° C burns the areas it flow through. People are forced to evacuate, so they may become homeless.
- Lava flow may block main roads, so that emergency help cannot reach the isolated families. [Evidence: Kilauea volcano advanced through two small residential subdivisions along Kapoho Bay.]
- Kilauea eruption also spew out ash and lava and some people may suffer from breathing problems.
- The amount of lava was so much that the bay area is now filled with lava, creating new land that was not there before. There was an extension of the shoreline. [Evidence: ... lava has now filled in Kapoho Bay, what used to be the bay is now all lava bed, new land, almost a mile out into the ocean.]
- The tourist area of Kapoho Bay is destroyed, thus affecting the livelihood of those who depend on tourism. [Evidence: Kapoho Bay used to be a scenic bay dotted with beach homes, lush greens and turquoise waters.]

4@1m
Do not award marks to copied text from the news report.

(d) Describe the successes and limitations of the Kyoto Protocol that attempts to reduce greenhouse gas emissions. [5]

Successes of international agreements – Max 3m
- Some countries like Finland, Greece and Ireland were able to reduce their greenhouse gas emissions by 5% below their 1990 levels.
- Some more developed countries can help LDCs with very high greenhouse gas emissions by installing energy-efficient infrastructure in LDCs. This in turn help LDCs to reduce their greenhouse gas emissions.

Limitations of international agreements – Max 3m
- The Kyoto Protocol does not make it compulsory for countries with low greenhouse gas emissions to provide support to other countries.
- e.g. countries with low greenhouse gas emissions do not have to provide energy-efficient technology to countries with high greenhouse gas emissions.
- Countries which did not sign the Kyoto Protocol continued to contribute significantly to the global emissions.
- Such countries include large industrial countries like USS, China and India.
The main cause of recent global climate change is largely due to natural factors rather than anthropogenic factors.'

To what extent do you consider this statement to be true? Give evidence to support your answer.

Candidates may provide the following information:

**Causes of climate change**

**Natural cause – variations in solar output**

- Natural causes like variations in solar output can also cause climate change.
- The sun emits solar radiation due to changes in its magnetic field. An increase in magnetic activity results in increase in solar radiation. The magnetic activity of the sun has a cycle that lasts about 11 years. This solar activity cycle was discovered through the study of sunspots.
- Sunspots are cooler regions on the sun's surface that appear as dark spots. Although the spots are cooler, there are more sunspots when solar activity is high. This is because the areas surrounding the sunspots radiate more energy, which compensates for the lower temperatures of the sunspot areas. In short, sunspot activity is linked to the amount of solar radiation emitted.
- The solar activity cycle is associated with the earth's cycles of high and low global temperatures. In 2000, there was an increase in the number of sunspots which coincided with higher solar activity. Global temperatures increased during this period.

**Natural cause – volcanic eruption**

- Volcanic eruptions also cause changes in global temperatures.
- When a volcano erupts, large volumes of carbon dioxide, water vapour, sulphur dioxide, dust and ash are released into the atmosphere.
- Sulphur dioxide reacts with water to form sulphur-based particles in the atmosphere. Together with dust and ash, these particles reflect solar energy back into space. This results in global dimming.
- An example of cooling influence is the eruption of Mt Pinatubo in the Philippines in 1991.
- The Pinatubo eruption released 17 million tonnes of sulphur dioxide into the atmosphere, forming sulphur-based particles that spread around the earth in two weeks.
- The sulphur-based particles reflected solar energy back into space and lowered temperatures in the northern hemisphere by as much as 0.6 C. The temporary lowering of global temperatures lasted for two years in some locations.

**Human / Anthropogenic causes**

- The burning of fossil fuels produces a large amount of energy that is important for human activities. Fossil fuels include oil, coal and natural gas.
- They are needed for industries, transportation and domestic and commercial activities. Due to the high carbon contents, fossil fuels contribute to the increase in greenhouse gases by producing large amount of carbon dioxide when burnt.
• The burning of fossil fuels is the highest contributor of greenhouse gases which leads to temperature increase.

**Deforestation**

• Another human activity that is responsible for temperature increase is **deforestation**.
• Forests absorb billions of tonnes of carbon dioxide every year via photosynthesis, thus taking in a large amount of global greenhouse gas emissions.
• With deforestation, there are fewer trees and plants to absorb carbon dioxide, leading to an increase in carbon dioxide levels in the atmosphere.
• There is plenty of carbon in the soil, accumulated through the decay of organic matter such as dead leaves and animals.
• When deforestation exposes soil to sunlight, the soil temperature increases, increasing the rate of carbon oxidation. This releases more carbon dioxide into the atmosphere. Thus, deforestation is the second largest contributor of greenhouse gases which then leads to temperature increase.

**Possible conclusion**

Human causes of climate change are the main cause of the rise in global temperatures. This is due to the increased amount of human activities in both DCs and LDCs, especially in changing the land use from forests to building homes, factories and transport systems, etc.

The rate of global rise in temperatures has been exceptionally fast and between 1980 and 2000, temperature has increased by 0.4°C in 20 years. Over the last 100 years, the earth has seen a gradual rise in temperature of 0.7°C. This period coincided with the rise of industrialisation.

Natural causes like increase in sunspots do not occur on a frequent basis and thus does not contribute to a sustained rise in global temperature. Also, volcanic eruptions have few long term effects on the earth's climate. The temporary cooling will stop once the volcanic dust and ash settle. For example, two years after Mt Pinatubo had erupted, global climate returned to its original state. Furthermore, despite the large volumes of carbon dioxide released by volcanoes, human activities since the mid-1980s have resulted in more than 100 times the amount of carbon dioxide emitted by volcanoes.

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

**Candidate at each level will show the following characteristics:**

**Level 1 (0-3m)**

At this level, answers will be generalized or with minimal support if any given at all. Reasoning rather weak and expression may be unclear.

A basic answer that has little development. Answers lack examples or other evidence, or it is so sketchy that it adds little support to the answer.

L1/1 – Identify natural factors / anthropogenic factors
L1/2 – 2 simple statements on natural / anthropogenic factors
L1/3 – 3 simple statements on natural and/or anthropogenic factors
Level 2 (4-6m)
At this level, answers will have disagreement or agreement and supported by appropriate detail.
Both agreement and disagreement are considered, but support is patchy so that the answer is not full.
Good reasoning and logic in parts of the answer with good expression in places.
Some examples or other evidence will be presented to support answers in at least one place in answer.
L2/4 – either detailed explanation of one human factor or one natural factor
L2/5 – either detailed explanation of one human factor or one natural factor + some description natural or human factor + at least 1 supported example for either human factor or natural factor
L2/6 – both human and natural factor + 2 supported examples

Level 3 (7-8m)
At this level, answers will be comprehensive and supported by sound knowledge.
Both agreement and disagreement are considered and well supported.
Reasoning is clear and logical with good expression of language.
Examples or other evidence to support answers will be extensive.
L3/7 – 2 human factors and 1 natural factor + 3 supported examples or 2 natural factors and 1 human factor + 3 supported examples
L3/8 – as above + conclusion – has to be because of human factors and reason must be given to qualify for L3/8. If the conclusion is 'natural factors play a greater role', only L3/7 will be awarded.
Section B

Answer one question from this section.

3 (a) Study Fig. 5, which shows access to clean water in some developed and less developed countries.

Access to clean water in 1990 and 2004

![Bar graph showing access to clean water in different countries in 1990 and 2004.](image)

Fig. 5

(i) With reference to Fig. 5, describe the changes in access to clean water between 1990 and 2004 for the various developed countries and less developed countries.

- **Overall statement**: DCs tend to have 100% access to clean water while LDCs tend to have less access to clean water. *
- Between 1990 and 2004, DCs like USA and UK have 100% access to clean water.
- Among the LDCs, Ethiopia has the lowest percentage access to access to clean water; only 22% of the population has access to clean water. In fact, for Ethiopia, the access to clean water dropped by 2%.
- Throughout the years from 1990 to 2004, South Africa had the most access to water among the LDCs. (at least 80%)
- Between 1990 and 2004, many LDCs have increased in their access to clean water. This include countries like South Africa, Kenya, Cote d’Ivoire and Congo.**
- The LDCs which have a drop in percentage of population with access to clean water are Nigeria and Ethiopia.
- Among the LDCs, Cote d’Ivoire has the greatest increase in access to clean water.

* Reserve 1m for describing difference in DCs vs LDCs.
** Reserve 1m for general trend in LDCs.
(b) Study Fig. 6 (Insert), which shows the effects of a lack of sanitation.

With reference to Fig. 6 (Insert) and with information you have studied, explain how access to better sanitation can improve the level of health in less developed countries. [5]

Access to better sanitation can improve the level of health in LDCs:
- More access to clean water for daily use will lead to less contamination by bacteria.
- Reduces infant mortality rate; less children will die below 1 year of age. (90% of these are children under 5 years of age.)
- Life expectancy of the people will increase. (1.6 million people die every year of diarrheal diseases)
- Reduces the number of deaths from diarrheal diseases. (Attributable to lack of access to safe drinking water and basic sanitation)*
- Reduces chances of being infected by various water-borne diseases. Eg. helminths infection and parasitic worms (information from Fig. 6)*
- Reduces the chances of people suffering from trachoma, a disease due to using contaminated water to clean the face and eyes. (information from Fig. 6)*

5@1m
Students need to infer from the information given in the info-graphics of Fig. 6.
*1m max for quoting any of the 3 mentioned diseases, namely, diarrheal diseases, helminths infection and parasitic worms and trachoma.

(c) Study Fig. 7 (Insert) which shows how Zika spread around the world and a report on the spread of Zika in 2015 in Brazil. Zika is an infectious disease caused by mosquito bites.

With reference to Fig. 7 (Insert), describe and comment on the spread of the Zika virus. [4]

- **Relocation diffusion** is the introduction of a disease to a location outside its current geographic range.
  - E.g. by 2007, Zika has spread to No 4 on the map and then across the Pacific Ocean to No 5 in 2013. Then by 2014 – 2016, Zika spread to northern parts of South America. (spread to other parts of the world in chronological order)
- **Expansion diffusion** occurs when an infectious disease is spread outwards from its source.
  - E.g. Zika originated in eastern Africa in 1947 and then spread to other countries in eastern part of Africa
  - E.g. By 2014, Zika has already spread to Brazil and by 2015, Zika has become epidemic in Brazil. Zika has already to a very large part of Brazil.

