



UNIVERSITY of CAMBRIDGE
International Examinations

Cambridge
International
AS & A Level

Example Candidate Responses (Standards Booklet)

**Cambridge International AS and A Level
Geography**

9696

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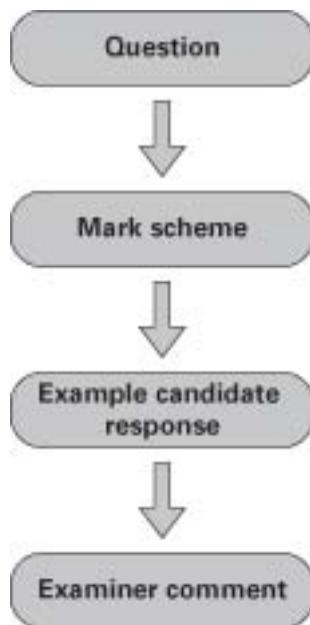
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Introduction

The main aim of this booklet is to exemplify standards for those teaching Cambridge International AS and A Level Geography (9696), and to show how different levels of candidates' performance relate to the subject's curriculum and assessment objectives.

In this booklet a range of candidate responses has been chosen as far as possible to exemplify grades A, C and E. Each response is accompanied by a brief commentary explaining the strengths and weaknesses of the answers.

For ease of reference the following format for each paper of the subject has been adopted:



Each question is followed by an extract of the mark scheme used by examiners. This, in turn, is followed by examples of marked candidate responses, each with an examiner comment on performance. Comments are given to indicate where and why marks were awarded, and how additional marks could have been obtained. In this way, it is possible to understand what candidates have done to gain their marks and what they still have to do to improve their grades.

Past papers, Principal Examiner Reports for Teachers and other teacher support materials are available on <http://teachers.cie.org.uk>

Assessment at a glance

- Candidates for Advanced Subsidiary (AS) certification take Paper 1 only.
- Candidates who already have AS certification and wish to achieve the full Advanced Level qualification may carry their AS marks forward and take just Papers 2 and 3 in the exam session in which they require certification.
- Candidates taking the complete Advanced Level qualification take all three papers.

Paper 1 Core Geography	3 hours
Candidates answer questions in three sections. In Section A, they must answer five of six questions on the Physical and Human Core topics for a total of 50 marks. In each of Sections B and C, candidates answer one of three structured questions based on the Physical (Section B) and Human (Section C) Core topics, for a total of 25 marks in each section. See Description of components in this booklet for more details.	
100% of total marks at AS Level	50% of marks at A Level
Paper 2 Advanced Physical Options	1 hour 30 minutes
Candidates answer two structured essay questions, each on a different optional topic, from a total of eight questions based on the Advanced Physical Options syllabus, for a total of 50 marks. See Description of components in this booklet for more details.	
25% of marks at A Level	
Paper 3 Advanced Human Options	1 hour 30 minutes
Candidates answer two structured essay questions, each on a different optional topic, from a total of eight questions based on the Advanced Human Options syllabus, for a total of 50 marks. See Description of components in this booklet for more details.	
25% of marks at A Level	

Papers 2 and 3 assess the Advanced Geography Options. These are separate 1½ hour exams, but will be timetabled for the same date and session. A short break (maximum 15 minutes) is allowed between Paper 2 and Paper 3.

Teachers are reminded that a full syllabus is available on www.cie.org.uk

Paper 1

Section A

Question 1

Hydrology and fluvial geomorphology

1 Photograph A shows features of a meander on the River Swale in North Yorkshire, UK.

(a) Identify the features labelled in Photograph A.

(i) A

(ii) B

[2]

(b) Describe the processes that lead to the features you have identified in (a). [5]

(c) Briefly explain how a floodplain is formed. [3]

Photograph A for Question 1

A meander on the River Swale in North Yorkshire, UK



Mark scheme

1 (a) Identify the features labelled in photograph Z.

(i) A

river cliff

[1]

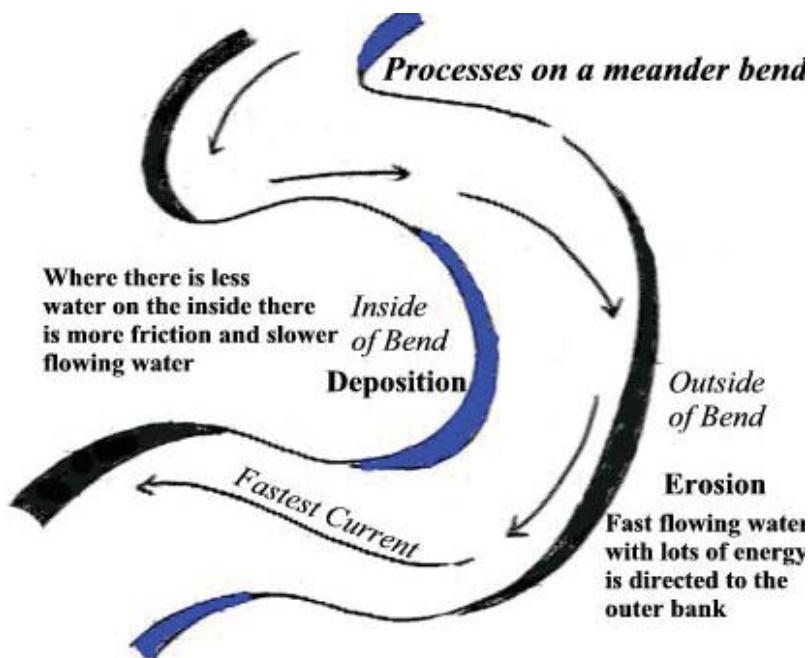
(ii) B

slip off slope/point bar

[1]

(b) Describe the process that leads to one of the features you have identified in (a). [5]

A well labelled diagram can get 2/3 marks.



Candidates will describe either the slip off slope/point bar or the river cliff.

River cliff

Water flows fastest on the outer bend of the river where the **channel is deeper** and there is **less friction**. This is due to water being flung towards the outer bend as it flows around the meander, this **causes greater erosion** which deepens the channel, in turn the reduction in friction and increase in energy results in greater erosion. This lateral erosion results in undercutting of the river bank and the formation of a **steep sided river cliff**.

Slip off slope

In contrast, **on the inner bend water is slow flowing**, due to it being a **low energy zone**, deposition occurs resulting in a **shallower channel**. This increased friction further reduces the velocity (thus further reducing energy), encouraging further deposition. Over time a small beach of material builds up on the inner bend; this is called a **slip-off slope**.

(c) Briefly explain how a floodplain is formed.

[3]

River transportation is an essential process in the formation of a floodplain. At this stage, the river will carry a large load, by solution and suspension and also by saltation and traction. When the river floods over the surrounding land it loses energy and deposition of its suspended load occurs. The shallower depth of water flowing over the surface results in frictional drag and a reduction in velocity (speed) of flow. As the floodwater loses energy, the capacity and competence of the flood-water is reduced, leading to deposition. The heaviest materials (bedload) are deposited first nearest the channel, as these require the most energy to be transported and therefore build up around the sides of the river forming raised banks known as levees. Finer material such as silt and fine clays continue to flow further over the floodplain before they are deposited (alluvium). Regular flooding results in the building up of layers of nutrient rich alluvium which forms a flat and fertile floodplain. The slopes of the river valley border the edge of the floodplain. These slopes are known as the "bluff line".

Example candidate response – grade A

1 a) Cut Bank

1 b) Point Bar

b. A cut bank is formed due to the horizontal ✓
flow of the river. This turbulent flow follows the
Thrusty which is on the outside of a meander. The water ✓
then erodes the bank material. Due to this fast water
the inside ^①, next to the bank point Bar ^② has lost its
velocity. Because of this it
deposits its load as the water cannot
hold it. Due to this depositing the
bar is created. To add on the horizontal flow is
creased and linked to the to pools and riffles in the river

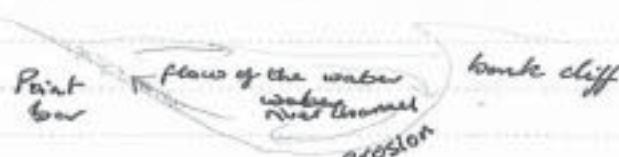
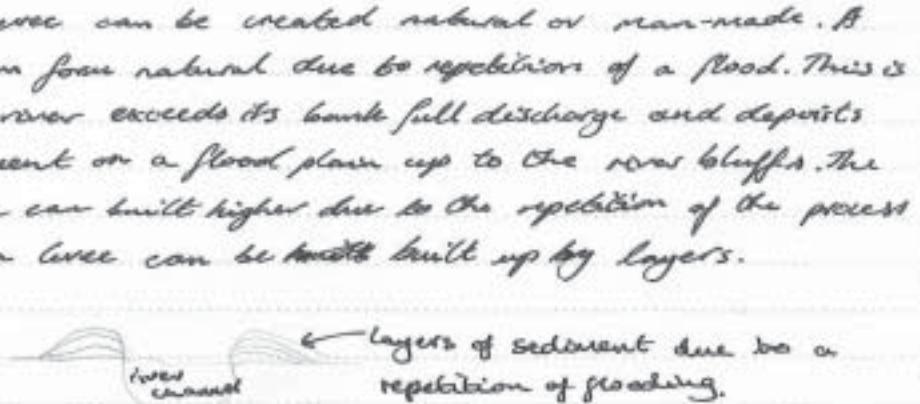
c) A floodplain is formed when a river
exceeds its bankful capacity. At this point the water ✓
spreads out over the land. Due to the sudden loss of
velocity the water deposits its load (also alluvium) when
on a floodplain. The biggest load is deposited first
causing natural levees to form next to the bank. ✓

Examiner comment – grade A

This is a somewhat variable answer but overall is worth the grade. The landforms are correctly identified in part **(a)**. Like many candidates, both features have been explained instead of only one. The key processes are mentioned, such as helicoidal flow, but are not explained. Also, the answer is somewhat limited in its explanation of erosional processes. In part **(c)** most of the main aspects are covered but the answer just lacks a little detail especially on the need for repetitive flooding.

Mark awarded = 6 out of 10

Example candidate response – grade C

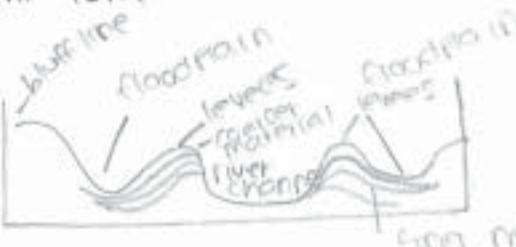
iai Levee ii Point bar	X ✓
<p>b. A point bar can occur due to secondary flow of a river. This is called the helicoidal flow in which fast velocity water / erodes the outside of the meander. This water collects sediment can transport it on the bottom of the river where it loses velocity on the inside of the meander. Due to the loss of velocity, the sediment is then deposited thus / creating a point bar.</p>  <p>A levee can be created natural or man-made. A levee can form natural due to repetition of a flood. This is when a river exceeds its bank full discharge and deposits the sediment on a flood plain up to the river bluffs. The levee can built higher due to the repetition of the process in which a levee can be built up by layers.</p>  <p>c. A floodplain is formed when a river experiences high levels of water and exceeds its bank full discharge. A floodplain starts flat the river bluffs. The land which is flood experiences deposition and sediment is deposited deposited after the water overflows the</p>	

Examiner comment – grade C

There is one misidentification in Part **(a)**. Point bar is taken as the feature answered in Part **(b)**. The processes involved are explained competently but lack detail. The operation of helicoidal flow is not explained. Also, the answer lacks information on the nature of the sediment that is deposited. Part **(c)**, on the floodplain, is answered in a very basic way. There is no account of the nature and cause of infiltration or the need for a repetition of events. A certain knowledge is demonstrated but all parts of the answer do not go far enough.

Mark awarded = 5 out of 10

Example candidate response – grade E

1(a) Slip off slope. / point bars. ✓
 1(b) Pools
 2(c) i) A flood plain is formed when a river overflows its banks, as a result of flooding, due to the increase in friction, the river loses velocity and no longer has enough energy to carry the load thus depositing materials in suspension on the land.
 2(c) ii) 
 1(d) A slip off slope is formed as a result of deposition in a meander. This occurs on the inside & outside of the bend whereby the water is shallow, friction increases and velocity decreases thus causing materials to be deposited, these are called riffles. Areas of shallow water where there is more friction, so the decrease in velocity cause materials to be deposited.
 And
 And it is formed as a result of pools, this are areas in the meander of deeper water, whereby velocity and discharge are at its greatest thus causing sediment to be eroded, leaving a concave shaped, crescent shaped bend. ~ link to helicoidal flow ✓
 1(e) 2/5

Examiner comment – grade E

In part **(a)** only the slip-off slope is correctly identified. The location of the slip-off slope is incorrectly identified in part **(b)** and is confused with riffles. There is no link to helicoidal flow. The answer

demonstrates only partial knowledge and understanding. Part **(c)** has some merit but the diagram is unconvincing and there is only a brief explanation of overbank deposition. As with part **(b)**, some knowledge is shown but it is very incomplete.

Mark awarded = 4 out of 10

Question 2

Atmosphere and weather

2 Fig. 1 shows a selection of average urban climatic conditions compared with surrounding rural areas.

- (a) Should the table state 'more' or 'less' in the place of:
 - (i) X,
 - (ii) Y? [2]

- (b) Using Fig. 1, explain the differences in temperature and precipitation between an urban and a rural area. [5]

- (c) Give reasons why air pollution is higher in urban areas. [3]

Fig. 1 for Question 2

Average urban climatic conditions compared with surrounding rural areas

Radiation: Sunshine Duration:	5% to 15% less in urban areas
Temperature: Winter minimum (average)	1 to 2°CX..... in urban areas
Wind Speed: Annual Mean	20% to 30% less in urban areas
Fog: Winter	100%Y..... in urban areas
Precipitation: Total	5% to 10% more in urban areas

Mark scheme

2 Fig. 1 shows a selection of average urban climatic conditions compared with surrounding rural areas.

(a) Should the table state "more" or "less" in the place of:

(i) X, [1]

More

(ii) Y? [1]

More

(b) Using Fig. 1, explain the differences in temperature and precipitation between an urban and a rural area? [5]

Temperature

Human activity in urban areas produces heat (from humans, factories, car fumes...). The albedo of urban areas is lower, allowing for greater absorption of energy, and subsequent release during the night. The buildings are also stores of heat, which can be subsequently released. In addition there is less evaporation so less energy is needed for the evaporation process, hence more available in the form of heat.

Precipitation

The higher temperatures and convectional heating (thus strong thermals) leads to an increased likelihood of thunder storms and hail in urban areas. Also an increase in condensation nuclei.

(c) Give reasons why air pollution is higher in urban areas.

[3]

The burning of fossil fuels, industrial processes and car fumes are three factors which cause an increase in the pollutants in urban areas compared with most rural areas. Carbon dioxide (as well as sulphur dioxide and nitrogen oxide) levels are thus increased. Also an increase in particulate matter.

Any 2: max 2 on either one

Example candidate response – grade A

Section A	
2.	
a)	
i.) More	✓
ii.) less	✗
b)	<p>Firstly, sunshine duration in urban areas is 5 - 15% less than in rural areas because urban areas are often covered in a layer of pollution making it harder for sunlight to breakthrough, also tall buildings provide shade for many areas. Whereas in rural areas the air is cleaner and there are no obstacles blocking sunlight. The temperature in urban areas is warmer in winter as pollutants reflect long-wave radiation over urban areas, keeping them warmer, also heat is given off from surfaces of urban areas at night as they absorb much radiation in the day. In rural areas, lots of terrestrial radiation is given off, so heat is lost, and the 'greenhouse effect' does not have as much influence, which as 20% - 30% less in urban area there is not as much long-wave radiation being trapped by pollutants above rural areas, also at night many rural areas are in frost hollows, therefore cold air sinks into these places, reducing the temperature. Precipitation is 5% to 10% more in urban areas as there is more condensation</p>

nuclei in urban areas than above rural areas, meaning that more water droplets will form above urban areas and more rain will fall. The condensation nuclei are particles of dust and pollutants. Also convective rainfall is a more common occurrence in urban areas as the ground heats more rapidly than in rural areas, so air heats by conduction and rises creating thunderstorms when it condenses.

- c) Air pollution is higher in urban areas as industries burn fuel and give off pollutants, whereas in the rural areas there is very little industry to give off solid pollutants. Also, ~~and~~ given there are far more cars in urban areas, so more exhaust fumes are given off than in rural areas, where less vehicles are ~~do~~ driven. Lastly, there are far more houses in urban areas, these houses give off pollution through chimneys and through the energy they use.

Examiner comment – grade A

Part (a)(i) is correct but not (ii). The answer to part (b) is very comprehensive and its great merit is that it continually compares urban with rural situations. The start of the answer is slightly off the focus of the question, but the main part of the answer is clearly focused with a good balance between temperature and precipitation. The only blemish is the failure to explain the albedo effect and the heat given off by human activities. The explanation of precipitation differences is thorough. The account of pollution only lacks some indication of the nature of the pollutants.

Mark awarded = 7 out of 10

Example candidate response – grade C

2.