Reserve 2m for stating expansion diffusion and 1 example and max 3m for stating relocation diffusion and 1 example.

Expansion diffusion: use Brazil (the report) and/or within eastern Africa.
Relocation diffusion: use the spread of Zika around the world and/or spread of Zika from eastern Africa to western Africa.
March 2, 2015. Between February and April 2015, almost 7,000 cases of this strange illness (Zika) were reported, though in most situations they were mild.

May 7, 2015. The cases were confirmed as Zika a few months later. Brazil made a statement that Zika virus was spreading in the country — the first time it was transmitted locally in the Americas. The very same day, the WHO declared an alert to Zika virus infection.

(d) Explain the economic impacts of infectious diseases like malaria and Zika.

- The household has to increase spending on medical expenses to treat malaria/Zika. The treatment of such diseases can be very expensive.
- The government has to set aside funds for the provision of healthcare for patients of such infectious diseases. The expenditure can be as high as 40% of public healthcare spending as the government has to spend on building hospitals and clinics and buying medication and insecticide-treated nets.
- People infected with malaria/Zika are not able to work due to poor health, which results in a loss of income for these people.
- Over time, people infected with malaria/Zika will fall ill so often, that there will be a loss of productivity for the workforce.
- The country will face a slowdown of economic growth, as there will be less investment and tourism coming into the country.
(e) 'The main challenge in controlling the spread of malaria is the ease in population movement.'

To what extent do you consider this statement to be true? Give evidence to support your answer. [8]

Candidates may provide the following information:

Population movements due to efficient transport and communications (socio-economic challenge)
- Population movement is the movement of people across borders. The movement of people spreads and transmits disease to new locations. Malaria control programmes become ineffective because it is difficult to monitor the movement of people.
- The volume and speed of movement are increasing and occurring at a larger scale than before. This is due to the ease of travelling with better transport links between countries and the efficiency of modern transportation.
- E.g. the Greater Mekong sub region in Southeast Asia sees a large-scale population movement.

Socio-economic challenges in controlling the spread of malaria (TB p227)

Limitations of healthcare (a socio-economic challenge)
- This is due to the ability of the malaria parasites to develop resistance to anti-malarial drugs.
- The resistance to drugs is caused by the incomplete treatment of an infected person. This causes some of the surviving parasites to develop resistance to the drugs.
- In 2009, resistance to anti-malarial drugs was observed along the Thai-Cambodian border.

Effects of climate change (an environmental challenge)
- Climate affects the temperature and the amount of rainfall an area receives.
- Changes in temperature and the amount of rainfall affect the behaviour and range of mosquitoes.
- Increased temperatures can cause mosquitoes to breed and mature faster.
- Increased rainfall also provides more pools of stagnant water for mosquitoes to breed. These suitable conditions have also lengthened the periods in which mosquitoes can breed and transmit malaria. This results in a greater frequency of malaria infection.

Effect of monsoons (an environmental challenge)
- The number of malaria cases increases during monsoons.
- This is because monsoons bring high rainfall during the wet season. High rainfall is strongly correlated with the high increase in malaria cases in India.
- In urban areas in India, heavy rains created long lasting pools of stagnant water for mosquitoes to breed. The mosquitoes transmit malaria to the urban population when they mature.
A full answer does not need to include all the above points.

Candidate at each level will show the following characteristics:

**Level 1 (0-3m)**
At this level, answers will be generalized or with minimal support if any given at all.
Reasoning rather weak and expression may be unclear.
A basic answer that has little development.
Answers lack examples or other evidence, or it is so sketchy that it adds little support to the answer.
L1/1 – 1 simple statement on ease in population movement
L1/2 – 2 simple statements on ease in population movement and/or other challenges
L1/3 – 3 simple statements on ease in population movement and/or other challenges

**Level 2 (4-6m)**
At this level, answers will have disagreement or agreement and supported by appropriate detail.
Both agreement and disagreement are considered, but support is patchy so that the answer is not full.
Good reasoning and logic in parts of the answer with good expression in places.
Some examples or other evidence will be presented to support answers in at least one place in answer.
L2/4 – Explain population movement only + 1 example.
L2/5 – Explain population movement + describe another challenge e.g. climate change + 1 example
L2/6 – Explain population movement + explain another challenge, e.g. resistance to anti-malarial drugs / insecticide-resistant mosquitoes + 2 examples

**Level 3 (7-8m)**
At this level, answers will be comprehensive and supported by sound knowledge.
Both agreement and disagreement are considered and well supported.
Reasoning is clear and logical with good expression of language.
Examples or other evidence to support answers will be extensive.
L3/7 – Explain population movement + 2 other challenges + 3 examples
L3/8 – above + conclusion

**Possible conclusion:**
Agree – population movement is the main challenge
Population movement is very widespread and common among DCs and LDCs due to a variety of reasons.
With the rise of technology and tourism, people travel to other places. If they are infected, they will bring malaria with them to other destinations.
For DCs, population movement can be due to tourism; for LDCs, population movement can be due to seeking employment in other states and other countries.
(a) Study Fig. 8 (insert), which shows the changes in HIV/AIDS prevalence in Africa between 1986 and 2001.

![Fig. 8](map_of_africa)

With reference to Fig. 8 (insert), describe the extent of spread of HIV/AIDS in sub-Saharan Africa between 1986 and 2001.

- General trend: Between 1986 and 2001, there was an increase in HIV/AIDS prevalence rate. (Reserve 1m for general trend)
  - In 1986, only Uganda has the highest HIV/AIDS, with 10-20%.
  - In 1986, the surrounding countries of Uganda, e.g. Zambia has only 1 - 5% prevalence rate.
  - But in 2001, most of southern Africa experienced the highest HIV prevalence of 20 to 39%, which in 1986 only shows the lowest HIV prevalence of 0-5%
  - However, in 2001, Uganda did not suffer a very high HIV/AIDS, its HIV/AIDS prevalence rate has been reduced to 1 - 5%

4@1m
Reserve 1m for stating general trend
Reserve 1m for data and specific examples.

(b) Explain the social factors that can contribute to the spread of HIV/AIDS in Africa.

- Social stigma: HIV patients may face various forms of discrimination, which may include refused access to health care facilities, rejection by family or community and being expelled from school or denial from housing. This has led to people with HIV/AIDS not revealing their HIV/AIDS status. This will lead to greater spread of HIV.
- Education: In some places, people are not aware of how it is being transmitted due to a lack of education. As a result, these people do not know how to protect themselves and avoid being infected, causing them to be vulnerable to HIV/AIDS.
- Education: In some countries, cultural practices that keep girls from knowing about sex and sexuality until marriage may also cause the spread of the disease.
- Lifestyle choices: drug injection or sharing of needles, or refusal to use condoms may lead to people to be at greater risk of being infected.
- Lapses in medical practice: Blood transfusion tainted with HIV/AIDS. This often occurred in countries where there was no effective blood screening before blood was donated.

(c) Study Figs. 9A and 9B, which show consumption of food in USA and India respectively in 2011.

```plaintext
(c) Use information from Figs. 9A and 9B to describe and account for the differences in the food consumption pattern in USA and India in 2011.
```
Compare the food consumption pattern in USA and India. (max 2m)

- USA has a higher average daily food intake than India, a difference of 1183 kcal.
- USA also consumes more meat than India, a difference of 18%.
- On the other hand, India consumes more cereals/grains than USA, a difference of 36%.
- USA consumes more sugar and fats than India, a difference of 18%.

Reasons for the differences food consumption pattern. (max 2m)

- USA consumes more meat than India because USA has higher income than India. With more income, the people will be able to afford to consume more varieties of food.
- Meat is generally more expensive than other food, thus, it will require the people to have higher income.
- India consumes more cereals/grains than USA because India is a country where many people are vegetarians. Thus, there will be a high consumption of cereals and grains.
- USA consumes more sugar and fats than India because people in USA have fast foood as their regular diet. / USA has more availability of fast food.

(d) Study Fig. 10 (Insert), which shows the relationship between food and oil prices between 2000 and 2011. Fig. 11 (Insert), shows the comparison between US grain production used to make ethanol for cars and the number of people the grains could feed.

Using information from Figs. 10 and 11, suggest difficulties in achieving food security in less developed countries (LDCs). [5]
With reference to Fig. 10

- Prices of food and oil are on the rise. With a rise in oil / petroleum, there will be an increase in the price of fertilisers as well as transport.
- Modern farming uses oil (petroleum) products to fuel farm machinery and to transport farm produce.
- As fuel costs increase, transport costs and machine operation costs increase as well. As a result, the prices of food rise also rise.

With reference to Fig. 11

- After 1995, more grains are used to produce ethanol for cars instead of using them to feed the population.
- Grains are food crops but they are used for industrial purposes, thus, there will be less food available for consumption. Farmers will convert their farmland to growing grains for industrial use rather than growing food. Many crops in the US became fuel for vehicles instead of food for people.
- Over time, the price of grains will increase as people demand for grains as food increase.
- Rise in food prices are transferred to the consumer. But for many people in LDCs, a very large portion of their income is spent on food. Any increase in food prices may result in them not being able to afford enough food to meet their basic nutritional needs. (the link)

2m – to explain how increase in oil prices will lead to rise in food prices
2m – to explain how more grains are used to produce ethanol for cars will lead to rise in food prices
1m – to summarise the link of these 2

(e) ‘Political and economic strategies are the most important in overcoming the problem of food shortage.’

To what extent do you consider this statement to be true? Give evidence to support your answer. [8]

Candidates can provide the following information:

Political and economic strategies
- National strategies e.g. Agricultural policies e.g. Felda scheme; high-tech farming in Singapore
- International strategies e.g. food programmes and aid assistance e.g. responding to emergencies; cash and voucher scheme; school meals; Global Agriculture and Food Security Programme 2010.

High-tech farming in Singapore
Agrotechnology parks that house high-tech farms have been built in Singapore in the 1970s. These parks are equipped with necessary infrastructure that modern farms require, such as computers. Local farms produce up to 8% of vegetables, 8% of fish and 26% of eggs
consumed in Singapore. As a result, Singapore can ensure that there is some form of food supply even during times of disaster. However, high-tech farms involve high cost in setting up. This will mean higher prices of food produce for consumers. Shortage of trained workers for high-tech farming results in this industry being a very small one. Local consumers still choose to buy cheaper food produce from neighbouring countries like Malaysia and Thailand.