- a) i. more ✓
ii. less ✗

b) The temperature is slightly higher in urban areas than surrounding rural areas because of a number of reasons. In urban areas, buildings and concrete retain heat for longer and slowly release the heat when it gets colder. This means that the temperature range in urban areas is more moderate than rural regions. Unnatural and man-made heat sources, such as radiators, are obviously more prevalent in urban areas and this helps to raise the average temperature. Air pollution and smog in urban areas can also increase the amount of radiation 'trapped' in the area, and subsequently raise temperatures.

There are also various factors which contribute to higher levels of precipitation in urban areas. Potentially, the site of an urban settlement can lead to increased rainfall, particularly ~~£~~ (relief rainfall.) Towns and cities situated on the top of hills

or at the foot of valleys will experience higher levels of relief rainfall - this is because air is forced to rise, becomes unstable, cools and condenses at dew point to form precipitation. Similarly, the higher temperatures associated with urban areas will likely see an increase in convection rainfall. Ultimately it is the higher average temperatures which cause higher levels of precipitation due to rising air cooling and condensing, forming precipitation.

- c) Air pollution is higher in urban areas due to ^{and} the higher prevalence and use of cars ~~and~~ industry. Cars produce greenhouse gases when used due to the burning of fossil fuels. The use of electrical appliances such as radiators leads to increased temperatures - this in turn causes greater evaporation of water. Water vapour in the air constitutes part of air pollution due to the provision of air-borne nuclei.

Examiner comment – grade C

Part (a)(i) is correct but (ii) is incorrect. In part (b), the candidate clearly understands that buildings etc. retain heat but there is no explanation as to why. The answer also recognises the role of heat sources in urban areas. The role of air pollution is also recognised. The explanation for precipitation differences wanders off the point into relief rainfall, arguing that many towns are situated on hills. The candidate does recognise the role of convection but omits condensation nuclei. There is little direct comparison between rural and urban areas. Thus, the knowledge and understanding is partial, but the answer is not without merit. In part (c), there is no mention of the nature of the pollutants and the answer is confused over water vapour.

Mark awarded = 5 out of 10

Example candidate response – grade E

<p>(a) i) more = \square</p> <p>ii) less = \times</p>	<p>\checkmark</p> <p>\times</p>
	<p>b) the difference in temperature is about 1 to 2°C more in urban areas. This may be because of a phenomenon called "The Urban Heat Island Effect." Large amounts of concrete and tarmac absorb heat (short wave solar radiation) during the day then re-radiate it out overnight, but very slowly. This time lag means that the sun subsequently heats it up the following day.</p> <p>The difference between urban and rural precipitation is that there is 5 to 10% more in urban areas. This is because the warm air generated is forced to rise rapidly causing convection rainfall over large urban areas.</p>
	<p>c) One reason why air pollution is higher in urban areas is because the main areas of industry are located in urban areas near employment thus generating pollution.</p> <p>A second reason may be due to temperature inversion. Due to the high level of pollutants and greenhouse gases the air surrounding them is warmed. This means that the cooler air below can rise above. This creates smog.</p>

Examiner comment – grade E

Part (a) (i) is correct but part (ii) is incorrect. In part (b) there is a partial explanation but with serious limitations. The candidate recognises that concrete etc. absorbs short wave radiation and then re-radiates it at night but there is no explanation. The precipitation in urban areas is related to convection but again with little explanation and there is no mention of condensation nuclei. There is no comparison with rural areas. In part (c) there is a very basic mention of industries producing pollutants but no detail. The candidate then gets a little confused in trying to explain smog. Overall, the answer demonstrates some basic knowledge but with large gaps.

Mark awarded = 4 out of 10

Question 3

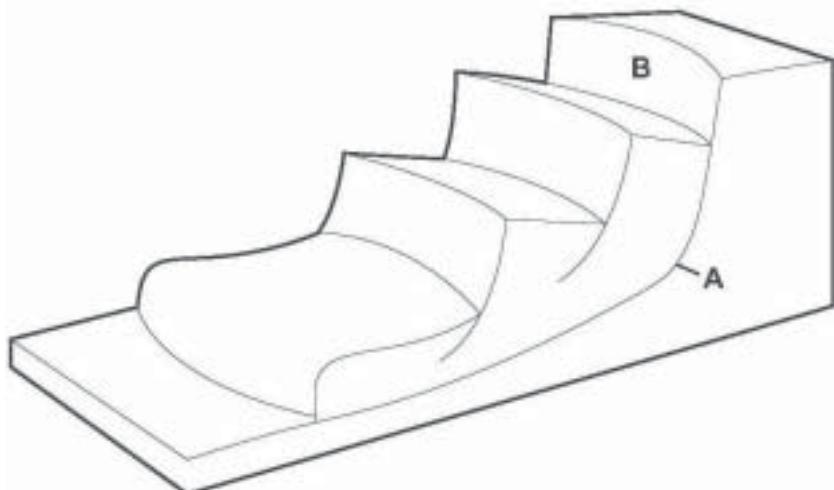
Rocks and weathering

3 Fig. 2 shows a landslide.

- (a) Name and briefly describe the feature named A. [2]
- (b) Name and briefly describe the feature named B. [2]
- (c) Explain the role of rock type and structure in affecting the movement and stability of slopes. [6]

Fig. 2 for Question 3

A landslide



Mark scheme

- (a) Name and briefly describe the feature named A. [2]
A = shear, failure or slip plane, plus brief description
- (b) Name and briefly describe the feature named B. [2]
B = scar or back slope, plus brief description
- (c) Explain the role of rock type and structure in affecting the movement and stability of slopes. [6]

There is a wide range of factors that can be used. Beware the inappropriate terms such as 'hard' and 'soft'. Jointing and bedding planes will affect rock falls and planar slides. Permeable over impermeable can lead to instability. Clays and mudstones are usually more affected by mudflows and sometimes rotational slides. Better candidates might refer to the nature of weathering profiles in influencing slope stability.

Example candidate response – grade A

3.

- a) Feature A is the ~~cliff face~~ / slide plane. This is usually the stronger in unweathered rocks which the partially weathered material sits upon. X

- b. Feature B is the cliff face or the flat rupture surface. This is the debris which flows down along the slide plane and consists of the weathered material.

$\frac{1}{4}$
= water is little place

$\frac{3}{4}$

- c. Rocks type and Structure play a significant role in the development of slopes. In rocks with alternating layers of resistant and less resistant rocks, the less resistant rocks may be exposed to agents of erosion and weathering. Such as where clay overlies limestone, rainfall may saturate the the clay and make it less stable hence allowing it to slide over the more resistant limestone. Additionally, rocks which contain joints or bedding planes may allow water to pass through the bedding planes or joints and as a result, there is less internal cohesion, reduced friction and the rock may slide over the slide plane at a later date. Where ~~an impermeable layer or regolith~~ ~~is~~ ~~set~~ over impermeable rocks, infiltration is impeded and

~~and~~
~~as a result~~ during times of high precipitation,
 the ~~rock~~ ~~many~~ upper layer, as a result of pore water
 pressure, and reduction of friction and internal cohesion slide
 as an ~~an~~ active layer over the slide plane. / 5

Examiner comment – grade A

In part **(a) (i)** the feature is correctly identified but there is no description and the answer trails off into explanation. In part **(ii)**, the feature is partially identified but then there is a description of material that has moved and not the feature itself. In part **(b)**, the candidate does show an understanding of slope stability and the factors governing it. The answer recognises the importance of the juxtaposition of rock types, the role of water and uses terms such as cohesion and friction correctly. Also, the candidate understands the nature and importance of pore water pressure. This is a very comprehensive and accurate answer.

Mark awarded = 7 out of 10

Example candidate response – grade C

(3a)	Rotational slope plane. Occurs when a slide takes place. It is the area where the slope has moved along down hill.
b)	Scar - It is often the rock face left behind after a steep slope has collapsed. a slide
c)	For a slope to be stable, shear strength must remain above shear stress. For deciding this often the deciding factor is whether the rock is impermeable or permeable. If the rock is impermeable then the pores are pushed tightly together allowing moisture to move very slowly. Whereas permeable rock allows moisture between its pores very easily. This lessens the friction in the rock structure and ^{thus} weakens its shear strength forming a slide.
	If it is a hard rock such as granite the angle of rest is much greater than that of soft basalt. If the angle of rest is higher then the movement is likely to be sharper and quicker, compared with a low gradient slope formed with basalt.

Examiner comment – grade C

Part **(a)** identifies both features. The description of the features is not as clear as it might be, but is along the right lines. In part **(b)** the candidate does recognise the concepts of shear strength and shear stress and does know that water has a role but gets confused over impermeability with little understanding as to why instability occurs. The candidate uses terms such as 'hard', which are not very useful. The answer then becomes confused with angle of rest and the nature of granite and basalt. This answer demonstrates that marks can be awarded in a variety of ways. There is some valid understanding but it is not consistent.

Mark awarded = 5 out of 10

Example candidate response – grade E

(3)

- a. A bedding plane. X
- b. A rockface or cliff (a crater in some cases.) X
- c. A slope, has a certain degree of stability and strength which prevents it from giving way in a form of mass movement. The rock type and structure can play a role in the likelihood of slope failure.

The permeability of rock can make a big difference, impermeable rocks, i.e. those such that do not allow water into their structure, tend to such as granite in Dartmoor, tend to be more stable, since this prevents weathering from taking place (inside) the rock, the slope stability refers to how stable and strong a slope is, if the rock is not being weakened and weathered inside then this will decrease the chance of slope failure as the rock remains strong.

A rock such as limestone as found in North Yorkshire is at Malham, is porous and permeable, it allows water into its structure, allowing weathering to take place which will weaken its structure, and the added physical weight of the water may add to the stress - stress on the slope causing it to give way, it is for this reason that limestone, chalk slopes are more vulnerable and unstable.

The answer density of joints and bedding planes can also add to slope stability and instability, bedding planes are the horizontal joints found in rock and are common in sedimentary rock such as chalk, these provide the perfect point at which a slope may give way in the form of a flow or slide ~~area~~, for example Holbeck Hall, Scarborough. The cliff slid out away following the added pore water pressure (rain in rock) and the available slip planes.

Chemical weathering can also make a difference, for example the feldspar found in granite can, when it comes into contact with hydrogen ions in rainwater (from released by carbonation) change its composition and turn into kaolinite which is simplistically a powder and can be washed away, making the remaining rock more vulnerable, weaker and the overall slope less stable and more likely to experience slope failure.

Examiner comment – grade E

Both features are misidentified in part (a). The answer to part (b) belies the lack of success in part (a). It is a lengthy answer which demonstrates sound knowledge and understanding of some of the factors leading to instability. The role of weathering is noted as well as rock structure such as joints and bedding planes. The Holbeck Hall landslide is a good example to use. This part of the answer suggest a competence beyond grade E but is let down by part (a). This demonstrates the need for consistency throughout an answer.

Mark awarded = 4 out of 10

Question 4

Population

- 4 Fig. 3 shows the top 10 risk factors to health for MEDCs and LEDCs in 2002 according to the World Health Organization.

(a) Using Fig. 3, identify the greatest risk factor to health in:

(i) LEDCs,

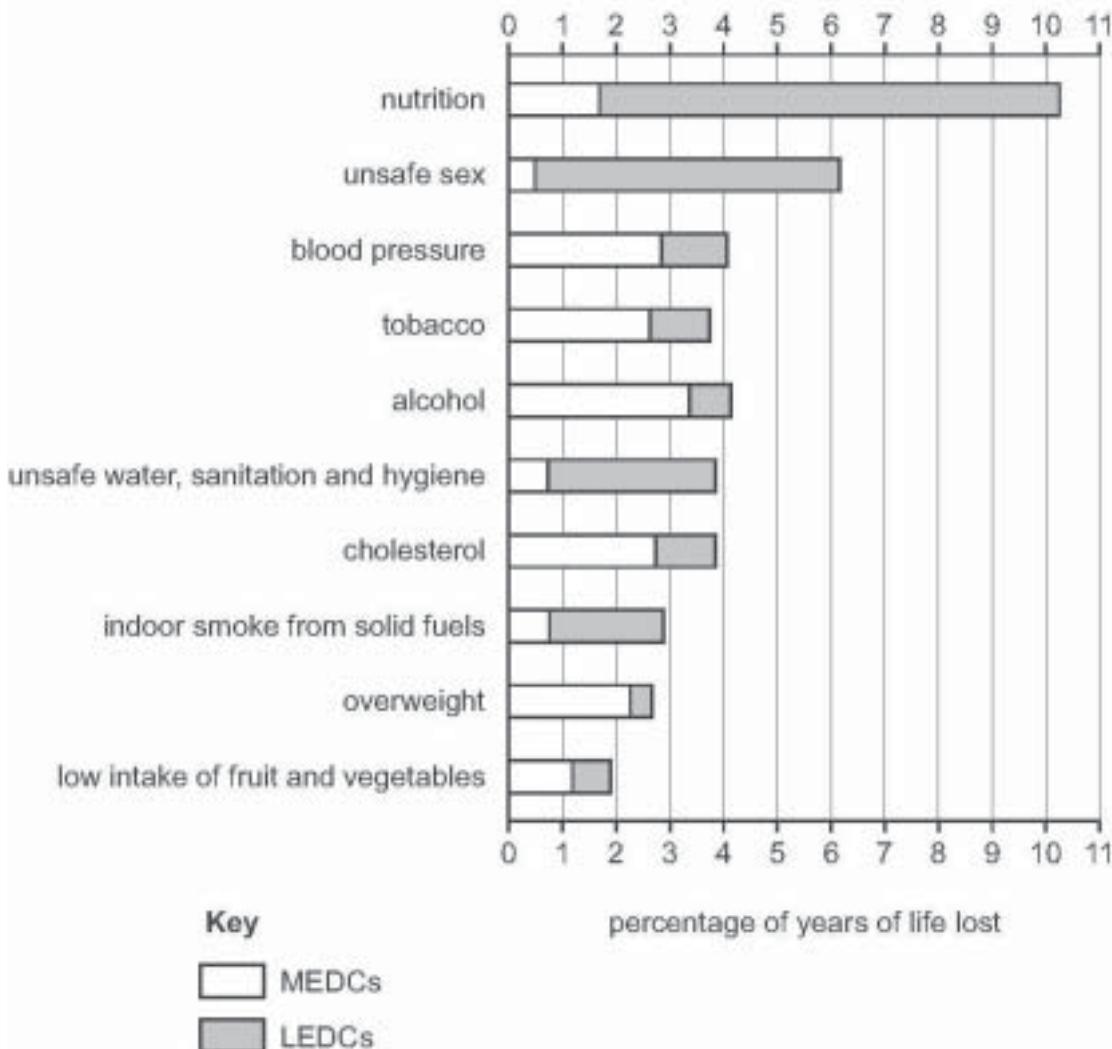
(ii) MEDCs. [2]

(b) Use data from Fig. 3 to describe the impact of 'unsafe sex' on length of life in LEDCs and MEDCs. [3]

(c) With the help of examples, briefly explain why it is difficult for governments to address the health issues identified in Fig. 3. [5]

Fig. 3 for Question 4

Top 10 risk factors to health for MEDCs and LEDCs in 2002



Mark scheme

4 Fig. 3 shows the top 10 risk factors to health for LEDCs and MEDCs in 2002 according to the World Health Organization.

(a) Using Fig. 3, identify the greatest risk factor to health in:

(i) LEDCs, [1]

[Poor/inadequate] Nutrition

(ii) MEDCs. [1]

[Consuming] Alcohol

(b) Use data from Fig. 3 to describe the impact of 'unsafe sex' on length of life in LEDCs and MEDCs. [3]

The percentage reduction of life is significant in LEDCs (second greatest shown), approx. 5.5% / over 5%; whereas in MEDCs it is relatively small, < 1% (the least amongst the 10 risk factors shown). An element of comparison is needed to achieve the third mark.

(c) With the help of examples, briefly explain why it is difficult for governments to address the health issues identified in Fig. 3. [5]

For a variety of reasons, including:

- scale
- accessibility
- finance
- resistance to change
- tradition, e.g. use of fuelwood in LEDCs
- lifestyle choices
- education and literacy levels
- governance issues, e.g. corruption, maladministration
- vested interests, e.g. tobacco companies
- other

A full answer uses two or more examples (countries, initiatives, issues) and considers two or more reasons. Comprehensive answers are not required, although the best will apply to or explicitly address both LEDCs and MEDCs.

Example candidate response – grade A

4(a)

- i) nutrition
ii) alcohol

/ /

b) The impact of 'unsafe sex' in MEDCs is far less than in the LEDCs, it is very low loss will only 0.5% of years of life lost. In LEDCs however the risk is much greater, ~~it is about~~ 12 times as more % of years of life are lost than in MEDCs, with over (6%) of years of life lost in LEDCs. Therefore, the impact of 'unsafe sex' in LEDCs is very great, and the impact of 'unsafe sex' in MEDCs is not very large.

c) It is difficult for governments in LEDCs to address the issue of 'unsafe sex', especially in places like Botswana, where 50% of the population has AIDS, and many people live in remote areas, so it is difficult to provide them with education about safe sex and birth control measures. In Russia, it is very difficult for the government to control the alcohol epidemic, which has reduced real life expectancy to just 58, because many people ~~but lots~~ drink lots of alcohol in the winter due to the dark, cold climate as a way of cheering themselves up, so the government is struggling to find a way to reduce alcohol consumption. Also MEDCs struggle to control the ~~obesity~~ with high cholesterol problem in many people, as foods are fatty and mass produced, there are also many

junk food chains encouraging the consumption of unhealthy food, so the government struggle to see & address this health issue.

Examiner comment – grade A

Both parts are correct in (a). The answer to part (b) is comprehensive but with a slight misreading of the resource. The answer to part (c) is competent with relevant points for both MEDCs and LEDCs but the depth of analysis is somewhat limited, especially for LEDCs. There are many reasons that could be addressed but both MEDCs and LEDCs are covered. This is a consistent answer across all three components and, thus, deserves the grade.

Mark awarded = 7 out of 10

Example candidate response – grade C

(g)
(+)

- i) Nutrition ↑
ii) ~~Affet~~ Alcohol.

$\frac{2}{2}$

b) In LEDCs, ~~affet~~ it is very expensive for health care and for correct treatments and therefore people may not have ~~is~~ enough money to afford it. In LEDCs, people may not be educated well enough to know and understand the risks and the diseases which can be passed on whereas in MEDCs they have chance of better education. In ~~LEDcs~~ the hospitals maybe ~~is~~ might not be hygienic ~~as~~. In MEDCs there are a lot less deaths as they can afford health care and the health care and treatments are normally well developed compared to that of an LDC.

n/r

0/3

c) In certain countries such as ~~Af~~ Congo and Somalia, it is clear there is poverty. The government will find it hard to address situations such as problems with nutrition, unsafe sex, unsafe water and hygiene as there is political unrest in these countries. War is an ongoing problem and the country does not have the money to solve the problems.

(f) c)

(continued)

In MEDCs such as London, the government ~~can't~~ help and address the situations such as blood pressure, tobacco, alcohol and people with health issues such as cholesterol and obesity as fast food restaurants, tobacco and alcohol are ~~in~~ million pound industries which are common in everyday life and which have been accepted into society.

Examiner comment – grade C

The answer to part **(a)** is correct. The answer to part **(b)** demonstrates the need to read the question very carefully because the question has been completely misinterpreted. The candidate tries to explain the data rather than simply describing it. This is a common error that has been referred to many times in Examiners' Reports. The answer to part **(c)** does discuss both MEDCs and LEDCs with relevant arguments but lacks detail in the argument. A greater depth of detail is needed in the discussion or a wider range of issues, in order to achieve higher marks.

Mark awarded = 5 out of 10

Example candidate response – grade E

- 4
- i) Nutrition ✓ ✓
- ii) Alcohol consumption ✓
- b) Unsafe sex has a significant impact in the life expectancy of people in LEDC's. Figure 3 shows that it can reduce it by ~~8%~~ ^{8½} percent, which judging by normal life expectancy in LEDC's, which tend to be much lower than MEDC's, it is a huge decrease in

average life expectancy. MEDC data shows its 1.7 percentage of years lost, which is considerably lower than LEOC's.

~~points etc~~

c) One of the main problems is that there can be a lack of understanding and information into the causes of sexually transmitted diseases as a result of unsafe sex. In LEOC's, the main issues like nutrition and tobacco can be influenced by corruption in the black market, making it hard for government intervention to occur. Countries like India suffer a huge difference in distribution of income, making it hard for governments to tackle these problems of health.

In MEDC's, countries like the United Kingdom find it hard to stop obesity and high cholesterol levels by the availability of food in healthy food and high income meaning people can afford to eat a lot, advertising is also a big issue for governments.

(4)

Examiner comment – grade E

The answer to part (a) is correct. In part (b), the data have been misread which makes the answer incomplete. The answer to part (c) is ill-focused and descriptive rather than explanatory. The points made are basically relevant but are not made so in the answer.

Mark awarded = 4 out of 10

Question 5

Migration

5 Fig. 4A shows the age/sex structure of migrants to Switzerland. Fig. 4B shows the age/sex structure of the Swiss born population.

(a) Compare the age/sex structure in Fig. 4A with that in Fig. 4B. [5]

(b) Suggest reasons for the age/sex structure of the immigrant population. [5]

Mark scheme

(a) **Compare the age/sex structure in Fig. 4A with that in Fig. 4B.** [5]

A full answer requires comparison rather than separate descriptions. This includes similarities as well as differences.

Possible comparisons include:

- similar numbers under 10
- more pronounced ‘peaks’ in mid-thirties for foreign born
- second peak in mid-fifties for Swiss born missing in foreign born
- Swiss born has larger dependent population
- far fewer elderly in foreign born
- both have more female than male in the older population

Other comparative points acceptable

(b) **Suggest reasons for the age/sex structure of the immigrant population.** [5]

Reasons are likely to centre on the foreign born population being economic migrants to Switzerland to varying degrees. Hence the greater number in the 25–40 age group. Might also account for higher number in 20–25 age bracket amongst foreign born. Migrants more likely to be young, so fewer foreign in upper age group – may also return to country of origin when they retire or leave work as they have enough money to secure their futures.

Example candidate response – grade A

5.

- a) The structure of fig. 4A has many more people of working age than the structure of 4B. There are also many more older people in 4B than in 4A. The ~~amount~~ of people percentage of people below the age of 20 is roughly the same in both 4A and 4B. 4B has a more evenly distributed percentage of population than 4A which has a large bulge in the 25-45 year old section. Finally 4A has a higher ratio of males to females than 4B which is only ever except for elderly ages where females ^{outnumber} ~~outnumber~~ males.
- b) There is a very high percentage of the population are aged between 25-45, this is because this is the age of people who are ~~most~~ able to work and are looking for jobs, so they have migrated for work purposes. There is also a small percentage of elderly people, as elderly people tend not to migrate for working purposes, mainly to retire in peace, they do also not travel for distances as willingly as younger people seeking work, which most likely accounts for this fact the the elderly migrant population is small. There is also a relatively small number of children compared to adults, which shows us that many people who have migrated have done so for work, and do not have such time to support families. Also, there is a slightly larger number of males than females as males often migrate to work and send the money back home to their families.

Examiner comment – grade A

The key to a good answer for part **(a)** is a comprehensive coverage of both age-sex pyramids with use of data extracted from the pyramids. Many candidates simply notice the difference between the ages of 30 and 40. This candidate does examine the pyramids in their entirety with some data. But the amount of data back-up is limited, thus restricting the award of full marks. However, the coverage is sufficient for a good mark. The answer to part **(b)** is also fairly comprehensive covering both gender and age. The level of explanation is sensible but lacks detail in places. However, both answers do cover the main points outlined in the mark scheme. With a little more use of the resource, the mark could have been considerably higher.

Mark awarded = 6 out of 10

Example candidate response – grade C

- (5) The one obvious point of comparison is the large bulge experienced in Fig 4A. The bulge occurs between the ages of 25 and 45, which are normally considered working age. There is a bulge in Fig 4B around the same time, however it is much smaller only reaching around 0.75% compared with Fig 4A which reaches around 1.8%.
- A second point of comparison is the large difference between the size of the older population (80+) in Fig 4B compared with 4A. Even at 80 years old 4B can still reach 0.5%, so on the women's side. Whereas on 4A they, the graph can barely reach 0.1%.
- b) It is normally considered that working age (16-50) people are the most likely to move between countries. That is why there is such a sizeable bulge between those ages. Extending beyond the original population other parts age groups of the population by 0.5%.
- One reason why at the higher part of the period is so small 0.1% could be due to the immigrants wanting to move back to their homeland to live. After originally coming to that country to work, they raised a family who have now started working so they decide to move back home.

Examiner comment – grade C

There is much to credit in the answer to part **(a)** in that the candidate does extract information from the pyramids. The answer concentrates on the bulge in the age range 25–45 and the older population but ignores the younger age groups. However, the analysis is quite detailed. In the answer to part **(b)**, two relevant points are made about the working and old age populations, but the level of analysis is limited. With quite minor additions to both parts, this answer could be raised considerably. The difference between this and the exemplar for a grade A is merely the comprehensiveness of the detail.

Mark awarded = 5 out of 10

Example candidate response – grade E

- 5a) The Swiss bar population 4b shows that there is an increasing number of old dependants those living above 65+ as compared to figure 4A. Figure 4b shows there is a higher number of females living past the age of 80 as compared to the males. Figure A shows that there is a higher proportion of both males and females between 30 and 40 years of age as compared to figure B. Figure B seems to be following more of stage 4 of the DTM and figure A showing stage ?.
- In Figure A there is about 1.2% of females

- 5a) at the age of about $\frac{36}{38}$ as compared to the 0.7% of females living at 36 in fig B. In fig B there is about 0.49% of males living at infants 0-1 as compared to the 0.4 in fig A.
- ~~In fig A there is about 0.6% of females at the age of 65 years as compared to the in fig A there is about 0.013% of males living at the age of 90 years old as compared to the 0.1% of males living at the same age in fig B.~~
- In fig B it clearly shows that there is a lower number of economically active as compared to fig A, showing that most migrants moving to Switzerland at the working age so that they could work and get money. $\frac{3}{3}$

5b) There are many reasons for this. Some of them are as follows, there are more economically active females moving to Switzerland due to the lack of jobs where they come from. So at this age they go to Switzerland looking for jobs, as well as this is their marriageable age so there is a chance that they have moved to settle and start a family.

There is a decrease in the upward age, 80+ of males due to a number of reasons, the immigrant population is low because they can not afford to migrate anymore as it is expensive, and there is more females than males because females

5b) live at a later age, and will move to Switzerland for retirement.

There is a large number of immigrants from 0-10 years, due to the fact that children move with their parents, for education, better lives and better health care as well as amenities.

There are more males at the age of 70, as compared to females, males migrate for jobs, so they can send money back home as remittances.

Examiner comment – grade E

The characteristic of an answer at this level is an ability to describe elements of the resource but to struggle when discussion or explanations are required. This is true here. In part (a) the main bulge in the immigrant population in mid-years is identified as well as some aspects of the older population, using data extracted from the resource. But, for part (b), the candidate seems not to understand the question. Also, unsubstantiated statements, of little merit, are made.

Mark awarded = 4 out of 10

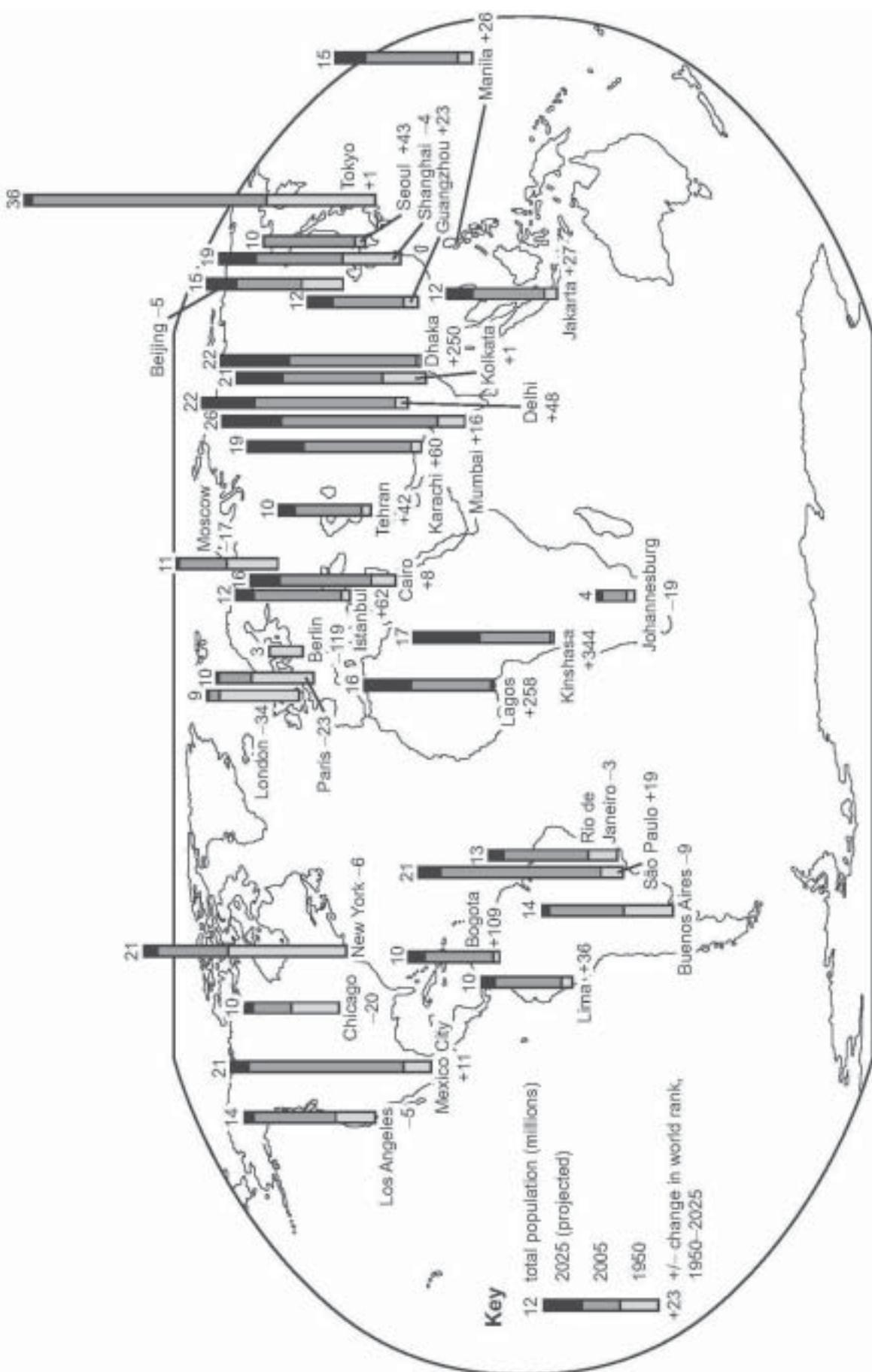
Question 6

Settlement dynamics

- 6 Fig. 5 shows the population of selected cities in 1950 and 2005, their projected population size in 2025 and change in the cities' world rank 1950–2025.
- (a) Give the name of the city in Fig. 5 which is expected to have:
- (i) the greatest increase in world rank,
 - (ii) the least population growth after 1950. [2]
- (b) Using Fig. 5, compare the growth of New York and São Paulo. [3]
- (c) Outline some of the challenges associated with the continuing growth of cities in either MEDCs or LEDCs. [5]

Fig. 5 for Question 6

Population of selected cities in 1950 and 2005 and projected for 2025



Mark scheme

(a) Give the name of the city in Fig. 5 which is expected to have:

- (i) the greatest increase in world rank, [1]

Kinshasa

- (ii) the least population growth after 1950. [1]

Berlin

(b) Using Fig. 5, compare the growth of New York and São Paulo. [3]

Both are projected to have 21 million people in 2025 (1), but they reach it by different routes. More than half NY's growth was before 1950, whereas SP was small (a few million). Between 1950 and 2005, SP outstrips NY and has its main period of growth. Both are predicted to grow at a slower rate 2005–2025, but SP still more than NY. (2)

(c) Outline some of the challenges associated with the continuing growth of cities in either MEDCs or LEDCs. [5]

In MEDCs challenges include overcoming traffic congestion, ageing infrastructure, replacing unsuitable housing stock, the inner city, governance, social disorder, etc.

In LEDCs challenges include providing housing, improving or replacing shanty towns/squatter settlement, providing clean water and electricity, overcoming traffic congestion, governance, reducing urbanisation, etc.

A different approach would be to consider challenges such as the lack of finance or governance issues.

Credit issues 2/3 or 3/2 on development, detail and exemplification.

Example candidate response – grade A

6.	
a)	
i) India Kinshasa + 344	/
ii) India USA Berlin	/
b)	<p>New York has a negative change in world rank between 1950 and 2025 with -6. Whereas São Paulo has a positive +19 for the change in world rank. New York had a greater population total in 1950 compared with São Paulo which was significantly smaller in 2005, São Paulo nearly doubled the population with New York and in 2025</p>

Projected São Paulo is slightly higher compared with New York. The total population in New York is 21 million, which is the same as in São Paulo. New York is a MEDC and São Paulo is a LEDC.

- c) In ~~LEDs~~, for example Rio de Janeiro in Brazil has some challenges associated with the continuing growth of cities. For instance, the levels of pollution are high from the traffic and factories which creates smog and breathing difficulties for the residents and the tourists. This leads to strains on health care as population growth increases. Also, with the many vehicles on the roads, congestion is another factor as there is such a high population density in LADCs. Due to the high population densities, there is little space and overcrowding is a major issue. Factors such as lack of housing, so people have to live in shanty towns which is unsafe, unstable and illegal land. Also healthcare becomes strained due to the overburden pressure and sewerage systems and water supplies become contaminated. Also, due to the increase in population, there is a major factor of unemployment, so competition is high for jobs.

Examiner comment – grade A

Most candidates identified the cities correctly for part **(a)** so the differentiation in marks between candidates will occur in parts **(b)** and **(c)**. The answer to part **(b)** is comprehensive noting the change in ranking and the time periods over which the growth of New York and São Paulo have occurred. The only element lacking is some indication of the populations at the various periods. The key to a good answer in part **(c)** is to discuss the challenges faced by growing cities. Answers, in general, tended to describe the problems but often did not translate this into why they are challenges. This answer tends to follow this trend. Some of the issues are enumerated, such as congestion and pollution, but why these are a challenge is only vaguely dealt with. Problems are not necessarily challenges. Some problems are easily dealt with. However, the problems are relevant and varied.