Responding to emergencies
The United Nations World Food Programme (UNWFP) provides emergency food assistance during wars and natural disasters. Food was successfully delivered to 99% of targeted recipients during the 2011 Sudan food crisis. However, during such emergencies, food prices may be inflated, which results in high costs for UNWFP. The extent of its assistance may also be limited by how much funds they can receive from donor countries.

Other strategies
- Technological e.g. storage, Green Revolution; GM crops
- Agricultural e.g. multiple cropping and crop rotation; water and soil conservation
- Leasing farmland to other countries
- Social e.g. support local farms; population control

Population control
In many LDCs, the growth in food production is slower than population growth. This is particularly a concern in countries like India and many African countries, where hunger and malnutrition are widespread. In addition, it is estimated that the world population will reach 10 billion by 2050. Controlling the population growth in LDCs is essential to ensure that people have sufficient food.

One way to alleviate this problem is for people to be educated on family planning as well as to be given access to reproductive health facilities. For example, in certain areas in the Philippines, the supply of traditional staples like fish are not enough to meet the increasing demand for food due to high population growth. In some villages in the Philippines, community-based family planning programme have been introduced to provide people with contraceptives. These programmes aim to slow down population growth to alleviate the problem of food shortage.

Possible conclusion
Political and economic strategies are most important as they are strategies taken by the government. They are likely to have the resources and capital to help in ensuring food security for their citizens.

The government will introduce suitable technological strategies like Green Revolution or Genetically-modified crops to the local farmers to increase their yields. Poor farmers in LDCs will not have enough resources to embark on such big projects like Green Revolution involving the construction of irrigation and drainage facilities, the purchase of High-yielding variety seeds.

The government can also introduce national strategies to support local farmers and to control population growth. Once the government can initiate strategies that can help with food production within the country, then there will be less chances of needing food aid.
A full answer does not need to include all the above points.

Candidate at each level will show the following characteristics:

**Level 1 (0-3m)**

At this level, answers will be generalized or with minimal support if any given at all. Reasoning rather weak and expression may be unclear. A basic answer that has little development. Answers lack examples or other evidence, or it is so sketchy that it adds little support to the answer.

L1/1 – 1 statement on political and economic strategy
L1/2 – 2 statements on political and economic strategy or other strategies
L1/3 – 3 statements on political and economic strategy and other strategies

**Level 2 (4-6m)**

At this level, answers will have disagreement or agreement and supported by appropriate detail. Both agreement and disagreement are considered, but support is patchy so that the answer is not full. Good reasoning and logic in parts of the answer with good expression in places. Some examples or other evidence will be presented to support answers in at least one place in answer.

L2/4 – 1 political strategy + 1 example
L2/5 – 1 political strategy + some description of another strategy + 2 examples
L2/6 – 1 political strategy + 1 other strategy + 2 examples

**Level 3 (7-8m)**

At this level, answers will be comprehensive and supported by sound knowledge. Both agreement and disagreement are considered and well supported. Reasoning is clear and logical with good expression of language. Examples or other evidence to support answers will be extensive.

L3/7 – 1 political strategy + 2 other strategies + 3 examples
L3/8 – above + conclusion

End of Paper
GEOGRAPHY

Paper 1

Additional Materials:   Answer Paper
                        2 Inserts

READ THESE INSTRUCTIONS FIRST

Write your index number and name on all the work you hand in.
Write in dark blue or black pen on both sides of the paper.
You may use a pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.

Section A
Answer Question 1.

Section B
Answer one question.

Write answers on the Answer Paper provided.
Start your answers to each question on a fresh sheet of paper.
Sketch maps and diagrams should be drawn whenever they serve to illustrate an answer.
Insert 1 contains Fig. 1 and Fig. 3 for Question 1.
Insert 2 contains Photographs A, B and C for Question 2 and Fig. 4, and Photographs D, E and F for Question 3.

At the end of the examination, fasten all your work securely together, including Insert 1.
The number of marks is given in brackets [ ] at the end of each question or part question.
The total number of marks for this paper is 50.

<table>
<thead>
<tr>
<th>For Examiner's Use</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Question 1</td>
<td>/ 25</td>
</tr>
<tr>
<td>Question 2 / 3</td>
<td>/ 25</td>
</tr>
</tbody>
</table>

Total / 50

Setter:  Mrs Wong Check Siew
Vetters: Ms Noraini and Mrs Ho-Tam Mee Fong

This answer paper consists of 6 printed pages including this cover page.
Section A
This question is compulsory.

1. (a) A group of students from Sunny Secondary School in Singapore carried out a geographical investigation on tourism in Sunway City, a popular tourist destination near Kuala Lumpur, Malaysia.

Prior to their fieldwork, the students embarked on a secondary research to find out more about Sunway City. They compiled their secondary findings shown in Fig.1 (Insert 1).

(i) Explain the usefulness of secondary data to this investigation. [2]

(ii) Add annotations to Fig.1 (Insert 1) to describe the factors (other than Sunway Lagoon Theme Park) which encourage visitors to visit Sunway City. [3]

(b) At Sunway Lagoon, the students stationed themselves outside the entrance of Sunway Lagoon Theme Park to administer a questionnaire to investigate the guiding question:
"How does distance travelled influence the number of visitors to Sunway Lagoon Theme Park?"

Study Fig. 2, which shows the questionnaire designed by the students.

**Questionnaire**

1. Gender: Male  Female

2. Which country do you come from? .........................

3. How old are you? (please circle) 15 & under  16-25  26-35  36-45  46-55  56 & above

4. How long are you staying in the theme park? (please circle)
   1 hour  2 hours  3 hours  4 hours  5 hours  6 hours & above

5. How big is your group? Alone  2-3  4-5  6-7  8-9  10 & above (please circle)

**Fig. 2**

(i) Explain why the entrance of Sunway Lagoon Theme Park is an appropriate choice. [1]
(ii) Study Table 1, which shows the results of the age and gender of the visitors interviewed.

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Age and gender of visitors ((Q 1 and 3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>15 &amp; under</td>
</tr>
<tr>
<td></td>
<td>16-25</td>
</tr>
<tr>
<td></td>
<td>26-35</td>
</tr>
<tr>
<td></td>
<td>36-45</td>
</tr>
<tr>
<td></td>
<td>46-55</td>
</tr>
<tr>
<td></td>
<td>56 &amp; above</td>
</tr>
<tr>
<td>Gender</td>
<td>Total</td>
</tr>
<tr>
<td>Male</td>
<td>100</td>
</tr>
<tr>
<td>Female</td>
<td>100</td>
</tr>
<tr>
<td>Total</td>
<td>200</td>
</tr>
</tbody>
</table>

How representative is the sample of the visitors interviewed? 

(iii) Study Table 2, which shows the results of origin of visitors by country.

<table>
<thead>
<tr>
<th>Table 2</th>
<th>Origin of visitors by country (Q 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Country</td>
<td>No. of visitors</td>
</tr>
<tr>
<td>Malaysia</td>
<td>55</td>
</tr>
<tr>
<td>Singapore</td>
<td>20</td>
</tr>
<tr>
<td>Saudi Arabia</td>
<td>20</td>
</tr>
<tr>
<td>Indonesia</td>
<td>18</td>
</tr>
<tr>
<td>China</td>
<td>17</td>
</tr>
<tr>
<td>India</td>
<td>13</td>
</tr>
<tr>
<td>Japan</td>
<td>13</td>
</tr>
<tr>
<td>Australia</td>
<td>12</td>
</tr>
<tr>
<td>South Korea</td>
<td>10</td>
</tr>
<tr>
<td>USA</td>
<td>8</td>
</tr>
<tr>
<td>UK</td>
<td>7</td>
</tr>
<tr>
<td>Thailand</td>
<td>7</td>
</tr>
<tr>
<td>Total</td>
<td>200</td>
</tr>
</tbody>
</table>

What conclusions can be drawn from Table 2 in response to the guiding question “How does distance travelled influence the number of visitors to Sunway Lagoon Theme Park?”.
(iv) A student analysed the origin of visitors from Malaysia as shown in Table 3, and represented it on a map. Fig. 3 (Insert 1) is their partially completed map.

Use the data in Table 3 to complete the map. [2]

<table>
<thead>
<tr>
<th>State</th>
<th>No. of visitors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Johor</td>
<td>11</td>
</tr>
<tr>
<td>Kelantan</td>
<td>2</td>
</tr>
<tr>
<td>Melaka</td>
<td>5</td>
</tr>
<tr>
<td>Negeri Sembilan</td>
<td>4</td>
</tr>
<tr>
<td>Pahang</td>
<td>3</td>
</tr>
<tr>
<td>Penang</td>
<td>5</td>
</tr>
<tr>
<td>Perak</td>
<td>7</td>
</tr>
<tr>
<td>Selangor</td>
<td>15</td>
</tr>
<tr>
<td>Trengganu</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>55</strong></td>
</tr>
</tbody>
</table>

(c) One student thought there may be a link between length of stay in Sunway Lagoon Theme Park and the size of the group (Q 4 and Q 5 in the questionnaire shown in Fig. 2).

State a hypothesis the student could use for this inquiry and explain how the hypothesis can be tested. [4]

(d) As an extension to their study, the students wanted to assess the environmental impact of tourism in the theme park.

Design a bi-polar recording sheet with 2 aspects. [3]

(e) Another group of 8 students travelled to Kuala Lumpur City Centre to investigate the hypothesis "Shops cater more to tourists than to the locals".

Describe how the students, working in pairs can go about collecting data using a land use transect and ensuring its reliability. [5]
Section B

Answer one question from this section

2. (a) Study Photograph A (Insert 2), which shows a coastal landform. Describe the features of landform X and account for its formation. [5]

(b) With the aid of a labelled diagram, explain the term "wave refraction". [4]

(c) Study Photograph B (Insert 2), which shows a coastal environment. Use Photograph B to describe two dominant erosional processes and explain how geology of the coast may have contributed to the rate of erosion at this coastal environment. [4]

(d) Study Photograph C (Insert 2), which shows different coastal protection measures. Compare the coastal protection measures shown in Photograph C. [4]

(e) "Man pose a greater threat to the coral reef ecosystem than nature." To what extent do you agree with this statement? Use examples to support your answer. [8]

3. (a) Study Fig. 4 (Insert 2), which shows distribution of mangroves species in some parts of the World. Describe the distribution of mangroves species as shown on Fig. 4. [4]

(b) Study Photographs D to F (Insert 2), which show a mangrove ecosystem. Use the photographs to help explain how mangroves adapt to the harsh environment they grow in. [3]
(c) Study Tables 4A and 4B, which show top 10 countries/territories tourism earnings in 2000 and 2015 respectively.