Mark awarded = 6 out of 10

Example candidate response – grade C

- i) Kinshasa ✓
ii) Berlin ✓
- b) the growth of São Paulo is positive, increased growth whilst the growth of New York has decreased. São Paulo and New York are both predicted to have a population of 21 million by 2025. São Paulo's growth has been much quicker during the period 1950 - 2005 whilst ~~recently~~ ^{now} of New York's growth was before 1950. These trends match the trends of other LEDC cities, who experience increased rapid growth during 1950 - 2005 whilst there was negative growth for MEDC cities. Detroit
- c) The continuing growth of Mumbai, one of India's and the world's most rapidly developing cities, is being hindered by the presence of the slum Dharavi, which occupies most of the perimeter of Mumbai, along the coast of India. Mumbai wants to expand its city to create a greener more environmentally friendly outer city but cannot as the un-organised sprawl of Dharavi, with disorganized informal links and a population of 2-3 million is

restricting it. Other challenges that Mumbai faces is that a large proportion of it is surrounded by physical features that are hard to develop on, like expanding past its harbour and the coast. The challenge of relocating the huge population of Dharavi is huge, as it costs money to rehouse them and offer them jobs.

Examiner comment – grade C

Part (a) is correct. The answer to part (b) covers most of the points but is expressed in very general terms with little quantitative information. It also wanders off the question at the end. This last point often differentiates between a grade A and grade C answer with the former being clearly focused on the question with little superfluous detail. This last point is emphasised in the answer to part (c), which is an account of Mumbai and its problems. Although some of the information could be relevant, it is not used in a focused way. Also, concentrating on only one example reduces the breadth of the analysis.

Mark awarded = 5 out of 10

Example candidate response – grade E

6.	
a	
i Krishnam	✓
ii Suburbia Berlin	/
b	Metro São Paulo's growth occurred between 1950-2005 where it just on itself has only not even doubled in population since 1950. Between 2005 and 2025, São Paulo is expected to grow by about a $\frac{1}{3}$ more than New York.
c	The challenges that are associated with the continuing growth of cities in MEDCs are a lack of space, lack of transport, increasing levels of pollution and a lack of infrastructure, like sewage systems. As the cities continue to grow, their populations continue to grow, this leads to a lack of space, and, more importantly, a lack of housing. The existing road network and public transport services struggle to cope with this increase in population which leads to more congestion and more delays. The existing infrastructure, such as ^{the} power grid, the sewage systems, will struggle to cope with the increased demand and use.

Examiner comment – grade E

Part (a) is correct. For part (b) there are merely a couple of very general statements. There is very little use of the resource. The answer to part (c) is merely a list of issues that could occur in an expanding city. There is no detailed discussion as to why these could pose challenges and to whom they are a challenge. Thus, the answers to parts (b) and (c) are severely limited. A significant proportion of the marks are gained from part (a), which is usually characteristic of a mark at this level.

Mark awarded = 4 out of 10

Section B

Question 7

Hydrology and fluvial geomorphology

- 7 (a) (i) Define the hydrological terms *groundwater* and *springs*. [4]
- (ii) Briefly describe how groundwater recharge occurs. [3]
- (b) Using diagrams, show how soils and vegetation within a catchment area (drainage basin) can affect the shape of storm hydrographs. [8]
- (c) Describe and explain the differences between the landforms found in braided and meandering river channels. [10]

Mark scheme

- (a) (i) Define the hydrological terms *groundwater* and *springs*. [4]

Groundwater is percolated water that is held below the water table (phreatic water)
 Springs are flows of water where the water table intersects with the surface

- (ii) Briefly describe how groundwater recharge occurs. [3]

Recharge of the groundwater occurs when precipitation exceeds evapotranspiration and water percolates downwards to the aquifer. Needs some indication that groundwater has been depleted and fills up again.

- (b) Using diagrams, show how soils and vegetation within a catchment area (drainage basin) can affect the shape of storm hydrographs. [8]

Soils that encourage infiltration (e.g. sands) will produce less run off and hence lower peak Q and longer lag times. Clay soils allow run off and hence shorter lag times and steeper limbs of the hydrograph. Dense vegetation encourages both interception and infiltration hence slowing down the arrival of water into the channel producing lower peak Q, flatter limbs and longer lag time. Sparse vegetation has the opposite effects.
 Can use a single soil type and single vegetation type.
 Max. 5 if no diagrams.

- (c) Describe and explain the differences between the landforms found in braided and meandering river channels. [10]

Braided channels are straighter, broader, steeper in channel slope and contain deposited eyots and bars of gravel and sand. Some may be colonized by vegetation and thus more permanent whilst others are temporary features. Meandering channels are sinuous, asymmetrical in shape, have lower channel slopes, slip off slopes, river cliffs and pools and riffles. Much can be achieved by diagrams. Explanation is the variations in discharge in braided channels and the swinging thalweg in meandering. Does not require a totally comprehensive coverage of all landforms to achieve max. marks.

Candidates will probably:

Level 3

Have reasonable coverage and good explanations for the differences between the two channel forms. Should be explicit mention of differences, rather than an account of each. [8–10]

Level 2

Have reasonable description of the two channel forms with some comparison, but more limited explanation. [5–7]

Level 1

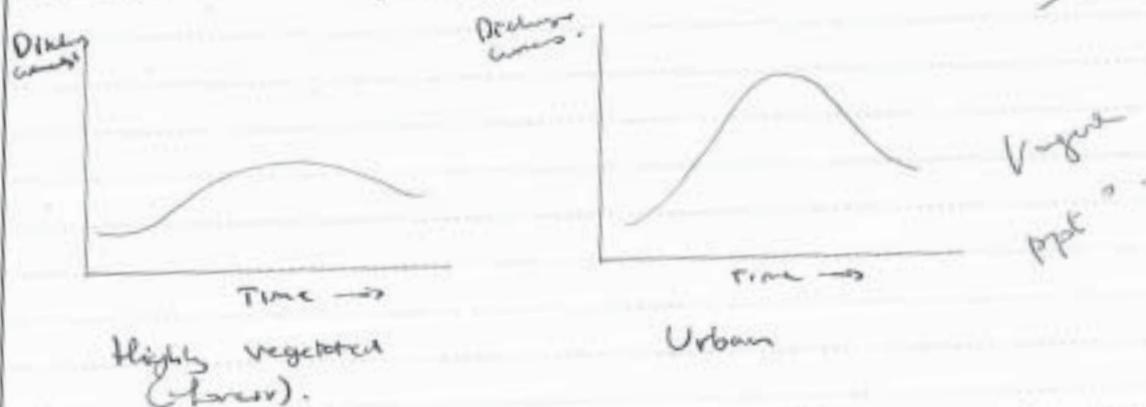
Present a jumble of landforms with some confusion between the two channel forms with little if any explanation. [0–4]

Example candidate response – grade A

- 7 a) i) Ground water is the water found in the (phreatic) layer, and it's permanently saturated.
Springs are located where there is a gap in bedrocks) and water is found in the ep. If ground stores are full enough the water is return to the surface.
- ii) Groundwater recharge occurs when high intensity rainfall occurs, and flows over as infiltration allows rain water into the top soil, and then water percolates through the permeable bed rock. Until the water has percolated down p into a groundwater store, replenishing the water table or aquifer in the phreatic layer.

b) A catchment's storm hydrograph's shape is dependent on a number of factors, the type of soil, and level of vegetation can have a large effect.

If a catchment has large amounts of vegetation then the storm hydrograph will have a lower peak discharge and a more shallow rising and recessing limb, than say an urban area or with little vegetation and more impermeable surfaces.



This is because the increased vegetation interception and stem flow mean the discharge has not got such a high and sharp peak. Then the rising and recessing limb are shallower as infiltration is high and water only gets back to the channel slowly via surface flows and subsurface flows whereas an urban area has a high peak discharge and its runoff is steeper as less infiltration is less prominent. Instead surface run off and over flow drains transport water back to the channel, making the recession limb steeper and deeper.

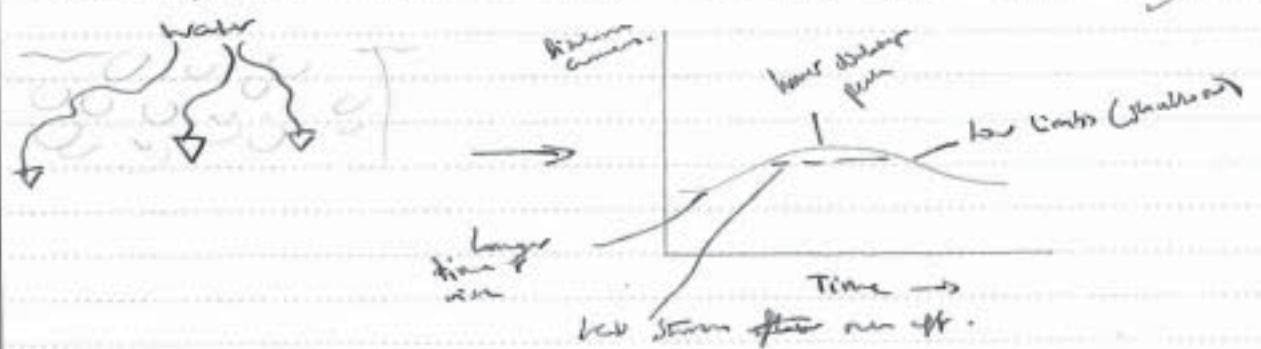
Depending on the soil type the storm hydrograph will change as more or less soil will

be able to infiltrate.

If the soil is more tightly compact and there are less gaps for water to infiltrate through then surface runoff will be increased, and the discharge peak will be higher, and lags will be steeper.



On the other hand with lower more permeable and porous soil then infiltration it is more prevalent and infiltration can occur till the soil is saturated if rain point is long enough. This means more though, into and then flow happens, which takes longer to reach the river. Thus the hydrograph shows a longer and shallower as some water is retained by soil and returns to atmosphere via evapotranspiration rather than reaching the river.

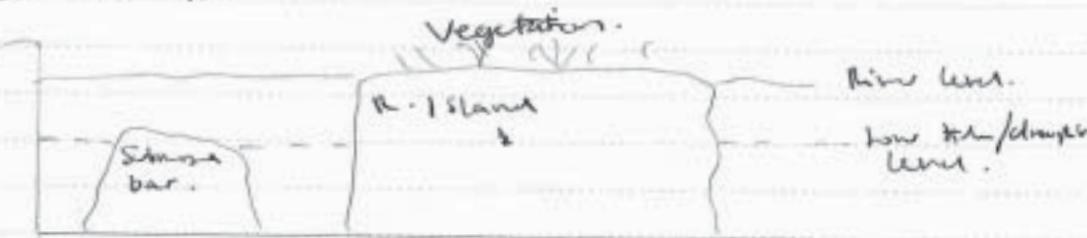


c) Braided channels are found in such land forms as alluvial fans, the Delta's → the Mississippi X birds foot delta, and high sediment areas.

Braided channels are formed when a river is overloaded with sediment or (flocculation occurs) X and clay particles settle in the sea bed → due to an electric charge exerted by mixing of fresh and salt water, making the clay particles coagulate and settle.

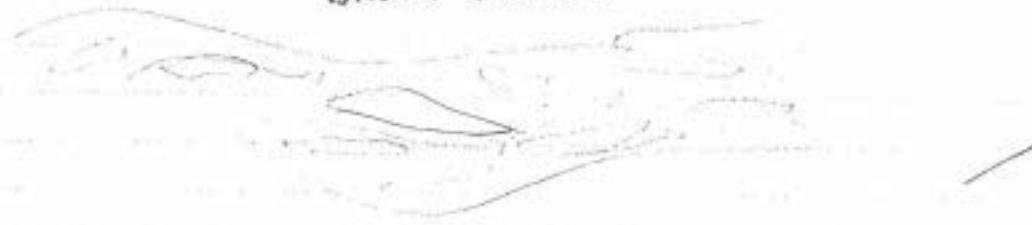
In braided channels one can find such land forms as submerged bars. These are areas of deposition which are close to riffles, however these bars are unvegetated and are made of fine alluvial sediment.

River Islands are formed as velocity decreases and more sediment is deposited as sufficient energy to transport is lost. These build up until they are large enough to become visible above the surface of the water. Eventually some form of vegetation may grow on it.



On the other hand where as braided channels are multithread channels, meandering river channels are singular and do not form ~~any~~ the same landforms.

Braided Channel.

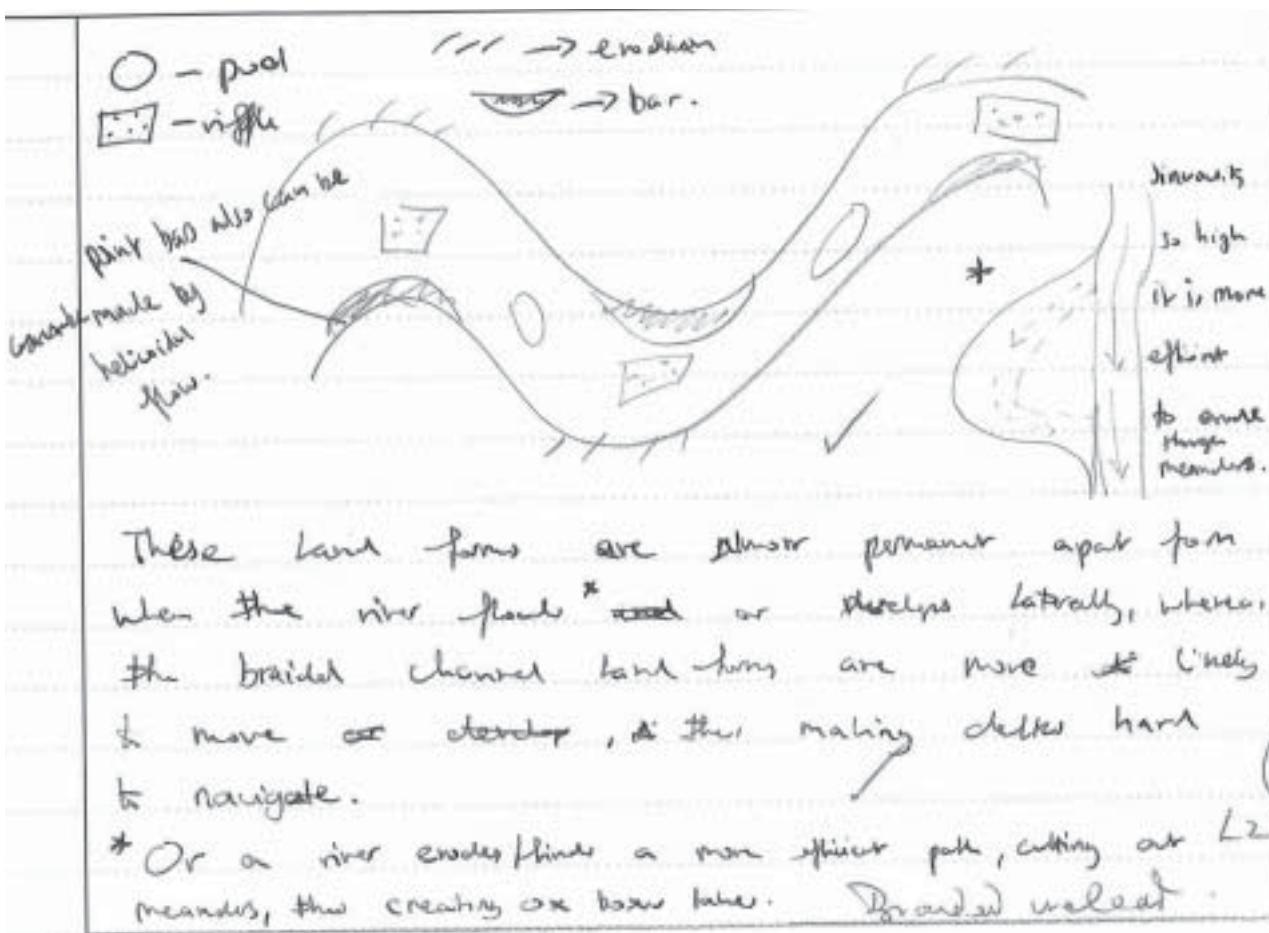


Meandering channels develop as single channels and they possess landforms such as pools and riffles and alternating bars as opposed to river islands.

Pools and riffles are the name given to the paths or - banks which are sunk very little deeper areas and riffles are the cause of sediment as the velocity can drop the load of water.



Alternating bars form as the current slows down as the velocity decreases. The thalweg accentuates these until the river sinuosity is lengthened and meanders begin to form. As the thalweg appears, the straight velocity is higher as the bed is scoured. The current into a pool on the straight of the river as the velocity decreases by the bar as the result the sediment is deposited leaving a small sub-surface bank. — Riffle.