### Table 4A

**Top 10 countries/territories tourism earnings in 2000**

<table>
<thead>
<tr>
<th>Rank</th>
<th>Country/Territory</th>
<th>Revenue (billion $US)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>USA</td>
<td>82.4</td>
</tr>
<tr>
<td>2</td>
<td>France</td>
<td>33.0</td>
</tr>
<tr>
<td>3</td>
<td>Spain</td>
<td>30.0</td>
</tr>
<tr>
<td>4</td>
<td>Italy</td>
<td>27.5</td>
</tr>
<tr>
<td>5</td>
<td>UK</td>
<td>21.9</td>
</tr>
<tr>
<td>6</td>
<td>Germany</td>
<td>18.7</td>
</tr>
<tr>
<td>7</td>
<td>China</td>
<td>16.2</td>
</tr>
<tr>
<td>8</td>
<td>Canada</td>
<td>10.8</td>
</tr>
<tr>
<td>9</td>
<td>Austria</td>
<td>9.8</td>
</tr>
<tr>
<td>10</td>
<td>Australia</td>
<td>9.23</td>
</tr>
</tbody>
</table>

### Table 4B

**Top 10 countries/territories tourism earnings in 2015**

<table>
<thead>
<tr>
<th>Rank</th>
<th>Country/Territory</th>
<th>Revenue (billion $US)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>USA</td>
<td>204.5</td>
</tr>
<tr>
<td>2</td>
<td>China</td>
<td>114.1</td>
</tr>
<tr>
<td>3</td>
<td>Spain</td>
<td>56.5</td>
</tr>
<tr>
<td>4</td>
<td>France</td>
<td>45.9</td>
</tr>
<tr>
<td>5</td>
<td>UK</td>
<td>45.4</td>
</tr>
<tr>
<td>6</td>
<td>Thailand</td>
<td>44.5</td>
</tr>
<tr>
<td>7</td>
<td>Italy</td>
<td>39.4</td>
</tr>
<tr>
<td>8</td>
<td>Germany</td>
<td>36.8</td>
</tr>
<tr>
<td>9</td>
<td>Hong Kong (China)</td>
<td>36.1</td>
</tr>
<tr>
<td>10</td>
<td>Macau (China)</td>
<td>31.3</td>
</tr>
</tbody>
</table>

Compare the changes in top 10 countries tourism earnings between 2000 and 2015.

(d) Discuss the role of the media in influencing tourist decisions in their choice of destination.

(e) "Sustainable tourism is best achieved by adopting ecotourism." To what extent do you agree with this statement? Use examples to support your answer.
GEOGRAPHY

Paper 1

2236/01

29 August 2018
1 hour 40 minutes

INSERT 1

This insert contains Fig. 1 and Fig. 2 for Question 1. Attach Insert 1 to answer script.
Fig. 3 for Question 1

VISITORS FROM PENINSULAR MALAYSIA VISITING SUNWAY LAGOON THEME PARK

Key (No. of visitors)
- 1-3
- 4-6
- 7-9
- 10-12
- 13-15
GEOGRAPHY
Paper 1

2236/01
29 August 2018
1 hour 40 minutes

INSERT 2

This Insert contains Photographs A, B and C for Question 2 and Fig. 4, Photographs D, E and F for Question 3.

This insert consists of 4 printed pages including this cover page.
Photograph C for Question 2

Fig. 4 for Question 3

Mangroves species in some parts of the World
GEOGRAPHY

Paper 2

Additional Materials: Answer Paper
1 Insert
1:25 000 Topographical Map of Rose Belle

READ THESE INSTRUCTIONS FIRST

Write your name, class and register number on all the work you hand in.
Write in dark blue or black pen on both sides of the paper.
Do not use staples, paper clips, highlighters, glue or correction fluid.

Section A
Answer one question.

Section B
Answer one question.

Write all answers on the Answer Paper provided.
Candidates should support their answers with the use of relevant examples.
Sketch maps and diagrams should be drawn whenever they serve to illustrate an answer.
The Insert contains Fig. 1, Fig. 2 and Fig. 3 for Question 1, Fig. 4 and Photographs A and B for Question 2, Fig. 6 and Fig. 7 for Question 3, and Fig. 9, Fig. 10, Fig. 11 and Table 1 for Question 4.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.
The total number of marks for this paper is 50.

<table>
<thead>
<tr>
<th>For Examiner’s Use</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Section A</td>
<td>/25</td>
</tr>
<tr>
<td>Section B</td>
<td>/25</td>
</tr>
<tr>
<td>Total</td>
<td>/50</td>
</tr>
</tbody>
</table>

This document consists of 5 printed pages including this cover page.
Section A

Answer one question from this section.

1. a) Study Fig. 1 (Insert), which shows the global distribution of solar radiation. Describe the global variation in solar radiation above 200 kWh/m². [5]

b) Use an annotated diagram only to explain the formation of convectional rain. [4]

c) Study Fig. 2 (Insert), which shows the climate and location of Lisbon, Portugal.

Use Fig. 2 to describe and account for the temperature characteristics of Lisbon. [5]

d) Study Fig. 3 (Insert), which shows ways to mitigate the impact of storm surges.

With reference to Fig. 3, explain how damage to property caused by storm surges can be reduced. [3]

e) ‘Human actions are the main drivers of climate change.’ Using examples, discuss the accuracy of this statement. [8]
2 a) Study Fig. 4 (Insert), which shows the annual change in forest area by region from 1990 to 2010.

With reference to Fig. 4, compare the changes in forest areas in each region from 1990 to 2010. [5]

b) With the use of a specific example, discuss one measure which the government has implemented to mitigate climate change in an urban environment. [4]

c) Study Fig. 5, which shows the age of oceanic rocks and mid-ocean ridges on the ocean floor.

![Age of rocks relative to ridges on ocean floor](image)

Fig. 5

Describe the distribution of mid-ocean ridges in the world and the ages of the rocks where the ridges lie. [4]

d) Study Photograph A and Photograph B (Insert), which show the eruption of Mount Agung and its surroundings in Bali in 2017.

With reference to Photographs A and B, suggest the hazards associated with the eruption of Mount Agung. Draw a well-labeled cross-section of Mount Agung. [4]

e) 'The severity of impact of an earthquake is largely determined by its distance from the epicentre.' To what extent do you agree with this statement? Use examples to support your answer. [8]
Section B

Answer one question from this section.

3 a) Account for the prevalence of HIV/AIDS in less developed countries. [4]

b) Study Fig. 6 (Insert), which shows information about the lack of access to clean water.

With the help of Fig. 6, suggest the impacts caused by a lack of access to clean water. [5]

c) Study the 1:25 000 topographical map of Rose Belle.

Explain the factors to intensify and process sugar in the area shown. [4]

\[ \text{Diagram: } \]

<table>
<thead>
<tr>
<th>79</th>
<th>79</th>
</tr>
</thead>
<tbody>
<tr>
<td>76</td>
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<tr>
<td>05</td>
<td>05</td>
</tr>
<tr>
<td>09</td>
<td>09</td>
</tr>
</tbody>
</table>

\[ \]

\[ \]

d) Study Fig. 7 (Insert), which shows the production of corn and the use of corn for ethanol production in the U.S. from 1980 to 2009.

Describe the trend in the production of corn and the use of corn for ethanol in the U.S. from 1980 to 2009. Explain how this trend could threaten food security in less developed countries. [4]

e) 'Food safety is a primary cause for food consumption to vary in the world.' To what extent do you agree with this statement? Use examples to support your answer. [8]
4 a) Study Fig. 8, which shows the trends in infant mortality rates and female literacy from 1990 to 2004.

**INFANT MORTALITY AND FEMALE LITERACY**

![Graph showing infant mortality and female literacy trends](image)

**Fig. 8**

Describe and suggest reasons for the relationships between infant mortality rate and female literacy.

b) Study Fig. 9 (Insert), which shows the doctor to patient ratio in Lesotho and Table 1 (Insert), which shows some statistics for Lesotho.

With the help of Fig. 9 and Table 1, account for the life expectancy of the people in Lesotho.

c) Study Fig. 10 (Insert), which shows the areas infected by malaria and Fig. 11 (Insert), which shows the spread of malaria.

With reference to Fig. 10 and Fig. 11, describe the extent of malaria transmission in Indonesia and explain how malaria is spread.

d) Use examples to comment on the roles of the community and international organisations in managing the spread of infectious diseases.

e) 'The social impact of HIV outweighs the economic impact.'
Do you consider this statement to be true? Explain your answer.

THE END
GEOGRAPHY

Paper 2

INSERT

13 September 2018

1 hour 30 minutes

READ THESE INSTRUCTIONS FIRST

This Insert contains Fig. 1, Fig. 2 and Fig. 3 for Question 1, Fig. 4 and Photographs A and B for Question 2, Fig. 6 and Fig. 7 for Question 3, and Fig. 9, Fig. 10, Fig. 11 and Table 1 for Question 4.
Fig. 1 for Question 1

World Solar Radiation

Fig. 2 for Question 1

Climate and location of Lisbon, Portugal

Temperature (°C)  Rainfall (mm)

Location of Lisbon
Fig. 3 for Question 1

Mitigation against storm surges

Fig. 4 for Question 2

Annual change in forest area by region, 1990-2010

- Net loss
  - 1990-2000
  - 2000-2010
- Net gain
  - 1990-2000
  - 2000-2010

Scale: 1 million ha

(million ha/yr)

- Africa
- Asia
- Europe
- South America
Photographs A and B for Question 2

Photograph A

Photograph B
Lack of access to clean water is a huge problem

- **768 MILLION** people live without access to improved drinking water sources.
- **40 BILLION** hours are spent every year walking to collect water in Africa alone.
- **75%** of the burden of collecting water is borne by women and children.

Without clean water, kids are especially vulnerable to death and illness:

- **88%** of diarrheal cases are preventable through safe drinking water, basic sanitation and hygiene.
- **272 MILLION** school days are lost each year due to diarrhea.
Corn and ethanol production in the U.S.
Fig. 9 for Question 4

Doctor to patient ratio in Lesotho

Table 1 for Question 4

National statistics in 2016

<table>
<thead>
<tr>
<th></th>
<th>Lesotho</th>
<th>LDC Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expenditure on health per capita (US$)</td>
<td>276</td>
<td>280</td>
</tr>
<tr>
<td>Total expenditure on healthcare (% of GDP*)</td>
<td>7.6</td>
<td>4.7 – 10</td>
</tr>
<tr>
<td>GDP per capita (USD$)</td>
<td>859</td>
<td>979</td>
</tr>
<tr>
<td>Life expectancy (years)</td>
<td>48</td>
<td>68</td>
</tr>
</tbody>
</table>

*GDP stands for the total dollar value of all goods and services produced over a specific year, divided by population in the country.

Fig. 10 for Question 4
Fig. 11 for Question 4

Spread of malaria

END
GEOGRAPHY
Paper 1

Additional Materials: Answer Paper
2 Inserts

READ THESE INSTRUCTIONS FIRST

Write your index number and name on all the work you hand in.
Write in dark blue or black pen on both sides of the paper.
You may use a pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.

Section A
Answer Question 1.

Section B
Answer one question.

Write answers on the Answer Paper provided.
Start your answers to each question on a fresh sheet of paper.
Sketch maps and diagrams should be drawn whenever they serve to illustrate an answer.
Insert 1 contains Fig. 1 and Fig. 3 for Question 1.
Insert 2 contains Photographs A, B and C for Question 2 and Fig. 4, and Photographs D, E and F for Question 3.

At the end of the examination, fasten all your work securely together, including Insert 1.
The number of marks is given in brackets [ ] at the end of each question or part question.
The total number of marks for this paper is 50.

For Examiners' Use

<table>
<thead>
<tr>
<th>Question 1</th>
<th>/ 25</th>
</tr>
</thead>
<tbody>
<tr>
<td>Question 2 / 3</td>
<td>/ 25</td>
</tr>
<tr>
<td>Total</td>
<td>/ 50</td>
</tr>
</tbody>
</table>

Setter: Mrs Wong Check Siew
Vetters: Ms Noraini and Mrs Ho-Tam Mee Fong
Section A
This question is compulsory.

1. (a) A group of students from Sunny Secondary School in Singapore carried out a geographical investigation on tourism in Sunway City, a popular tourist destination near Kuala Lumpur, Malaysia.

Prior to their fieldwork, the students embarked on a secondary research to find out more about Sunway City. They compiled their secondary findings shown in Fig. 1 (Insert 1).

(i) Explain the usefulness of secondary data to this investigation. [2]

- Provides background information about the place and the vicinity given that the students may not have travelled to Sunway City.
- Helps the students to formulate relevant hypothesis and guiding questions for their fieldwork.
- Secondary data can also be used to confirm their findings from the primary data they collected.

Any 2

(ii) Add annotations to Fig. 1 (Insert 1) to describe the factors (other than Sunway Lagoon Theme Park) which encourage visitors to visit Sunway City. [3]

- Near to Malaysian towns & cities for locals to recreate eg 23 km to Kuala Lumpur City Centre.
- Accessible to those who wish to drive there including Singaporeans eg Federal Highway OR
  Accessible to those using Bus Rapid Transit eg Sunway Lagoon BRT Station
  OR Accessible to international tourists flying in eg Kuala Lumpur International Airport and Sultan Abdul Aziz Shah Airport.
- A range of accommodations available to meet different budget needs eg Sunway Clio Hotel, Sunway Pyramid Hotel etc.
- Availability of varied food outlets eg Taste Enclave, Busaba Thai etc.
- Convention Centre able to hold conferences/exhibitions for MICE tourists eg Sunway Pyramid Convention Centre
- Shopping mall for shopping eg Sunway Pyramid Shopping Mall/spa for those who wish to relax eg Mandara Spa.

Any 3
At Sunway Lagoon, the students stationed themselves outside the entrance of Sunway Lagoon Theme Park to administer a questionnaire to investigate the guiding question: "How does distance travelled influence the number of visitors to Sunway Lagoon Theme Park?"

Study Fig. 2, which shows the questionnaire designed by the students.

Questionnaire

1. Gender: Male  Female

2. Which country do you come from? .....................

3. How old are you? (please circle) 15 & under  16-25  26-35  36-45  46-55  56 & above

4. How long are you staying in the theme park? (please circle)
   1 hour  2 hours  3 hours  4 hours  5 hours  6 hours & above

5. How big is your group? Alone  2-3  4-5  6-7  8-9  10 & above
   (please circle)

Fig. 2

(i) Explain why the entrance of Sunway Lagoon Theme Park is an appropriate choice. [1]

- Expected high visitor traffic flow being the entrance and so will enable the students to achieve their sample size.
- People entering the theme park is the correct target for the survey.
- Questions asked in the survey do not require interviewees to have completed the theme park experience.

Any 1.
(ii) Study Table 1, which shows the results of the age and gender of the visitors interviewed.

<table>
<thead>
<tr>
<th></th>
<th>Age 15 &amp; under</th>
<th>16-25</th>
<th>26-35</th>
<th>36-45</th>
<th>46-55</th>
<th>56 &amp; above</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Male</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td>100</td>
<td>200</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td>100</td>
<td>200</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>200</td>
<td>200</td>
<td>200</td>
<td>200</td>
<td>200</td>
<td>200</td>
</tr>
</tbody>
</table>

How representative is the sample of the visitors interviewed?  

- A sample size of 200 provides a large enough data to make accurate analysis/conclusion.
- Gender sampling with equal numbers for both males and females each 50% ensures views of both genders are represented.
- Unequal representation of each age group.

Any 2

(iii) Study Table 2, which shows the results of origin of visitors by country.
Table 2
Origin of visitors by country (Q 2)

<table>
<thead>
<tr>
<th>Country</th>
<th>No. of visitors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malaysia</td>
<td>55</td>
</tr>
<tr>
<td>Singapore</td>
<td>20</td>
</tr>
<tr>
<td>Saudi Arabia</td>
<td>20</td>
</tr>
<tr>
<td>Indonesia</td>
<td>18</td>
</tr>
<tr>
<td>China</td>
<td>17</td>
</tr>
<tr>
<td>India</td>
<td>13</td>
</tr>
<tr>
<td>Japan</td>
<td>13</td>
</tr>
<tr>
<td>Australia</td>
<td>12</td>
</tr>
<tr>
<td>South Korea</td>
<td>10</td>
</tr>
<tr>
<td>USA</td>
<td>8</td>
</tr>
<tr>
<td>UK</td>
<td>7</td>
</tr>
<tr>
<td>Thailand</td>
<td>7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>200</strong></td>
</tr>
</tbody>
</table>

What conclusions can be drawn from Table 2 in response to the guiding question “How does distance travelled influence the number of visitors to Sunway Lagoon Theme Park?”:

- The nearer the origin of visitors is to Sunway Lagoon Theme Park, the more their numbers. For example, largest group of visitors are from Malaysia
- Outside of Malaysia, nearby countries such as Singapore and Indonesia have higher percentage while countries further away such as USA and UK have smaller percentage.
- However, there are anomalies such as Saudi Arabia, though further away is similar to Singapore OR Thailand though nearer is similar to UK

(iv) A student analysed the origin of visitors from Malaysia as shown in Table 3, and represented it on a map. Fig. 3 (Insert 1) is their partially completed map.

Use the data in Table 3 to complete the map.
Table 3
Origin of visitors from Malaysia (Q 2)

<table>
<thead>
<tr>
<th>State</th>
<th>No. of visitors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Johor</td>
<td>11</td>
</tr>
<tr>
<td>Kelantan</td>
<td>2</td>
</tr>
<tr>
<td>Melaka</td>
<td>5</td>
</tr>
<tr>
<td>Negeri Sembilan</td>
<td>4</td>
</tr>
<tr>
<td>Pahang</td>
<td>3</td>
</tr>
<tr>
<td>Penang</td>
<td>5</td>
</tr>
<tr>
<td>Perak</td>
<td>7</td>
</tr>
<tr>
<td>Selangor</td>
<td>15</td>
</tr>
<tr>
<td>Trengganu</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>55</strong></td>
</tr>
</tbody>
</table>

- Accurate plotting of Kelantan and Johor 1m each

(c) One student thought there may be a link between length of stay in Sunway Lagoon Theme Park and the size of the group (Q 4 and Q 5 in the questionnaire shown in Fig. 2).

State a hypothesis the student could use for this inquiry and explain how the hypothesis can be tested.

Hypothesis [1]
"Visitors travelling in groups are more likely to stay longer in Sunway Lagoon Theme Park" OR
"Solo traveller is likely to stay fewer hours in Sunway Lagoon Theme Park"
Accept plausible answer

Test hypothesis [3]
- Draw a scatter graph to show the relationship between the size of the group and their length of stay in Sunway Lagoon Park. With X-axis being size of the group and Y-axis the length of stay in Sunway Lagoon Park.
- Plot the data collected from the survey and draw a line of best fit.
- When group size increases with length of stay in Sunway Lagoon Park, the hypothesis is proven.

(d) As an extension to their study, the students wanted to assess the environmental impact of tourism in the theme park.

Design a bi-polar recording sheet with 2 aspects.
• Format of bi-polar recording sheet from +2 to -2
  Any 2 aspects
• Overcrowding/Increased congestion
• Littering/pollution
• Shortage of parking space
Accept plausible answer

(e) Another group of 8 students travelled to Kuala Lumpur City Centre to investigate the hypothesis "Shops cater more to tourists than to the locals".

Describe how the students, working in pairs can go about collecting data using a land use transect and ensuring its reliability.

Method [4]
• Obtain a base map with the main street, identify transect and note the start and end points. Each pair 1 transect.
• Design a land use classification key on the types of goods and services (eg hotel, money changer, souvenir shop, F&B, local grocery shop etc) offered based on secondary research prior to the field work.
• Walk along the transect and note down on the base map the types of goods sold and services offered on both sides of the line of transect.
• Draw a land use map of the street using the key for the various types of land use and mark those for tourists and locals respectively.

Reliability [1]
• All 4 pairs do the land use transect concurrently and adopt similar key for classification of goods & services and distinction between shops for tourists/locals.
Accept plausible answer

Section B

Answer one question from this section
2. (a) Study Photograph A (Insert 2), which shows a coastal landform. Describe the features of landform X and account for its formation.