Examiner comment – grade A

For some reason, candidates find sub-surface hydrology difficult; a point which was raised in the Examiner report. This candidate falls into that category and the answer to part (a) is not typical of the rest of the answer. The definition of groundwater uses another term, phreatic, which should also be defined, but isn't. The relationship between springs and the water table is ignored or unknown. This answer flounders and makes no specific, accurate points. The answer to part (a)(ii) is thorough and does get all the main points, even if the replenishment aspect is somewhat vague. The answer to part (b) is more comprehensive than most in that it does attempt to cover both vegetation and soils separately. Many candidates combined soil and vegetation. The comparison for vegetation is that between a lot of vegetation and none, i.e. urban. The idea that different types of vegetation might be described, such as woodland and grassland, occurred to very few candidates. There are clear areas for improvement. The hydrograph sketches are vague and not very informative. However, the analysis of soils is more complete than in many answers with some attempt to explain their influence. Better hydrographs with more analysis of time lags would have raised the standard of the answer considerably. It is usually the case that meandering rivers are better understood than braided ones. This answer demonstrates this. The discussion of braiding starts unconvincingly with mention of deltas, which are inappropriate. Even alluvial fans are unconvincing with respect to braiding. Because of the mention of braiding, the discussion of clay flocculation is irrelevant. However, some of the main elements of braiding are understood even if the diagram is not very helpful. The discussion of meandering river channels is much better and quite comprehensive. Also, the diagram is more informative. Most of the important factors are discussed. This answer demonstrates that marks can be accumulated in a variety of ways and not all the parts will be answered to the same level.

Mark awarded = 15 out of 25

Example candidate response – grade C

7ai

Groundwater is the water ~~in~~ between the pores ~~in~~ of the soil.
 This is a type of water storage in which aquifers are found.
 Water can achieve to become groundwater after percolation.
 Springs ~~are~~ are areas where water has risen from
 the ground to the surface. A spring can be achieved when
 throughflow meets a layer of impermeable rock and moves
 upwards to the surface.

7aii * (it is after question 7b)

b.



drainage basin

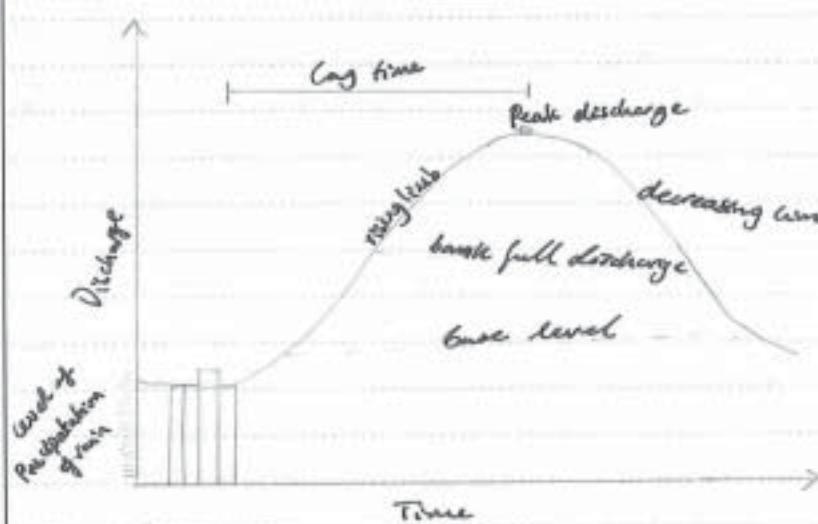
tributaries

main river

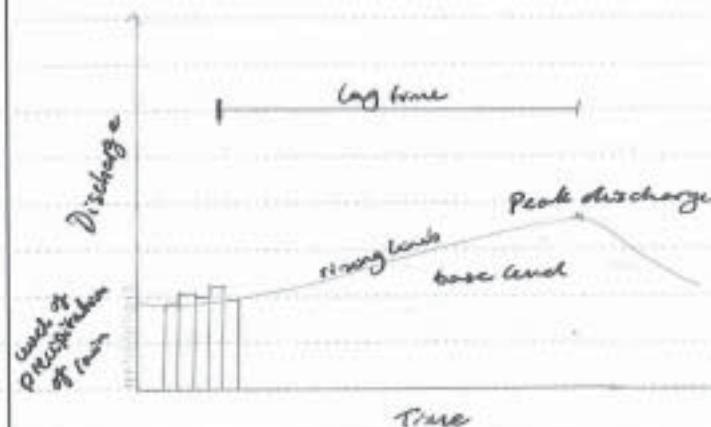
This diagram shows a drainage basin of impermeable rock such as (limestone). Impermeable rock restricts does not allow infiltration and percolation. This

therefore leads more surface run off and ^{a higher} rising limb and peak ~~full~~ discharge. The impermeable rock allows the water to flow into the hydrograph much quicker so surface run-off is much quicker than throughflow and baseflow.

Vegetation can lower the peak ~~full~~ discharge and a lower gradient of the rising limb. Vegetation increases infiltration such as evapotranspiration. Also the roots of the vegetation lowers the flows within the soil such as throughflow as well as surface-run off.



This diagram shows a storm hydrograph of an area of high gradient, impermeable rock with a high gradient rising limb.



This storm hydrograph shows a densely vegetated catchment area such as a wood land. Due to the number of trees, the rising limb has a lower gradient and a

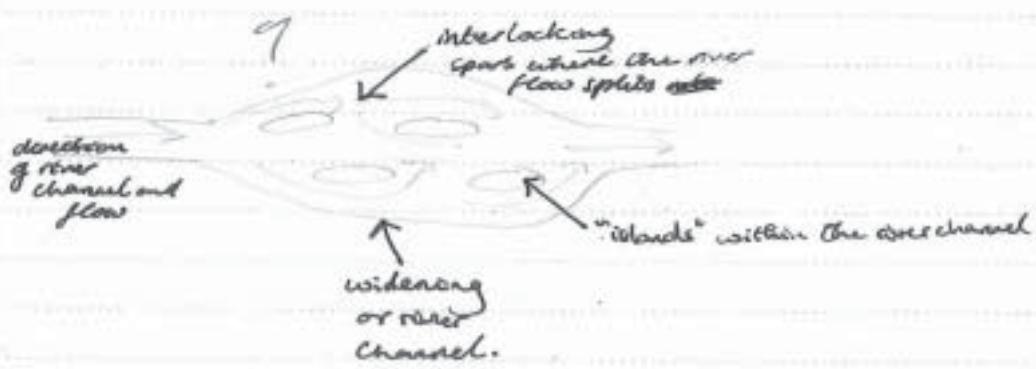
lower peak discharge. This is poor because the number of vegetation is too great than it affects the output and processes such as through flow of the river. Due to the significant consumption by vegetation such as absorption of water through the roots, the river does not reach its bank full discharge.

✓ Root uptake into soil

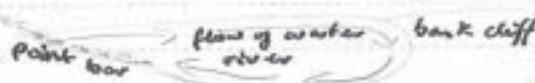
7a(i) Due to poor the processes of movement of water such as base

- 7.1 flow or groundwater flow, ground water level reduces in the temporary saturated zone to the permanently saturated zone. Groundwater recharge can occur through the downward movement of water such infiltration and then percolation. This can occur after or during precipitation thus replacing the water that has left.

7c Braided channels formation can occurs due to a number of factors. In order for braided channels to occur coarse lag material must be in the river channel. This encourages deposition. The ^{transverse} wave also encourage deposition to create "islands" within the channel. Due to these islands the width of the channel increases and the channel is divided into interlocking spurs which as high levels of velocity. Due to high levels of velocity, the islands can change form and places in the river channel quickly.



A meandering river channel occurs on the lower valley which helps the width of the river channel to increase. Landforms found in meandering river channels are point bars. Point bars occur due to the secondary flow of a river. This is called the helicoidal flow. It is the downward movement of water on the side outside of a the river on which the hydraulic pressure of the water erodes the bank and carries it along the river bed to the inside of the meander. Due to the ^{water of} meander's low velocity, the water deposits the sediment on the side making a low gradient slope bank called a point bar.



The difference between the two land forms in braided and meandering channels are that braided channel landform are visible in the river channel and under the high velocity of the river can change its shape and position very quickly. While point bars are half submerged on the meandering river channels and continuously grow bigger on one side of the river channel. The sediment between the two landforms can depend on the sediment it erodes. But usually point bars have finer sediment and small stones while braided channel channels have a base of larger sediment but also fine sediment.

*Labeled on Cefnfor
of meandering river*

- i) Natural increase is the number of birth rate per 1000 (against) the death rate per 1000 effectively not including migration.

Examiner comment – grade C

Overall, this is a good example of the general nature of a grade C answer. Much of the information presented is of a sound nature, but is usually lacking in some respects, often in depth of description and explanation. In part (a)(i) there is a partial explanation of groundwater but it lacks precision. The same is true for the description of springs. The general idea is there but there is no mention of water table. Unwittingly, the candidate has described the nature of a perched water table. There is a similar lack of complete detail in the discussion of groundwater recharge. The idea of recharge is sound but it is not connected to water draw down and the idea that groundwater utilisation has been greater than input because of a lack of precipitation or some other reason. The answer to part (b) is similarly partial. There is a discussion of the influence of rock, limestone, rather than soils. There is also confusion over the permeability of limestone. Thus, there is no account of the influence of soils on the hydrograph. The analysis of vegetation, using woodland as an example, is quite basic in terms of the processes but the

underlying concepts are sound. The diagram of the storm hydrograph is relevant and accurate. However, there is no direct comparison with areas lacking in vegetation. The same answer characteristics apply to the analysis of braided and meandering channel landforms in part **(c)**. The basic idea of a braided stream is sound, although the diagram is not especially accurate, labelling braids as interlocking spurs. The analysis of meandering channel forms only covers point bars, although the description of helicoidal flow and deposition is quite good. Thus, as throughout the answer, there are major omissions and lack of detail.

Mark awarded = 14 out of 25

Example candidate response – grade E

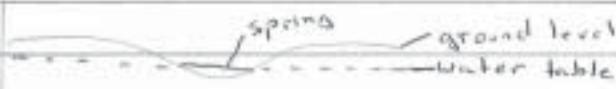
7.

a)

- i) Groundwater is water that has infiltrated through the soil and percolated through rock to enter the water table / and the water stored inside the water table is known as ground water.

2/

A spring is when the land and the water table come together meaning that water from the water table is above the level of the soil, so it literally comes out of the ground



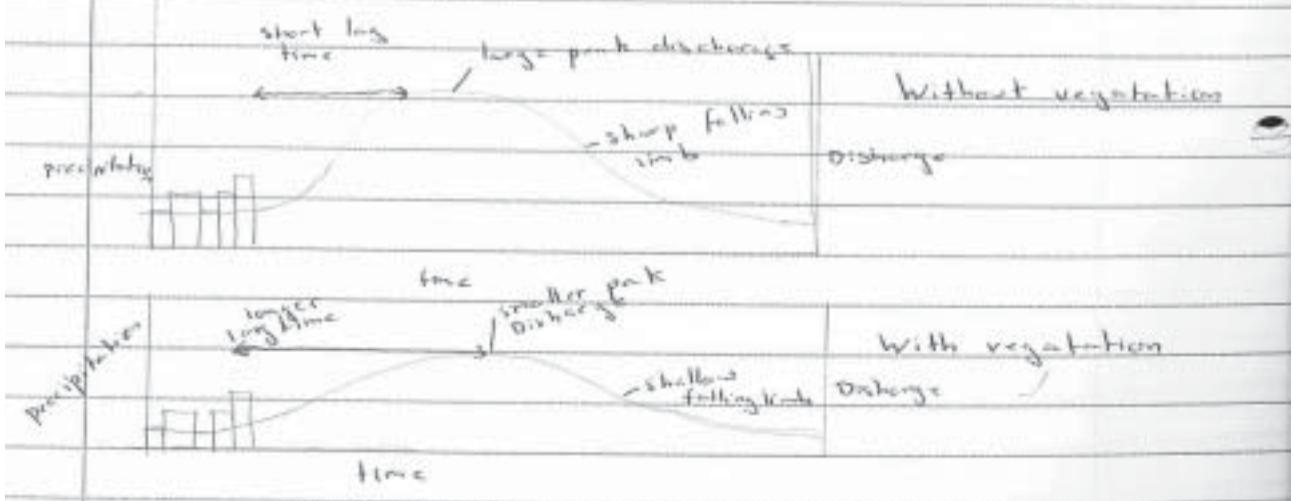
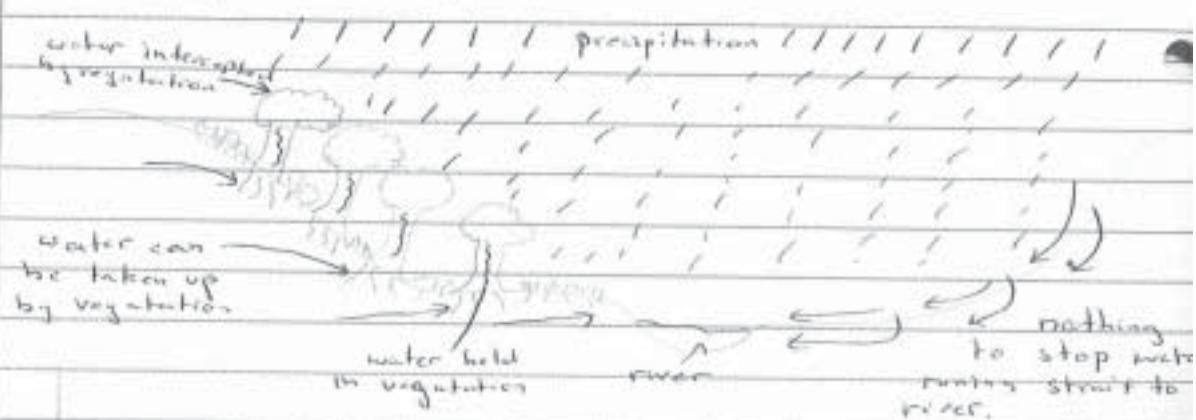
2/

4/

- ii) Groundwater can be lost through the process known as groundwater flow, so the water moves downhill. When precipitation occurs water begins to infiltrate into the soil. Some of the infiltrated water known as soil water storage will move downhill known as soil water flow. However some water will be left behind and through the force of gravity water will begin to percolate through the soil to enter the water table again to become once more groundwater.

4/

7(b) Vegetation is one of the major factors affecting storm hydrographs. Without vegetation the lag time of the hydrograph would be shorter. The reason that vegetation affects the lag time is because when it precipitates occurs some of it will be ~~soaked~~^{intercepted} by the ~~soil~~ vegetation, and can be stored inside the plant for a certain period and be ~~let out~~^{to where?} very slowly. As there is not as much water ~~go~~ coming to the river at once the peak discharge of the river could be lower.



c) Meanders form many different landforms one of which is called an oxbow lake this is where a meander becomes so severe that the easiest path for the water to take is to cut across the land and "cut out" the meander altogether. This will leave a horse shoe shape lakes, marshes or dried up river beds where the meander once was over time the oxbow lake will dry up. Meanders can also form interlocking spurs which is when the meander will cut away at a hill making them look like if they interlock.



Braided water channels however will form many small 'islands' where the water passes around, also because the river is limited here will be many areas of deposition where the river is to slow to transport sediments, this deposition can be seen by many point bars which over time will build up to form small islands.



Examiner comment – grade E

This answer is a good illustration of marks being obtained in a variable manner. The answer to part (a) (i) is much better than for most candidates. Both groundwater and springs are defined competently. It is in the rest of the question where the answer falls down. In (a) (ii) the answer does not focus on the question and is more about sub-surface hydrology than groundwater recharge. There is no indication of the groundwater being replenished. Part (b) is a very partial answer. There is no account of soils and the answer with respect to vegetation is simplistic with little detail. It is in the answer to part (c) where the candidate demonstrates a lack of knowledge and understanding. The only feature of relevance for a meandering channel is oxbow lakes. The discussion of interlocking spurs is irrelevant. The account of braiding is inaccurate in its discussion of point bars. There is one brief mention of deposition. Overall, this is a very marginal answer with large gaps in both knowledge and understanding.

Mark awarded = 10 out of 25

Question 8

Atmosphere and weather

- 8 (a) (i) Define the terms *atmospheric stability* and *atmospheric instability*. [4]
- (ii) Describe the conditions which may lead to the formation of *dew*. [3]
- (b) With the aid of a diagram, explain the generalised pattern of pressure and wind systems in either the northern or southern hemispheres. [8]
- (c) Explain how the *greenhouse effect* occurs in the earth's atmosphere. How have human activities affected it and with what consequences? [10]

Mark scheme

- (a) (i) Define the terms **atmospheric stability** and **atmospheric instability**. [4]

stability – where, if a parcel of air is displaced upwards it will return to its original position (because it remains cooler and heavier than the surrounding air). (2)

instability – where, if a parcel of air rises, it will continue to rise as it remains warmer than the surrounding air even though being cooled adiabatically. (2)

- (ii) Describe the conditions which may lead to the formation of dew. [3]

Nocturnal (long wave) radiation (on clear nights) leading to cooling of surfaces which cool air in contact with them sufficiently to cause condensation of water vapour to droplets on vegetation etc. Three positive points needed.