Describe [2]
- Flat/gentle gradient
- Consist of fine sediments
- Extends north-north west from the mainland
- Wider nearer the mainland and narrower towards the offshore island

Any 2

Formation [3]
- When longshore currents encounter an abrupt change in coastline, the materials they carry will be deposited in the direction of the longshore drift.
- Over time, the accumulation of materials will result in a long, narrow ridge of sand called the spit, with one end attached to the mainland and the other end extending seawards.
- As the spit extends seawards, it joins an offshore island to form a tombolo.

(b) With the aid of a labelled diagram, explain the term "wave refraction".

- Wave refraction is a process by which waves change direction and is accompanied by change in speed and wave length of the waves, as they approach a coastline.
- Waves bend and converge at headlands because when waves travel from deep water into shallow water, friction with the sea bed will slow it down causing a decrease in speed and a decrease in wave length. As it bends towards a headland, it increased in wave height leading to greater erosive power.
- Waves diverge when they reach a bay, resulting in decreased wave height and less wave energy and more deposition.
- Labelled diagram

(c) Study Photograph B (Insert 2), which shows a coastal environment. Use Photograph B to describe two dominant erosional processes and explain how geology of the coast may have contributed to the rate of erosion at this coastal environment.
2 erosional processes [2]

- Hydraulic action: when waves strike against a rock surface, air will be trapped in the bedding planes and rock joints. The air that is compressed by the oncoming waves exert pressure on the bedding planes/joints. When the waves retreat, the air will expand. This repeated compression and expansion of air will weaken and shatter the joints.
- Abrasion/corrosion: when waves carry sediments such as pebbles, they are hurled against the coast, knocking and scrapping the surface areas of the coast/landform.
- Attrition: when rock particles carried by waves hit against each other, they break down into smaller pieces.
- Solution/Corrosion: Sea water reacts chemically with water soluble minerals in the coastal rocks and dissolves them

Geology [2]

- Rock type: more resistant rocks such as granite will erode at a slower rate compared to less resistant rocks.
- Rock structure: less jointed rocks will provide less opportunities for erosion to take place compared to rocks with more joints.

(d) Study Photograph C (Insert 2), which shows different coastal protection measures. Compare the coastal protection measures shown in Photograph C. [4]

Similarity [2]

- Both are hard engineering measures.
- Both are made of concrete materials and need time for construction.
- Both lined the coastline.

Differences [2]

- The concrete seawall is curved at the upper portion and lined the coastline while the tetrapods are stacked at an interlocking position and placed in front and at the base of the seawall.
- The seawall helps to absorb and break the waves energy OR curve seawall helps to deflect up rushing water back into the sea while the tetrapods help dissipate wave energy as they allow water to pass around them and so no powerful backwash is generated.

Accept plausible answer

(e) "Man pose a greater threat to the coral reef ecosystem than nature."

To what extent do you agree with this statement? Use examples to support your answer. [8]

Level 1 [0-3 marks]

At this level, answers will be generalized or with minimal support if any given at all. Reasoning is rather weak and expression may be unclear. A basic answer that has little development. Answers will lack examples or other evidence, or it is so
sketchy that it adds little support to the answer.

Level 2 [4-6 marks]
Disagreement or agreement will be supported by appropriate details. Or, both agreement and disagreement are considered, but support is patchy so that the answer is not full. Good reasoning and logic in parts of the answer with good expression in some places. Some examples or other evidence 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. Both agreement and disagreement are considered and well supported. Reasoning is clear and logical with good expression of language. Examples or other evidence to support answers will be extensive. Balance in answer. A clear indication will be given on whether Man or nature pose a greater threat to the coral reef ecosystem.

3. (a) Study Fig. 4 (Insert 2), which shows distribution of mangroves species in some parts of the World.

Describe the distribution of mangroves species as shown on Fig. 4. [4]

- High mangrove diversity of 36-46 species are found within 20°N and 20°S of the Equator in the coastal areas of Southeast Asia such as western Thailand, Peninsular Malaysia, Borneo, Philippines, Sulawesi and New Guinea.
- Moderately high mangrove diversity of 26-35 species are located in the coastal areas of Cambodia and southern Vietnam and another stretch from Myanmar to Bangladesh. The Indonesian islands of Sumatra and Java also fall into this category.
- Moderately low diversity of mangrove species of 14-25 skirts the outline of India and northern Vietnam.
- The northern coastline of Australia has a moderately higher number of mangrove species (14-25) compared to the western and eastern coastal areas which range from low (4-13) to very low number of species (1-3).
- Beyond 20°N and 20°S mangrove biodiversity dwindles to low (4-13) and very low (1-2) such as along the southern coastline of China and southwest and southeast Australia.

Any 4
Accept plausible answer

(b) Study Photographs D to F (Insert 2), which show a mangrove ecosystem. Use the photographs to help explain how mangroves adapt to the harsh environment they grow in.
Photograph D

- Prop/stilt roots to anchor the trees firmly in the soft and muddy soil. OR
- Exposed roots such as pencil-like roots to take in oxygen when they are not submerged in water to cope with the waterlogged/oxygen-deficient environment.

Photograph E

- The propagule starts to grow its sprout in the fruit while it is still on the mother tree. When it falls, its javelin-shaped helps to pierce the soft mud to germinate and grow into a sapling immediately.

Photograph F

- Salt secreting glands on the underside of the leaves helps them cope with the saline environment as the salt will be washed off by rain.

(c) Study Tables 4A and 4B, which show top 10 countries/territories tourism earnings in 2000 and 2015 respectively.
Table 4A
Top 10 countries/territories tourism earnings in 2000

<table>
<thead>
<tr>
<th>Rank</th>
<th>Country/Territory</th>
<th>Revenue (billion $US)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>USA</td>
<td>82.4</td>
</tr>
<tr>
<td>2</td>
<td>France</td>
<td>33.0</td>
</tr>
<tr>
<td>3</td>
<td>Spain</td>
<td>30.0</td>
</tr>
<tr>
<td>4</td>
<td>Italy</td>
<td>27.5</td>
</tr>
<tr>
<td>5</td>
<td>UK</td>
<td>21.9</td>
</tr>
<tr>
<td>6</td>
<td>Germany</td>
<td>18.7</td>
</tr>
<tr>
<td>7</td>
<td>China</td>
<td>16.2</td>
</tr>
<tr>
<td>8</td>
<td>Canada</td>
<td>10.8</td>
</tr>
<tr>
<td>9</td>
<td>Austria</td>
<td>9.8</td>
</tr>
<tr>
<td>10</td>
<td>Australia</td>
<td>9.23</td>
</tr>
</tbody>
</table>

Table 4B
Top 10 countries/territories tourism earnings in 2015

<table>
<thead>
<tr>
<th>Rank</th>
<th>Country/Territory</th>
<th>Revenue (billion $US)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>USA</td>
<td>204.5</td>
</tr>
<tr>
<td>2</td>
<td>China</td>
<td>114.1</td>
</tr>
<tr>
<td>3</td>
<td>Spain</td>
<td>56.5</td>
</tr>
<tr>
<td>4</td>
<td>France</td>
<td>45.9</td>
</tr>
<tr>
<td>5</td>
<td>UK</td>
<td>45.4</td>
</tr>
<tr>
<td>6</td>
<td>Thailand</td>
<td>44.5</td>
</tr>
<tr>
<td>7</td>
<td>Italy</td>
<td>39.4</td>
</tr>
<tr>
<td>8</td>
<td>Germany</td>
<td>36.8</td>
</tr>
<tr>
<td>9</td>
<td>Hong Kong (China)</td>
<td>36.1</td>
</tr>
<tr>
<td>10</td>
<td>Macau (China)</td>
<td>31.3</td>
</tr>
</tbody>
</table>

Compare the changes in top 10 countries tourism earnings between 2000 and 2015.

Similarity [2]
- USA remained the top both in 2000 and 2015.
- Tourism earnings for all top 10 countries increased

Differences [4]
- Gap between the 1st and 10th widened ($US73.17 b in 2000 versus $US173.2 b in 2015)
- In 2000, the top 10 countries were dominated by developed countries from the continents of North America and Europe (except for China in 7th position) but in 2015, Asian countries such as China and her territories and Thailand entered into the list (4 out of 10 countries). OR in 2015, Austria and Australia are out of the race.
- In 2000, Australia was the only country in the southern hemisphere in the top 10 countries but by 2015 all top 10 countries are from the northern hemisphere.
hemisphere.
- In terms of rate of increase, China experienced an impressive rate of 604% and USA 148%
Accept plausible answers

(d) Discuss the role of the media in influencing tourist decisions in their choice of destination.

- The media refers to channels such as television, radio, newspapers, internet and reports about a country or an area. The media influence tourist decisions by increasing their awareness of tourist destinations which they might not have considered.
- Positive reports such as the friendliness of the local population, interesting culture, shopping opportunities and attractive scenery can encourage tourists to visit a place.
- Negative reports such as disease outbreaks and natural disasters can deter tourists both immediately and for many years to come.
- The media through the internet also provides a convenient platform for tourists to make their travel plans such as booking of flights, hotel reservation etc through “expedia”, “trivago” etc.
Accept plausible answers

(e) “Sustainable tourism is best achieved by adopting ecotourism.”
To what extent do you agree with this statement? Use examples to support your answer.

Level 1 [0-3 marks]
At this level, answers will be generalized or with minimal support if any given at all. Reasoning is rather weak and expression may be unclear. A basic answer that has little development. Answers will lack examples or other evidence, or it is so sketchy that it adds little support to the answer.

Level 2 [4-6 marks]
Disagreement or agreement will be supported by appropriate details. Or, both agreement and disagreement are considered, but support is patchy so that the answer is not full. Good reasoning and logic in parts of the answer with good expression in some places. Some examples or other evidence 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. Both agreement and disagreement are considered and well supported. Reasoning is clear and logical with good expression of language. Examples or other evidence to support answers will be extensive. Balance in answer. A clear indication will be given on whether sustainable tourism is best achieved by adopting ecotourism.
Section A

Answer one question from this section.

1 a) Study Fig. 1 (Insert), which shows the global distribution of solar radiation.

Describe the global variation in solar radiation above 200 kWh/m².