- (b) With the aid of a diagram, explain the generalised pattern of pressure and wind systems in either the northern or southern hemispheres. [8]

Can be achieved totally from a clearly annotated diagram/sketch map showing essentially: equatorial low, polar high and tropical high with the winds deflected appropriately as they move from areas of high to low pressure. Explanation should be in terms of the ITCZ as warmed air at the equator rises, the Hadley and Ferrel cells. Good candidates will show an understanding of the low pressure systems at the polar front.

Max. 5 if no diagrams.

- (c) Explain how the **greenhouse effect** occurs in the earth's atmosphere. How have human activities affected it and with what consequences? [10]

The greenhouse effect is the warming of the earth's atmosphere with short-wave radiation readily penetrating to the surface, whereas long wave radiation from the earth is impeded by the greenhouse gases in the atmosphere. Thus less heat escapes from the earth's surface than that arriving. The effect is increased with cloud cover and with particulate matter and certain gases in the atmosphere. Ever since humans started clearing forests and cultivating the land they have affected the composition of the atmosphere and increased the greenhouse effect, but industrialisation since the nineteenth century, pouring CO₂ into the atmosphere from burning fossil fuels, will be the main factor, plus emissions from I.C.Es and jet engines. The consequences will have been well rehearsed; global warming, polar and glacial ice melting, rising sea level, increased energy to fuel atmospheric disturbances, changing climatic patterns.

Candidates will probably:

Level 3

Accurate detail, knowledge and understanding of the science and demonstrated throughout the answer. Well balanced in covering the three demands in the question. Appropriate awareness of the scale of human factors and likely consequences [8–10]

Level 2

Covers the essential demands but lacking in some of the accurate detail. Less well balanced on consequences which may be exaggerated or less detailed. [5–7]

Level 1

Weak answers lacking accurate understanding of the science behind the topic. Limited coverage of the question with imprecision and generalisations. [0–4]

Example candidate response – grade A

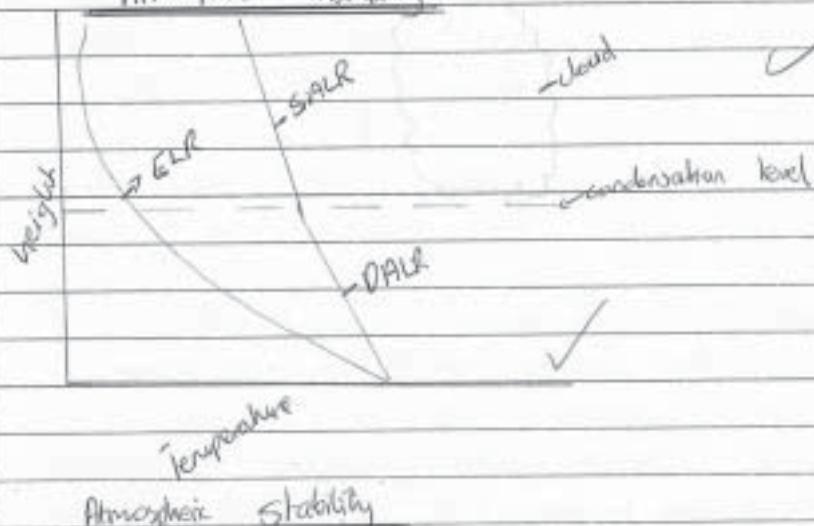
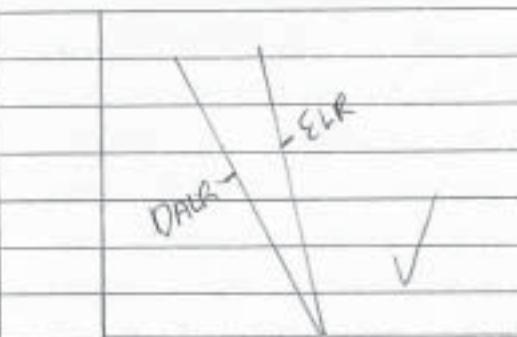
8u

Do not
write in
this column

Atmospheric stability is when the rising parcel of air is cooler and drier than the surrounding air and subsides and does not continue to rise, for example in the diagram below.

Atmospheric instability is when the rising parcel of air is warmer than the surrounding air and it continues to rise and cools adiabatically at the DALR until dew point is reached and condensation takes place. For example in the diagram below.

Atmospheric Instability

4
4.Atmospheric Stability

Q4ii

Dew is formed ~~at~~ under stable conditions. Air rises below dew point and condensation takes place on vegetation or ~~and~~ dew is formed.

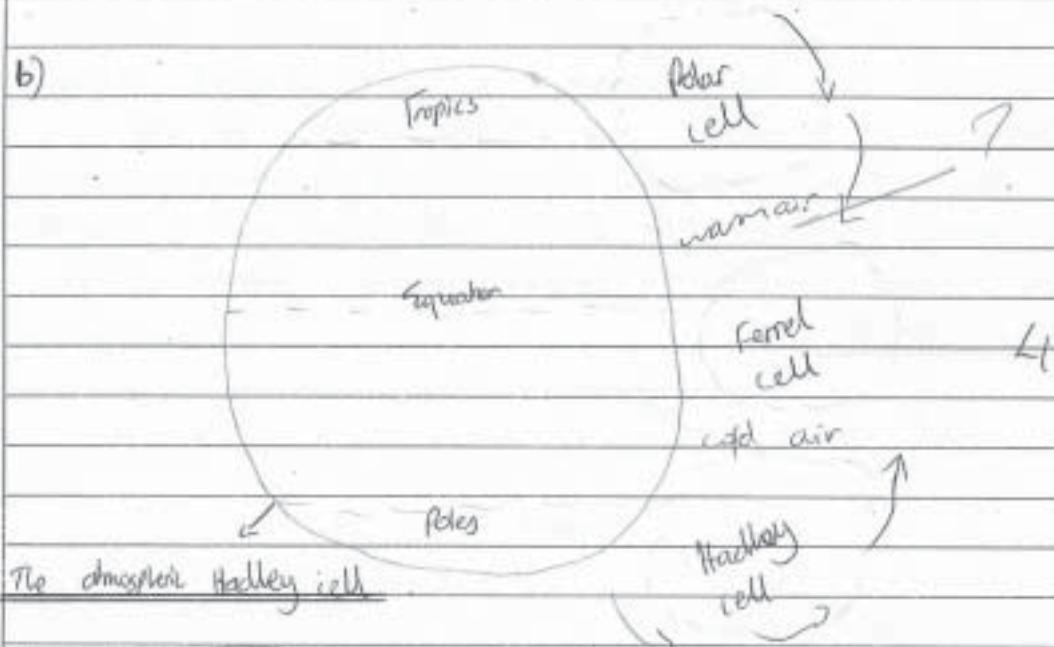
Q4iii

Dew is formed under ~~stable~~ conditions at night when there is long wave radiation that is taking place. The earth's atmosphere is cooled at night because of a loss of heat ~~caused by~~ outgoing terrestrial radiation. And the earth gets lack of insulation from the sun.

The earth surface becomes cooler and cold at night. Air rises below dew point and condensation takes place on vegetation. If there is a presence of condensation nuclei, little droplets are formed over the vegetation.

3
3

b)

2
10

The atmospheric Hadley cell

In the southern hemisphere the pressure patterns and wind systems differ according to the season. If it is in summer, the southern hemisphere will be experiencing unstable conditions. The pressure pattern will be low and the wind speeds very high because of the rain. And in the Northern hemisphere they will be experiencing stable conditions because there is generally high pressure and low humidity levels so therefore, the heat is generally transferred from the tropics, to the equator and to the polar areas. The general pattern of pressure and wind systems can also differ in the amount of solar radiation that is received. Differences in the general pattern and wind systems can also differ because of the hemisphere in which the sun will be shining more brightly.

nag

Marked
Agreed

8c.

increasing solar radiation enters the earth's atmosphere as short wave radiation and energy exchanges during the day occur in the soil and at night heat shortwave radiation leaves the earth's atmosphere as long wave radiation or terrestrial radiation. As the long wave radiation escapes the earth into the atmosphere the main greenhouse gases which are carbon dioxide and methane and to a lesser extent CFC's absorb some of that outgoing radiation and this in turn is called the greenhouse effect. To a large extent human activities have affected the greenhouse effect by factors industrial activities which leads to the atmosphere becoming warmer. Another example of a human activity which affect the greenhouse effect are pollution from exhaust fumes which lead to an increase in global warming therefore increasing the greenhouse gases, and this lead to an increase in precipitation because of the presence of a lot of hydrosopic nuclei. An increase in these pollutants can lead to the warming of the earth's atmosphere which can lead to an increase in sea levels because of the icebergs that will be melting and this could be very dangerous. An increase in the greenhouse gases could also lead to destruction of the ozone layer.

6
10

Domestic appliances that are used in homes can also lead to the greenhouse effect being affected and increasing the global temperature. And to a lesser extent human activities do not affect the greenhouse effect. Other things that affect the greenhouse effect are an increase in animals. Animals destroy the vegetation therefore transpiration cannot take place and this could lead to drought because of a lack of rainfall for example in Botswana.

To a larger extent human activities do affect the greenhouse effect.

L2 Limited impacts of
greenhouse effect ✓

15
25

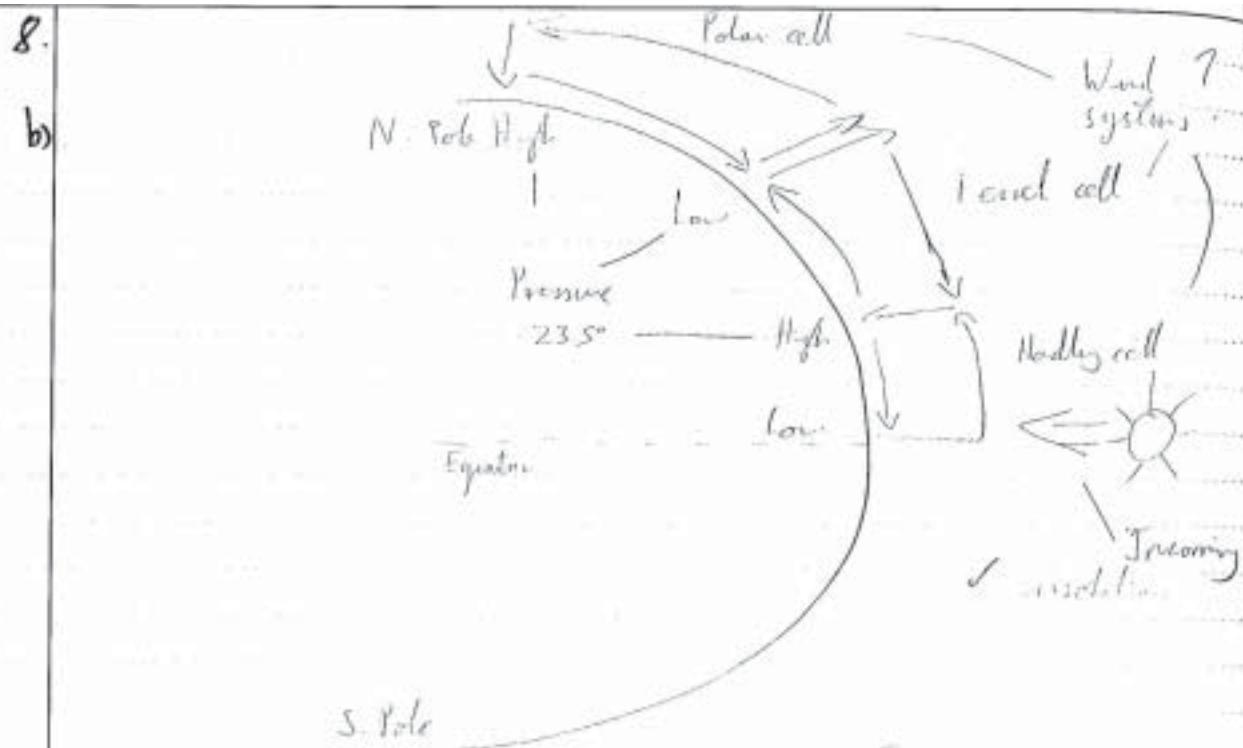
Examiner comment – grade A

Much of the answer operates at a level higher than the minimum for a grade A and demonstrates that knowledge and understanding is important across the full range of the syllabus. The answer to part **(a)(i)** is complete with informative diagrams. The account of the formation of dew for part **(a) (ii)** is also complete with an accurate description of the necessary conditions. It is in the answer to part **(b)** where the quality wavers. The description of the global pattern of pressure is incomplete and the cells are in the wrong position. The entire answer is muddled and does not really answer the question. The answer to part **(c)** is much better. The explanation of the greenhouse effect is sound as is the role of human activities. The wavelengths of the various radiation fluxes are correct and, mercifully, there is no mention of the (irrelevant) hole in the ozone layer. However, the consequences are discussed in very simplistic terms, thus the answer is slightly unbalanced. This highlights the need to consider all components of the question.

Mark awarded = 15 out of 25

Example candidate response – grade C

		Section B
8.	a) i)	<p>Atmospheric stability is where the environmental lapse rate is (saturated) adiabatic? Lapse rate is below the environmental lapse rate, resulting in no clouds and clear skies.</p>
	iij)	<p>Atmospheric instability is where a parcel of air that has reached SALL continues to rise and crosses the ELR cooling slower than the ELR which then results in dew point temperature being reached and therefore condensation occurring and forming cumulus clouds growing.</p>
	iiij)	<p>If there are clear skies which allow long-wave radiation from the ground to escape into the atmosphere at night, dew may occur.</p>
		<p>The escaping of this energy from the ground makes the temperature drop. Any air close to the ground also experiences this drop in temperature. Relative humidity increases, and if dew point temperature is reached, condensation can occur on the ground - aka dew.</p>
P.T.O		



The diagram above demonstrates the global wind patterns and pressures in the northern hemisphere. This is called the tri-cellular model and is made up of the Hadley, Ferrel and Polar cell.

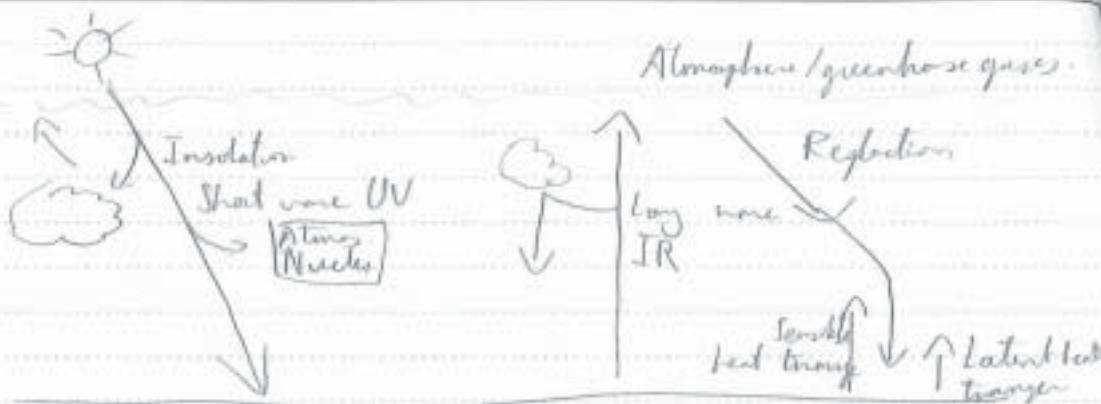
The system starts at the equator, where the air rises as it absorbs energy from incoming solar insolation. From here by advection (wind), it moves to ~~as~~ a colder area and subsequently cools and therefore falls. Because air is rising and leaving the equator there is often a low/

pressure at the equator. Here where the air falls (roughly the tropics), a high pressure is created. If the air does not have much heat energy left, it will move via wind back to the equator where this process repeats. This is the Hadley cell.

If the air still has some energy left it will continue north until it meets the cold, denser air mass from the poles. As the air masses are different densities they do not mix, and therefore rise. This forms a period of low pressure where these air masses meet. The air may return to the beginning of the cell (tropics) and will fall with the air from the hadley cell. This is the Ferrel cell.

The polar cell meets the warmer air mass and winds from the Ferrel cell and rises. It then retreats back to the poles and falls, creating a high pressure here. Winds transport the energy and air mass back to where it meets the Ferrel cell and this repeats. This is the polar cell.

The interaction of these three cells with each other and the subsequent energy transfer are what drive high/low pressures and general wind currents like the.

Q.
c)

The greenhouse effect is a natural effect which creates the ~~warm~~ warm environment that we live in. Without it, humans would not be able to exist.

The simplified diagram above shows the basics of greenhouse gases. Short wave UV energy from the Sun enters the ground, warming it up (approx 51%, after reflection by clouds/sea etc.).

The ground then emits this energy as long-wave IR. Gases in the atmosphere reflect this outgoing radiation back to the Earth's surface. This traps the energy within the Earth's atmosphere, warming the Earth up to hospitable levels.

The gases which reflect outgoing

radiation are called greenhouse gases. Examples of these are CO_2 , methane, water vapour, and Nitrous Oxide compounds, or NO_x gases.

Human activities over the last 100 years have seen a large increase in ~~the rate of~~ industrialisation and mechanisation. One of the side-effects ~~are~~ of industrialisation is the production of CO_2 , common to many industrial processes. This has the widespread use of cars, which also produce CO_2 has also added to the enhanced greenhouse effect. The enhanced greenhouse effect is when a rise in the amount of greenhouse gases means a rise in the amount of outgoing IR radiation reflected.