- Areas experiencing high solar radiation above 200 kWh/m² are mainly located between 40°N to about 50°S. **OR**
- Stretches from 40°N in the northern hemisphere to 50°S in the Southern hemisphere. [General trend – 1m]

- High solar radiation of 201-225 kWh/m² is experienced in regions around the Tropic of Cancer (about 20°N), in Asia - countries such as the northern part of Myanmar, Bangladesh, India, Pakistan, Afghanistan, Iraq and the northern part of Saudi Arabia.
- On the South American continent where there is a stretch on the west stretching along Peru to Brazil and a small area on the eastern coast of Brazil.
- Dominant in Australia, covering most of the northeastern region.
- Major parts of the African continent, covering much of the northern and eastern coast and most of Madagascar, except its southern tip. [Any 2 points – 2m]

- The highest solar radiation of 226-250 kWh/m² is found in small regions on each continent. A small region is located in southern USA and northern Mexico.

- On the western coast of South America, stretching inland towards Peru and Bolivia.
- On the African continent, about 10°N to 30°N on both sides of the Tropic of Cancer, near the south western part of Africa in Namibia and a small area at the tip of Somalia, extending towards Yemen, Oman and a large part in the south of Saudi Arabia.
- In central Australia, spreading from inland towards the Northwestern coast of the country. [Any 2 points – 2m]

b) Use an annotated diagram **only** to explain the formation of convectional rain. Annotations @1m each

c) Study Fig. 2 (Insert), which shows the climate and location of Lisbon, Portugal.
Use Fig. 2 to describe and account for the temperature characteristics of Lisbon. [5]

- Large annual temperature range of about 13°C.
- Mild winters (4°C) and cool summers (17°C)
- Low mean annual temperature (about 9°C).
Account for [2m]
- Lisbon experiences mild winters and cool summers as it is near the coast. During winter, the sea takes a longer time to lose heat, thus warm air above the sea increases the temperature of coastal areas, resulting in mild winters (4°C). During summer, the sea takes a longer time to gain heat, thus cool air above the sea helps lower the temperature of coastal areas at Lisbon, hence summers are cool (17°C).
- Lisbon is also located at a high latitude of about 40°N, hence the angle of incidence from the sun is small as solar radiation spreads over a large area, resulting in a low mean annual temperature (about 9°C).

d) Study Fig. 3 (Insert), which shows ways to mitigate the impact of storm surges.

With reference to Fig. 3, explain how damage to property caused by storm surges can be reduced.

[3]
- Developments are restricted in the areas near the coasts by gazetting it for recreational use so as to prevent property damage during floods.
- Properties are elevated above ground using stilts and concrete to prevent flooding due to storm surges.
- Utility lines such as power and telecommunication lines and water supply networks can be buried underground to avoid damage by strong winds and storm surges which may cause breakage and disruption to services.

e) 'Human actions are the main drivers of climate change.' Using examples, discuss the accuracy of this statement.

[8]

Level 1 [0-3 marks]
At this level, answers will be generalized or with minimal support if any given at all. Reasoning is rather weak and expression may be unclear. A basic answer that has little development. Answers will lack examples or other evidence, or it is so sketchy that it adds little support to the answer.

Level 2 [4-6 marks]
Disagreement or agreement will be supported by appropriate details. Or, both agreement and disagreement are considered, but support is patchy so that the answer is not full. Good reasoning and logic in parts of the answer with good expression in some places. Some examples or other evidence 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. Both agreement and disagreement are considered and well supported. Reasoning is clear and logical with good expression of language. Examples or other evidence to support answers will be extensive. Balance in answer. A clear indication will be given to decide whether human actions are the main cause of climate change.

2 a) Study Fig. 4 (Insert), which shows the annual change in forest area by
region from 1990 to 2010.

With reference to Fig. 4, compare the changes in forest areas in each region from 1990 to 2010.

- Generally, the southern hemisphere experienced a greater net loss of forest area (about 6.5 million ha in South America, 6 million ha in Africa) than the northern hemisphere, which only experienced a small net loss of about 0.5 million ha in Asia from 1990 to 2010.
- In South America, there was a greater net loss of forest area from 1990-2000 (3.3 million ha) as compared to 2000-2010 (3.2 million ha).
- In Africa, there was also a greater net loss of forest area in 1990-2000 (3.2 million ha) than from 2000-2010 (2.8 million ha).
- One anomaly would be Asia where there was a net loss of forest area from 1990-2000 (0.5 million ha) but there was a net gain of forest area from 2000-2010 (2 million ha).
- Whereas in Europe, there was no net loss of forest throughout the years. There was a net gain of forest area from 1990-2010. From 1990-2000, there was a larger net gain (0.7 million ha) but a smaller net gain from 2000-2010 (0.5 million ha).

b) With the use of a specific example, discuss one measure which the government has implemented to mitigate climate change in an urban environment.

- One implementation by the Singapore government is the Green Mark Scheme which is an award to encourage the construction of energy efficient 'green' buildings.
- This can be done by installing solar panels / using natural ventilation instead of air-conditioning to reduce the usage of electricity. Lesser fossil fuels would be burnt to produce electricity, hence reduce the amount of greenhouse gases which are emitted.
- Less greenhouse gases would trap less heat in the atmosphere, mitigating the effects of climate change.
- The limitation would be that 'green' buildings cost more to build as materials such as bamboo or reusable or recycled metal are more expensive. Thus, some companies might not be keen to construct 'green' buildings.

Other possible strategies: Plant-a-tree, Singapore Green Plan

Accept other plausible answers.

Describe the distribution of mid-ocean ridges in the world and the ages of the rocks where the ridges lie.

Distribution of mid-ocean ridges – 2m

- The mid-ocean ridges are found in the middle of the Atlantic Ocean, where the mid-Atlantic ridge runs through North to South in the
middle of the ocean.
- A stretch of mid-ocean ridges run from the Indian Ocean near Somalia, southwards into the Southern Ocean and extends towards the south and eastern part of the Pacific Ocean.

Each point to have at least 2 details.

**Age of rocks – 2m**
- The ages of the rocks are mostly similar on both sides of the spreading ridge and increase with distance away from the spreading centre of each mid-ocean ridge.

**OR**
Right beside the spreading zone of the mid-ocean ridge, the rocks are the youngest (10 million years old), and increases in age. Furthest away from the spreading ridge, the rocks are the oldest (60 million years old) on both sides of the ridge.

- One anomaly would be that in the Southern Ocean at the Southeast of Australia, there is a band of rocks 60 million years old on one side of the spreading ridge but not on the other.

Accept other plausible answers.

d) **Study Photograph A and Photograph B (Insert), which show the eruption of Mount Agung and its surroundings in Bali in 2017.**

With reference to Photographs A and B, suggest the hazards associated with the eruption of Mount Agung. Draw a well-labeled cross-section of Mount Agung. [4]

- The eruption of Mount Agung emitted **thick ash clouds** which could be carried by winds to other cities, causing breathing difficulties such as asthma.

**OR**

- **Thick ash cloud** could reduce visibility in the atmosphere resulting in airport closures as the ash could damage plane engines and cause dangers.
- **Pyroclastic flows** of hot gases and burning rocks could travel at high speeds and burn acres of vegetation, damaging farmland and destroying property, incurring economic losses.
- **Hot lava flows** could travel down the flanks of the volcano to burn everything in its path hence destroying properties.
- **Volcanic bombs** may be spewed out of the volcano which can crush properties and kill people.

Any 3 points.

- Well-labeled diagram – 1m
e) 'The severity of impact of an earthquake is largely determined by its distance from the epicentre.'
To what extent do you agree with this statement? Use examples to support your answer.

Level 1 [0-3 marks]
At this level, answers will be generalized or with minimal support if any given at all. Reasoning is rather weak and expression may be unclear. A basic answer that has little development. Answers will lack examples or other evidence, or it is so sketchy that it adds little support to the answer.

Level 2 [4-6 marks]
Disagreement or agreement will be supported by appropriate details. Or, both agreement and disagreement are considered, but support is patchy so that the answer is not full. Good reasoning and logic in parts of the answer with good expression in some places. Some examples or other evidence 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. Both agreement and disagreement are considered and well supported. Reasoning is clear and logical with good expression of language. Examples or other evidence to support answers will be extensive. Balance in answer. A clear indication will be given on whether the distance from epicenter determines the severity of impact of an earthquake.

Section B

Answer one question from this section.

3 a) Account for the prevalence of HIV/AIDS in less developed countries.

- Social stigma in LDCs may lead to many infected victims being discriminated by family members and healthcare professionals who might refuse to treat them. Without timely treatment of the disease, these patients spread it to others.
- Due to the lack of education, people in LDCs are unaware about sex and sexuality, hence engage in unsafe sex which increase the spread of HIV/AIDS.
- Risk-taking behaviors such as drug abuse and alcohol consumption may affect one's judgement and lead to unsafe sexual practices which encourages the spread of HIV/AIDS.
- Lapses in medical practices in LDCs such as reusing needles tainted with HIV/AIDS or blood transfusions tainted with HIV/AIDS, result in the patient being infected with the disease in hospitals.
- Due to the lack of education and difficulty in getting jobs, many people in LDCs turn to vice trades as commercial sex workers.
Sexual activity with an infected person led to the spread of the disease.
- Highly mobile populations in the LDCs such as truck drivers travel long distances for work or work far from home hence they engage with commercial sex workers while travelling and become infected.
- HIV is difficult to detect because there are no visible signs of the disease for most of the period of infection. Infected people may not be aware and spread it to others.
- Due to poverty, HIV/AIDS victims in LDCs often fail to stay on track with their antiretroviral therapy as antiretroviral therapy treatment is too costly for them. They are not cured of the disease and spread it to others.

Any 4 points.

b) Study Fig. 6 (Insert), which shows information about the lack of access to clean water.
With the help of Fig. 6, suggest the impacts caused by a lack of access to clean water.

- 788 million people lack access to clean drinking water so they consume dirty water which could cause diseases such as cholera to spread, eventually leading to death.
- As women and children spend as much as 40 billion hours to collect water in Africa, they are unable to be employed. Without an income, their standard of living remains low.
- A lack of basic sanitation and hygiene could result from open defecation which contaminated river / underground water, which might increase incidences of diarrhea.
- As population have poor health such as 88% of diarrheal diseases, there is a loss of productivity for the workforce as they are unable to work which will result in slower economic growth.
- Children lose about 272 million school days a year as they are ill from diarrhoea hence are uneducated and lack the skills to be employed. They are unable to help contribute to the economy.
- The government would have to channel more funds into healthcare to treat the population, with less funds available for infrastructural development. A lack of basic infrastructure and sanitised environment would discourage investors from investing in the country, reducing foreign revenue.

Any 5 points.
Accept other plausible answers.

c) Study the 1:25 000 topographical map of Rose Belle.

Explain the factors to intensify and process sugar in the area shown.
- Sugar is cultivated on fairly gentle slopes, seen from the widely-spaced contour lines and a low elevation of around 220-310m. A gentle slope would reduce soil erosion so that the fertile topsoil and nutrients in the soil will be retained for repeated harvests.

OR

A gentle relief reduces surface runoff so that water can infiltrate into the soil for the sugar crops to absorb for growth.

OR

A gentle relief allows farmers to transport and operate machines more easily on the farm which reduces the need for labour per unit area leading to higher productivity.

- Presence of a sugar factory and mill in 0777 allows for the processing of sugar to be packaged and processed into sugar products, so as to minimise degradation of the crop (reduce yield lost).

- Presence of many watercourses and dams (0678, 0778) channel water to various parts of the sugar plantation to irrigate the crops.

- Presence of the town of Rose Belle (0877, 0777, etc) provides a market for the sale of sugar crop and also drives the demand for sugar.

- Presence of many roads (Motorway UC and Road-Main A) allow sugar to be transported to the factory (0777) to be processed efficiently or to other towns to be sold.

Any 4 points.

d) Study Fig. 7 (Insert), which shows the production of corn and the use of corn for ethanol production in the U.S. from 1980 to 2009.
Describe the trend in the production of corn and the use of corn for ethanol in the U.S from 1980 to 2009. Explain how this trend could threaten food security in less developed countries.

- The production of corn remains fairly constant, between 0.1 tonnes to 0.2 tonnes from 1980 to 2009.

- At the same time, ethanol production from the use of corn for ethanol also increases gently from about 0.1 billion gallons in 1980 to about 2.1 billion gallons in 2002, before increasing more rapidly till about 10.5 billion gallons in 2009.

- There was a slight dip in ethanol production from the use of corn from about 1.4 billion gallons in 1995 to about 1 billion gallon in 1996, which then continued to increase thereafter.

Reason – 1m

- The increased use of corn for ethanol would result in less corn being made available for sale and consumption in less developed countries. This would cause the prices of corn to rise due to competition for corn. People in LDCs will be unable to afford the high price of corn, leading to food shortages.

- Food safety is a primary cause for food consumption to vary in the world.'
To what extent do you agree with this statement? Use examples to support
Level 1 [0-3 marks]
At this level, answers will be generalized or with minimal support if any given at all. Reasoning is rather weak and expression may be unclear. A basic answer that has little development. Answers will lack examples or other evidence, or it is so sketchy that it adds little support to the answer.

Level 2 [4-6 marks]
Disagreement or agreement will be supported by appropriate details. Or, both agreement and disagreement are considered, but support is patchy so that the answer is not full. Good reasoning and logic in parts of the answer with good expression in some places. Some examples or other evidence 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. Both agreement and disagreement are considered and well supported. Reasoning is clear and logical with good expression of language. Examples or other evidence to support answers will be extensive. Balance in answer. A clear indication will be given on whether food safety concern is a primary cause for food consumption to vary in the world.

4 a) Study Fig. 8, which shows the trends in infant mortality rates and female literacy from 1990 to 2004.

Describe and suggest reasons for the relationships between infant mortality rate and female literacy.

Describe – 2m
- The higher the level of female literacy, the lower the infant mortality rate. With secondary level education, infant mortality rate is lower, ranging from 6 to 11 per 1000. With primary education, the infant mortality rate is slightly higher, ranging from 8 to 15 per 1000. With no education, the infant mortality fluctuates greatly from 10 to 44 per 1000.
- From 1995 to 1996, there was a sharp increase in the infant mortality rate from 30 to 44 per 1000. However from 1996 to 1997, there was a drastic decline in infant mortality rate, from 44 to 26 per 1000.

Reasons – 2m
- Mothers of infants who have no education are unable to obtain jobs hence will be unable to afford nutritious food for the infants. Infants are malnourished, resulting in a high infant mortality rate.
- Mothers who have primary or secondary education are aware of providing a balanced diet for the infants, hence have a lower infant mortality rate.
- With no proper education, mothers lack skills and remain
unemployed. As a result, they lack the income and capability to
afford healthcare services for themselves and the infant, resulting in
high infant mortality rates.

OR

With primary or secondary education, mothers have the ability to work
and income to afford healthcare to monitor the healthy growth of
infants, accounting for the low infant mortality rate.

- With no education, females lack knowledge to care for the infants,
  leading to high infant mortality.
- Due to the lack of education, mothers lack the knowledge and
  awareness to take precautions against sudden disease outbreaks
  such as cholera, accounting for the sharp increase in infant mortality
  rate from 1994 to 1996. Intervention by the government or NGOs
  might have taken place to rapidly control the disease outbreak which
  led to a drastic decline in infant mortality from 1996 to 1997.

Accept other plausible answers.

b) Study Fig. 9 (Insert), which shows the doctor to patient ratio in Lesotho and
Table 1, which shows some statistics for Lesotho.
With the help of Fig. 9 and Table 1, account for the life expectancy of the
people in Lesotho.

- Lesotho has a low doctor to patient ratio of 1:22 000, hence one
doctor would have to cater to many patients. Doctors will be unable
to provide timely treatment for each patient. Diseases are left
untreated to cause death, resulting in a low life expectancy of 48
years.
- Low expenditure on healthcare per capita of US$276 hence children
are rarely vaccinated due to lack of funds. They are more prone to
diseases and hence have a low life expectancy of 48 years.
- A low total expenditure on healthcare in Lesotho (7.8% of GDP)
would mean that less funds were allocated to train and recruit
medical professionals. A lack of healthcare professionals will affect
the health of patients as they are unable to receive prompt treatment,
thus they succumb to diseases and have a low life expectancy of 48
years.
- Lack of available healthcare infrastructure like hospitals and clinics
due to a low expenditure on healthcare (7.8% of GDP) will hinder
patients' access to treatments hence they succumb to diseases,
resulting in a low life expectancy of 48 years.
- A greater proportion of the poor in Lesotho with a low GDP per capita
of US$859 would be unable to afford the costs of healthcare
treatment and medicine, resulting in poor health to shorten the life
expectancy of the population of 48 years.
- A low GDP per capita of US$859 hence the population has lower
purchasing power to afford food. Without a balanced diet, people
have poor health and thus a low life expectancy of 48 years.

Any 5 points.
Accept other plausible answers.
c) Study Fig. 10 (Insert), which shows the areas infected by malaria in Indonesia and Fig. 11 (Insert), which shows the spread of malaria.

With reference to Fig. 10 and Fig. 11, describe the extent of malaria transmission in Indonesia and explain how malaria is spread.

- Malaria is spread throughout all the Indonesian islands. East Indonesia has many islands concentrated with a high risk of infectious malaria, stretching from Papua to the smaller islands on its west (Maluku Utara, Maluku, Nusa Tenggara Timur and Timor-Leste). The islands to the west of Indonesia experiences endemic malaria, namely the islands of Sumatra, Kalimantan, Java, Sulawesi and Bali.

- Generally, the more developed islands of Indonesia experience endemic Malaria, namely Sumatra, Kalimantan and Java.

- Malaria is spread via expansion diffusion. When the population is infected with malaria, the disease spreads outwards from the original source from Area 1 and extends to Area 2 and Area 3. [1m - compulsory]

- Malaria is spread via the mosquito-human-mosquito chain where a mosquito takes the blood from an infected person. The malaria parasites from human blood infect the mosquito with malaria. The infected mosquito then bites another healthy human victim and infects the person with the disease.

d) Use examples to comment on the roles of the community and international organisations in managing the spread of infectious diseases.

Community [2m]:
- Communities can work together to control diseases by introducing possible disease control strategies based on knowledge of local conditions / deciding on when and where strategies will be implemented and by whom / engaging health workers to train and monitor members. [1m]

- One example of a community involvement is the Stamp-out dengue in Singapore where students educate the neighbourhood to learn about precautions against breeding of mosquitoes to control the spread of malaria. / The limitation would be the stubborn attitudes of residents to resist change in lifestyles to prevent mosquito breeding.

OR

- Community-Led Total Sanitation in Sierra Leone works to remove the practice of open defecation by raising awareness and digging toilets at each household to contain the spread of bacteria from human waste. / There is difficulty in implementing the strategy in urban areas due to ongoing migration and lack of space for toilets.

International Organisations [2m]:
- Both international organisations and the community play complementary roles to provide financial and technical resources, and expertise from both public & private sectors to provide treatment for victims. [1m]
• The World Bank has set up the Rolling Back Malaria programme since 2005 to provide insecticide-treated bed nets & anti-malarial drugs at a lower cost, which would allow more people to safeguard against mosquitoes at home and afford the drugs to treat the disease to prevent further spread. However, the World Bank has limited control over how its fund is used in health care once the monies have been provided to the country.

OR

• The United Nations has implemented the 'Getting to Zero UNAIDS Strategy' with the aim of achieving zero new HIV infections, zero discrimination and zero AIDS-related deaths through the provision of universal access to antiretroviral therapy for HIV/AIDS victims to treat the disease. However, stigma against women and other victims of HIV/AIDS remain widespread and continue to obstruct effective responses to manage HIV/AIDS.

Answer to consist of 1 definition and 1 example.

e) 'The social impact of HIV outweighs the economic impact. Do you consider this statement to be true? Explain your answer. [8]

Level 1 [0-3 marks]
At this level, answers will be generalized or with minimal support if any given at all. Reasoning is rather weak and expression may be unclear. A basic answer that has little development. Answers will lack examples or other evidence, or it is so sketchy that it adds little support to the answer.

Level 2 [4-6 marks]
Disagreement or agreement will be supported by appropriate details. Or, both agreement and disagreement are considered, but support is patchy so that the answer is not full. Good reasoning and logic in parts of the answer with good expression in some places. Some examples or other evidence 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. Both agreement and disagreement are considered and well supported. Reasoning is clear and logical with good expression of language. Examples or other evidence to support answers will be extensive. Balance in answer. A clear indication will be given on whether the social impact of HIV outweighs the economic impact.