The industrialisation of agriculture has lead to more animals ~~but~~ producing methane, another greenhouse gas.

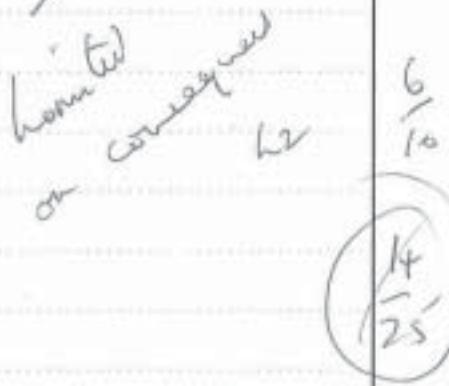
The gradual warming of the atmosphere due to the enhanced greenhouse effect is making the world hotter. This means the polar ice caps are melting, resulting in higher sea levels and an increased vulnerability to low islands, especially in the Pacific which may soon be wiped out.

Ecological systems will also be

affected, as land is less available as it gets swallowed up by increasing sea levels.

The increase in global temperature may also mean that many species, especially those adapted to colder climates may die out.

In conclusion, humans have enhanced the greenhouse effect past the natural rate. This may result in problems such as the melting of ice caps, rising of sea levels and increase in global temperature.



Examiner comment – grade C

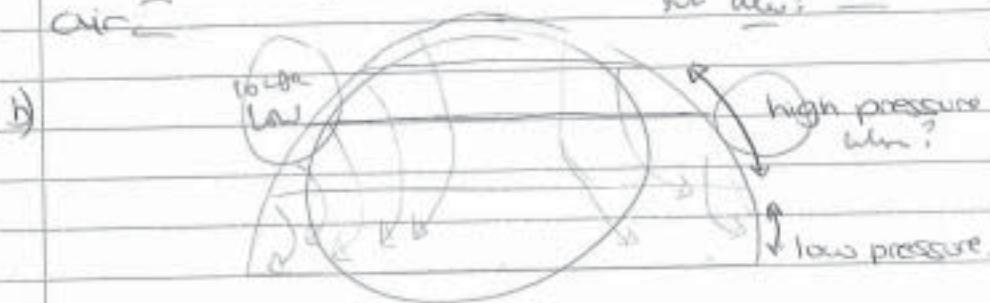
The account of stability for part (a)(i) is thoroughly confused. The account of instability demonstrates a basic understanding of air reaching saturation and continuing to rise but little reasoning for the continued uplift. The explanation of dew is sound but is incomplete in some respects. The significance of clear nights, the escape of long-wave radiation, and the fall in temperature, is sound. It just lacks the idea that cooler air is unable to hold as much moisture, leading to condensation. The answer to part (b) is unbalanced. There is an accurate diagram of the tri-cellular model with sensible explanation. However, there is little of relevance about winds. This is a good example of partial knowledge, which is typical of answers at this grade. The answer to part (c) is also slightly unbalanced. There is a straightforward diagram of the greenhouse effect and the account of gases is quite detailed. The causes of the enhanced effect are covered but the effects are limited to rising sea level and the extinction of some species in polar areas. Overall, a sound answer but lacking in detail and balance in some areas.

Mark awarded = 14 out of 25

Example candidate response – grade E

8) a)) Atmospheric stability is where the ELR is ~~less~~
than the DALR and the SALR. This ~~gives~~ leads
to good stable weather conditions.
Atmospheric instability is where the ELR is ~~more~~
than the DALR and the SALR. This leads to
poor unstable weather, usually rain and thunder
storms. ~~but we need the elevation air moves.~~ 2
F

- i) ~~Water~~ → cooler air for condensation to occur at low
levels, therefore ~~even~~ there must be moisture in the
air? 0
3



At the equator there is ~~not~~ low pressure due to the
amount of evaporation of water from the sea. This
causes ~~very~~ the condensation to form clouds.
The northern hemisphere has high pressure due to
more land and less ~~sea~~ evaporation to cause clouds.
The wind pattern curves outwards towards the
equator. 1
0
-
8

c) Greenhouse gases are a natural occurrence as the atmosphere is made up of different gases, there to keep the earth warm for humans to survive. Solar Short Wave radiation enters the atmosphere, with a percentage being absorbed by clouds, and some being absorbed by the earth. Depending on the abiding the earth reflects ^{more} long wave radiation back off, however the greenhouse gasses enclose the long wave radiation in the atmosphere, ~~just as~~ keeping in the heat, just like a greenhouse. Humans have affected it by increasing the amount of gases. Humans have done this by letting off pollution, by cars and other motor vehicles. Pollution is also being let off by nuclear power plants ^{for nothing like burning fossil fuels} to supply energy to houses. Factories let off pollution, ~~and even~~ ^{but from the} fluctuation lets off methanol. These activities have caused great consequences, as the greenhouse gases are becoming stronger, are letting less longwave radiation out of the atmosphere therefore heating up the earth at an warming rate, causing global warming, where the polar ice caps begin to melt, causing the sea levels to rise which will produce catastrophic floods. The thawing of permafrost in ~~Scandinavia~~, which ~~will~~ will then let off huge amounts of methane ~~for~~ which will end up overheating the world. If global warming continues, natural disasters will increase CO_2 doesn't figure here.

Examiner comment – grade E

There is a marked variation in quality in this response. However, it does demonstrate how a lack of breadth in knowledge and understanding can produce unsatisfactory answers. The answer to part (a)(i) is partial. The understanding is there but the definitions are incomplete. The return of rising air to its original position is missing for atmospheric stability and air continuing to rise is missing for atmospheric instability. The account of dew formation has nothing that is relevant. The answer to part (b) is also completely wrong. However, the answer to part (c) is sound if a little unbalanced. There is a good grasp of the causes and possible consequences of the greenhouse effect but with a surprising lack of mention of carbon dioxide. This part of the answer rescues the overall answer. The answer demonstrates that to get a mark above grade E, it is necessary to cover all aspects of the syllabus.

Mark awarded = 9 out of 25

Question 9

Rocks and weathering

- 9 (a) (i) Define the terms *oxidation* and *freeze thaw*. [4]
- (ii) Explain the process of exfoliation. [3]
- (b) Explain how the differences in the chemical composition of limestone and granite lead to differences in the ways they are weathered. [8]
- (c) With the aid of diagrams describe and explain the formation of landforms found near convergent plate boundaries. [10]

Mark scheme

- (a) (i) Define the terms *oxidation* and *freeze thaw*. [4]

Oxidation is a chemical weathering process. This occurs when a rock is exposed to oxygen from air or water. The most common example is when iron is present in rock, and thus turns from a ferrous state to a ferric state turning a reddish brown colour (better known as the process of rusting).

Freeze thaw is a physical weathering process. The water enters cracks in the rocks. When the temperature falls below 0°C the water freezes and expands by 9%. This forces open the crack in the rock. The temperature subsequently rises and the ice melts, allowing more water to enter and repeat the process. A sequence of diagrams would suffice for full marks.

- (ii) Explain the process of exfoliation. [3]

Exfoliation is a form of physical weathering. It is commonly found with granite, where the overlying rock/material has been removed and this unloading allows pressure release. Exfoliation may also be caused by the temperature changes in the rock due to the differences in the expansion and contraction of the outer rock and that of its core. The term onion skin weathering may be referred to. Full marks may be gained from reference to only one of the causes if sufficient detail is given.

- (b) Explain how the differences in the chemical composition of limestone and granite lead to differences in the ways they are weathered. [8]

The answer should focus on the differences in the chemical composition of the rocks. The answer is therefore likely to focus on the different nature of chemical weathering.

Limestone is a sedimentary carbonate rock. The small proportion of carbon dioxide within rainwater acts as a weak acid, and is able to dissolve limestone rock. This process is carbonation.

Granite is an igneous rock, formed as a result of intrusive activity. Whilst granite may take many forms, the dominant chemical composition is mica, feldspars and quartz. It is crystalline. The three minerals react differently with water – quartz remains mainly unchanged, mica releases aluminium and iron under more acidic conditions and feldspar reacts markedly, producing kaolin (china clay). This process can be termed hydrolysis.

The best answers will focus on the differences between the two rock types, rather than give a general dialogue on factors which affect the rates of weathering.

- (c) With the aid of diagrams describe and explain the formation of landforms produced near convergent plate boundaries. [10]

The diagrams should illustrate landforms such as ocean trenches, island arcs, volcanoes and fold mountains. The explanation can include the plates moving on convection currents. An oceanic plate is denser and thus is subducted under a continental plate. An example would be the Nasca Plate subducting under the South American Plate. The oceanic crust melting at the subduction zone supplies magma which subsequently rises creating features such as island arcs. Fold mountains, such as the Andes, may also have volcanoes present. High marks can be gained with the good use of annotated diagrams. Landforms should be related to the type of convergence: continental – continental; oceanic – continental; oceanic – oceanic.

Max. 6 if no diagrams.

Candidates will probably:

Level 3

Diagrams are accurate and well labelled and are referred to in the text, or annotated so well that little text is needed, such that all the major features are covered, probably in an integrated way. For fold mountains needs mention of sediments such as accretionary wedges. [8–10]

Level 2

Diagrams are reasonable but with labelling/annotation a little insecure. Reference to diagrams in text possibly limited and either explanations lack some detail or some major feature(s) not discussed. [5–7]

Level 1

Weak diagrams with limited useful labelling/annotation. Little understanding shown of the formation of features and limited features discussed. [0–4]

Example candidate response – grade A

9ai Oxidation is where O_2 reacts with minerals in the rock to form oxides. These expand when being made causing the rocks either side to be pulled away causing cracking.

Freeze-thaw is when water seeps into cracks at then freezes when the temperature drops below $0^\circ C$. It expands by 9% which forces creates to widen with pressure. This is repeated as the ice melts and the refreezes the next night.

ii. Erosion is a process by which rocks, under pressure, crack due to the sheer力量 of the pressure. On the Shetland Islands it is an example of erosion where the outside of the rock is heated while the inside remains cold. The heating creates a pressure difference causing the rock to 'peel' the top layer off. This is usually found on sand dunes in the desert.

Cooling?

b. Limestone is made up of Calcium Carbonate or $CaCO_3$. These means that it can be very easily worn by carbonic acid or acid rain. Carbonic acids can create through the weathering process of carbonation where the acid erodes the limestone.

Granite on the other hand does not contain any Calcium Carbonate but mica, feldspar and quartz. None of these 3 are weathered by ~~carbonic~~ acids carbonation. Feldspar though can be easily weathered by hydration because it reacts with the H^+ ion in water causing the feldspar

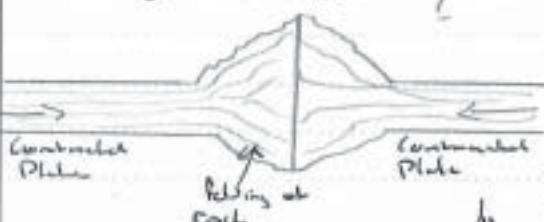
to crack, crack and splinter causing angular rocks to fall off? creating scree or regolith.

Due to this difference in make up of the two rocks they have very different landscapes that they form due to these weathering processes. Limestone is very easily weathered so in a karst landscape limestone pillars are very common as only the hard rock is left after the rest has washed away. By processes of infiltration and percolation limestone caves are very common as the water or acid rain reacts with underground limestone.

The infiltration & percolation is a very different effect on granite because it resists the dissolution & pressure from weathering due to its fine grain causing tors to form. Bedding planes help these weathering processes.

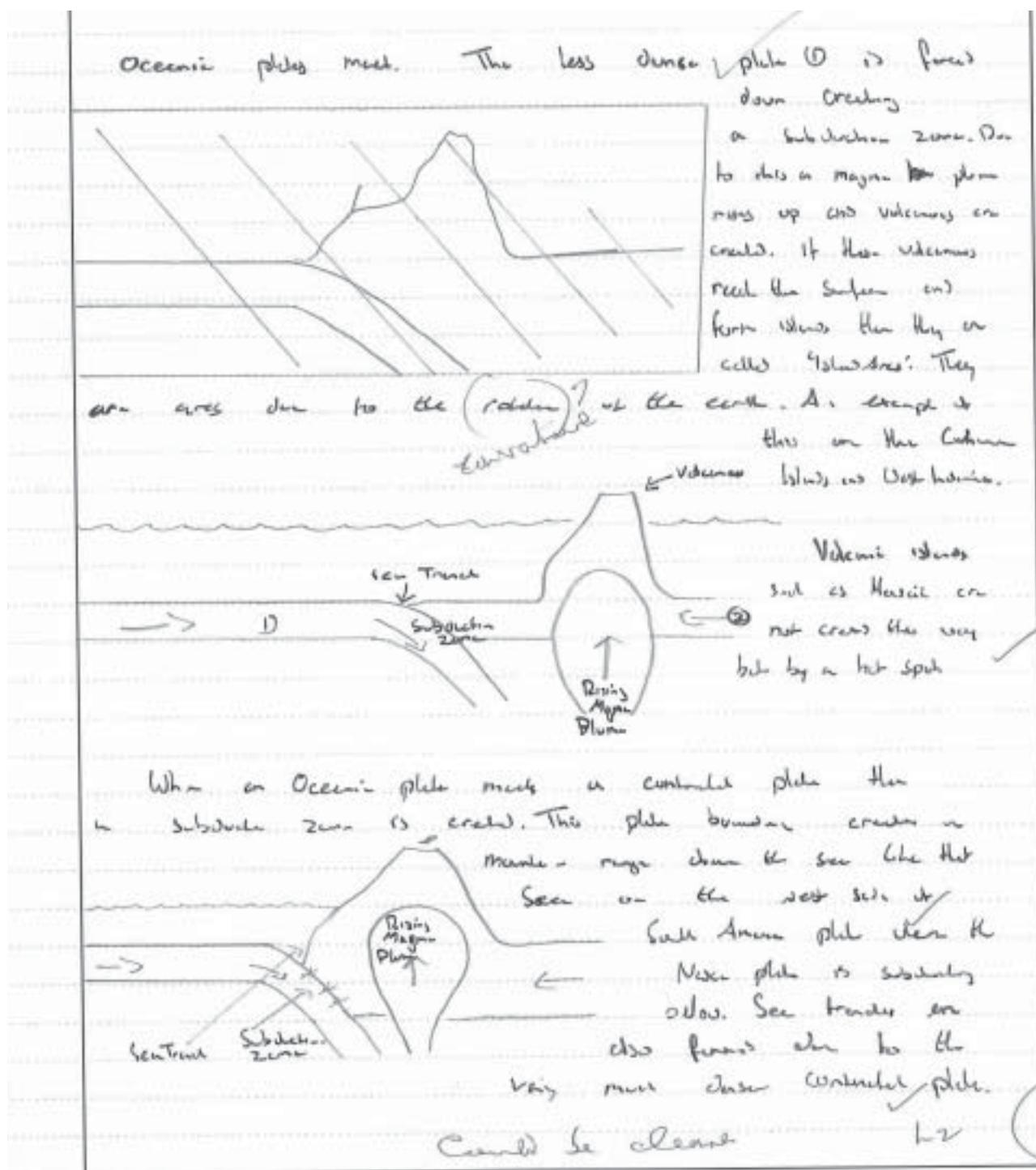


C. There are 3 major landforms that are found near convergent plate boundaries: Fold Mountains, Island Arcs and Volcanic Mountains & Coastal Ranges.



Fold Mountains are created when two continental plates boundaries collide with each other. Due to the huge amount of pressure the plates start to fold upwards in dangerous cracks in mountain ranges. The Himalayan Mountains is an example of a fold mountain where sedimentary rock can become with sea crests found at very high altitude because in the process a sea was pulled together by the pressure from the two plates.

Island Arcs are created when two



Examiner comment – grade A

In part (a) (i) the definition of oxidation caused many candidates problems. Most possessed a vague notion that it was a chemical weathering process involving oxygen but few were able to define it in detail. For full marks there needed to be some reference to iron oxides. This candidate only gets part of the definition. The definition of freeze-thaw caused fewer problems; the most common omission is the need for repetitive cycles. This answer produces the complete definition. The explanation for exfoliation fails to mention heating and cooling cycles. A good answer to part (b) needs a balance in the discussion between limestone and granite. It is chemical composition that requires discussion in this question, thus accounts of joints and bedding planes are not really relevant. The introduction is good, describing the essential chemical composition of both limestone and granite. However, the answer then discusses the origin of limestone and granite landforms and not the ways they are weathered. The answer to part (c) is comprehensive with all the main landforms being discussed. Some of the diagrams, such as that for fold mountains, are somewhat

unrealistic but there is a good understanding of the mechanism, even if there is a slight error in the density of the plates in one instance. Some relevant examples are provided and the candidate does recognise that the Hawaiian Islands are formed over a hot spot.

Mark awarded = 16 out of 25

Example candidate response – grade C

Section B

Q.

a.)

i.)

Oxidation is when rocks react with oxygen / dissolved in water to form oxides and hydroxides, the oxides and hydroxides are then more easily be washed away in solution.

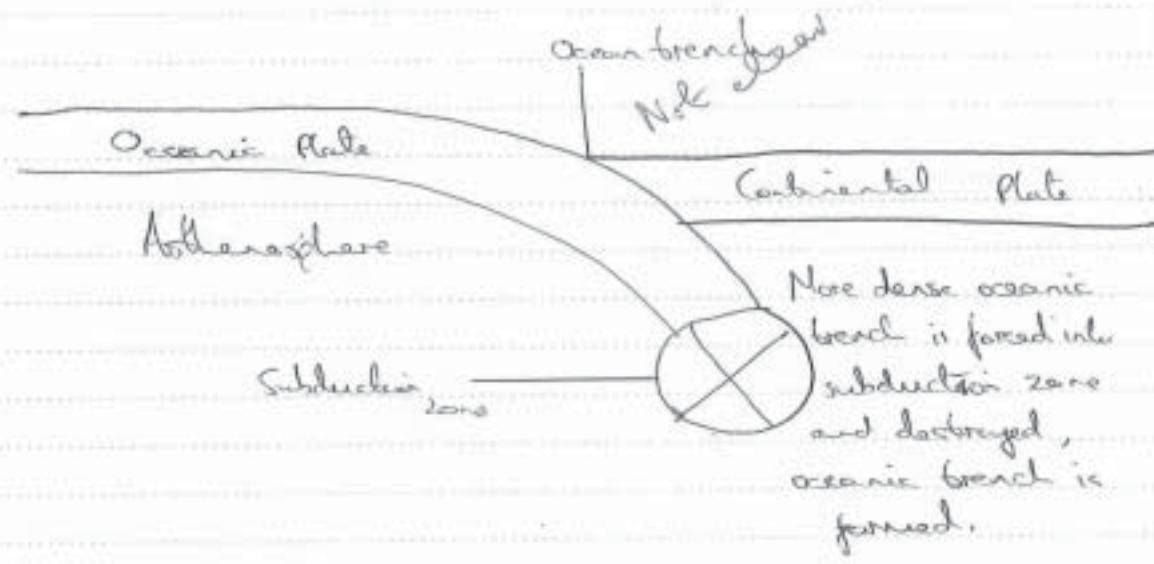
Freeze-thaw is when ~~constant~~ fluctuations of temperature above and below ~~at~~ zero degrees celsius results in water in cracks of rocks expanding when freezing and contracting when melting, this weakens the rock for further weathering. The rate of freeze-thaw depends on how

(frequent) these temperature fluctuation occurs.

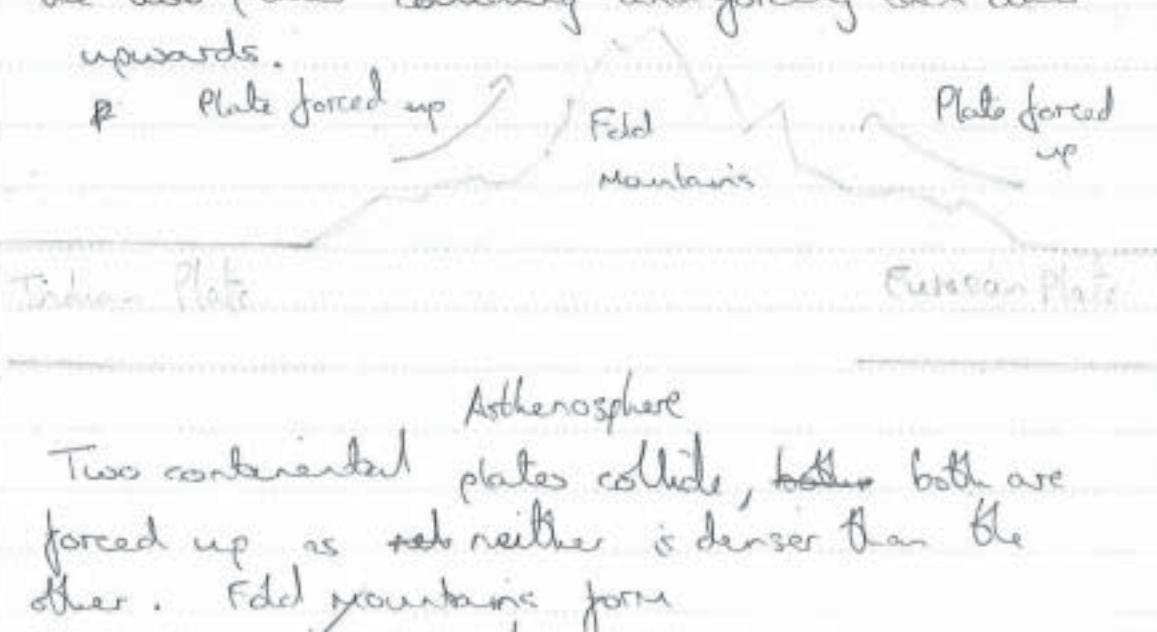
- ii) Erosion is when the top layer of ~~so a rock~~² is heated more than the (bottom) layers, causing the layers to top layer to expand and contract more, causing the layers to spall, called ~~crust~~² weathering. It occurs in ~~so~~ hot and delicate.
- b) Limestone is much more easily affected by carbonation than granite, as limestone contains calcium carbonate, which when reacted with carbonic acid in rainwater forms calcium bicarbonate, this is very easily (eroded) dissolved by water, and so limestone is more affected by ~~and~~ carbonation due to it's chemical composition. Granite is a much darker rock though, due to the colouration of its crystalline structure, in this way it is much more affected by erosion than limestone, as limestone is a much paler rock, meaning it reflects & more insulation than granite. This also means that granite is weathered more by heating and cooling weathering. Granite is however a much harder rock than limestone due to it's chemical composition, meaning it is far less affected by freeze-thaw weathering and wetting and drying weathering in comparison to limestone which is no much more easily affected by both. Finally, granite is more affected by hydrolysis, as hydrolysis is particularly effective at weathering rocks which contain

few feldspar, and a granite contains feldspar & and limestone doesn't, then granite is more affected by hydrolysis weathering. ^{Washed off}

- c) Ocean trenches are one major form of landform found near convergent plate boundaries. For example, the Peru-Chile trench is a result of the convergent plate boundary of the Nazca plate colliding with the South American plate. The denser oceanic Nazca plate is forced downwards under the less dense continental South American plate. The Nazca plate is forced into the subduction zone and as it is forced into the upper mantle. It is this downward movement of the oceanic plate which forms the Peru-Chile trench because the ocean floor is forced down under the oceanic continental plate.



Fold mountains are another landform formed during near convergent plate boundaries. They are formed when two continental plates collide, and as neither plate is denser than the other neither can be forced downwards, & so they are forced upwards to form fold mountains, e.g. the Indian plate and Eurasian plate collided to form the Himalayas. The mountains are a result of the two plates colliding and forcing each other upwards.



Examiner comment – grade C

In part (a)(i) the definition of oxidation is only partially correct but that for freeze-thaw is complete. The explanation of exfoliation in part (ii) is only partial, with little detail on the way rocks are heated and cooled and the need for many cycles. Unfortunately the answer to part (b) is ill-focused. The account of limestone weathering is sound, apart from getting confused between weathering and erosion. The main part of the answer wanders off the point. Much of the discussion about granite is not about its chemical composition but about physical characteristics and physical weathering. The answer does produce a few relevant points at the end but not enough to rescue the answer. The answer to part (c) is partial with no mention of volcanoes and the diagram illustrating the formation of an ocean trench is not clear. However, the main processes seem to be understood and the specific geographical examples are relevant. This is an answer with some merit but lacking in important respects.

Mark awarded = 13 out of 25

Example candidate response – grade E

a.

i) Oxidation is the addition of oxygen to the rocks minerals, which combine to the oxygen molecules freeze than weathering is the expansion and contraction of water due to increasing and decreasing temperature. Water in the joints expand and increase pressure on the surrounding rock causing it to break off and shatter.

LW
C&W

ii) Exfoliation weathering is the 'peeling' off of the top layers of rock due to them experiencing a greater temperature than the rock below. The constant expansion when there is

umber

an increase in temperature and contraction with a decrease means the top layers will break off from the layers below.

Th

b) Granite, coarsely crystalline which contains minerals feldspar, mica and quartz as the result of a ~~slow~~ slow cooling episode is susceptible to both chemical and physical weathering. The slow cooling which created the texture of granite also formed a frequent joint pattern, making it vulnerable to physical weathering processes like freeze thaw. Chemical reactions caused by weathering can occur. Hydrolysis, the reaction of H^+ and OH^- ions ~~of~~ of feldspar can weather away the igneous rock, reducing its size in-situ.

Limestone experiences different processes of chemical weathering, by processes like carbonation. Carbonation is the reaction of CO_2 with calcium carbonate, when the reaction is taken away ~~by~~ by solution calcium carbonate is formed. The amount of CO_2 (carbon dioxide) in the limestone and the surrounding soil influences the rate of carbonation weathering, as well as the temperature and surface area of

limestone. Limestone also has frequent joints and bedding planes in which physical processes like freeze thaw can occur.

Although different in composition, both types of rock ~~can~~ can be heavily chemically and physically weathering depending on certain factors which influence the lithology of the rock.

Confused in place

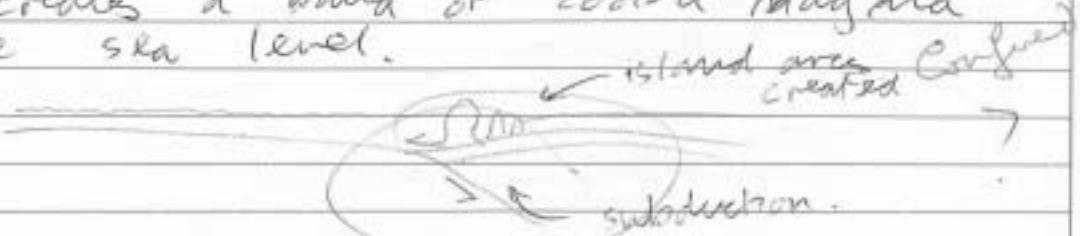
- c) Convergent plate boundaries are known to form both rift valleys and the compression of ~~rock~~. These plate boundaries are the result of an



oceanic ~~crust~~ being forced under another oceanic plate. Fold mountains do not occur as the partially melted, more denser oceanic crust produces phyllitic magma; however folding does occur due to compression at the surface when the two plates collide. In the diagram shown, oceanic crust is compressing the less dense oceanic crust, causing it to become uplifted.

Rift valleys are also the result of a convergent plate margin, examples include the rift valley in Arizona and East Africa. This occurs when an magma intrusion weakens an area of rock, causing the oceanic crust to be pushed away by the tension created. The faults created by the weakness then take away the weakened rock, creating a rift valley as shown in the diagram.

Both these features are the result of intense tectonic activity creating convergent currents which cause the movement of the oceanic plates involved. Convergent plate margins are ~~not~~ known to create island arcs like Japan or Hawaii, when oceanic crust partially melts during subduction and creates a band of cooled magma above sea level.



Island arc formation also involves the input of significant tectonic activity.

Gated
John

$$\begin{array}{r} 1 \\ 2 + 3 + 4 = 9 \end{array}$$

Examiner comment – grade E

The definition of oxidation is devoid of merit, whilst that for freeze-thaw weathering is lacking in many respects. The only point of any merit is the increasing and decreasing of temperatures. The explanation of exfoliation recognises the expansion and contraction of the rock, but lacks detail. In part **(b)** there is some useful information of the nature of granite and limestone but the account of weathering is limited. The account of granite weathering is marginally better than that for limestone. There is confusion concerning carbonation and the role of carbon dioxide. The formation of carbonic acid is ignored. Thus, this is a very partial answer, but with some knowledge and understanding. The answer to part **(c)** is confused and demonstrates little knowledge and understanding. The explanation of the formation of fold mountains, by the convergence of two oceanic plates, is in error as is the account of rift valleys. Hawaii is described as an island arc. This illustrates the lack of knowledge and understanding.

Mark awarded = 9 out of 25

Section C

Question 10

Population

- 10 (a) (i) Give the meaning of the term *natural increase rate*. [2]
- (ii) With the help of examples, describe the differences in natural increase between countries. [5]
- (b) Outline the main features of one country's population policy regarding natural increase. [8]
- (c) Assess the results of seeking to manage natural increase in the country you chose in (b). [10]

Mark scheme

- (a) (i) Give the meaning of the term *natural increase rate*. [2]

birth rate – death rate = natural increase rate

or the difference between gains from births and losses from deaths (excluding migration)

- (ii) With the help of examples, describe the differences in natural increase between countries. [5]

Some indication of high, moderate and low rates, maybe ZPG (zero population growth), and negative natural increase (sometimes called natural decrease). Not all need to be exemplified. A sense of change over time / population dynamics is highly creditable. Will allow choice of 2 countries.

- (b) Outline the main features of one country's population policy regarding natural increase. [8]

Much depends on the chosen country, straightforward descriptions might achieve up to 5 marks. Award 6–8 marks for responses which seek to do as required – to identify "main features", e.g. focus on educating women; incentives to promote sterilisation (India); coercion (China); tax breaks for larger families (France); responsive change from "one is enough", to "have three if you can afford it" (Singapore).

- (c) Assess the results of seeking to manage natural increase in the country you chose in (b). [10]

Again, dependent on the case chosen, but "results" may be expected and unforeseen and include the outworking or consequences, e.g. China's "little emperors" or high percentage of unmarried men. Credit the use of data and any wider or global perspective offered.

Candidates will probably:

Level 3

Offer an appropriate assessment of the policy's results, showing detailed knowledge and strong conceptual understanding. [8–10]

Level 2

Make a reasonable attempt, which may contain good points, but which remains limited in scope, detail or the assessment offered. [5–7]

Level 1

Offer one or more basic ideas about results. May write generally or loosely, offering little or no assessment. [0–4]

Example candidate response – grade A

(10)(a)(i)	<p>Natural increase rate can be simply described as a country / region's Birth rate - Death rate. This excludes the influence of migration.</p>
ii)	<p>Stage 1 coast of the Demographic Transition Model (DTM) shows a low natural increase rate as both the Death rate and Birth rate remain high as the country has not had time to develop. Such as <u>Sierra Leone</u>, due to its extended civil war.</p>
Stage 2	<p>Countries such as Kenya and Morocco have a major increase in the rate of natural increase, due to the introduction of modern medication prolonging people's lives until they are middle aged.</p>
Stage 3	<p>Countries are very stable countries, steadily growing with a natural increase of between 2.1 and 2.2. This is in contrast with countries in Stage 1 such as China where the Birth rate is slowly starting to decrease whilst the death rate remains low.</p>
Stage 4	<p>Stage 5 is even a theoretical stage for countries who are experiencing a negative natural rate of increase. i.e. Death rate exceeds Birth rate. This is the case for both Italy (1.8 nat. increase rate) and Germany (1.9 nat. increase rate).</p>

5) China.

→ In 1979 China introduced an act called the 'one child policy.' It was aimed at decreasing the birth rate of the ~~total~~^{other group} Han population (70% of entire Chinese population) whose TFR (Total fertility rate) was about 7/8. It was not an obligation as demonstrated by only 20% of eligible couples signing up to it.

If you signed up to it you received many benefits such as child support, and cheaper education and free health care.

It was introduced by the Chinese government because it saw a potential crisis in the future. After the great famine in the 1960's where millions starved, often to death. ~~To avoid~~ ^{stop} ~~over~~ this To stop this from happening again the policy was introduced.

The Chinese government saw that the rural dwellers needed more than 1 child, so they offered them the chance to have two, yet many did not sign up to it.

Another feature of the policy was the constant attention given to women workers. Who when going to get a health care check up from their factory would often give be given a lecture on family planning, the benefits of a small family and education on the use of contraception.

c) Overall you would say that it was a success, because during the period in which the Chinese One Child policy was used it stopped the birth of over 300 million people. The government would point that to being a success but you need to look closer to see the result better.

It was introduced in 1979, yet from 1974 to 1984 the Birth Rate went from 18 up to 20.1. This was because the Chinese government at the time opened their market to capitalist ideas. There were no more farming communes so the farmers had an incentive to over produce as they could sell the profit. This resulted into desire for more sons to be born in order to help work the land as they were now an economic asset.

Many people who are pro-policy say that one of its successes is that it helped form a tradition of having small families. However before the policy was even introduced Birth Rate was on the decline due to families being more cautious due to the great famine of the 1950s in China.

The policy achieved very little success in the rural areas, as previously mentioned. It did however prove far more successful in urban areas. This was due to the increased cost of living in the cities. Often due to education, clothing, food and transport costs that did not leave to accounted for in

rural areas. To therefore reduce their costs ~~and~~
they reduced their family size, whilst also collecting their benefits from the government.

Another reason for its success in urban areas is because a large family was not required for work as they did not need manual labour to work on a farm. Instead they received a good education enabling them to find a well paid job.

The final ~~other~~ reason why it could be considered a success is because of its lasting legacy. I previously said that it did not help form a tradition, which remains correct, however it helped solidify the tradition that was already there so much so that even now when the context for the policy is no longer available available urban families are still restricting their family size.

One criticism that has been levelled at the policy is the creation ~~to~~ of a gender imbalance due to high rates of abortion. This however is ~~a~~ blown out of proportion. In China, Chinese cities women are considered equal economic assets as they are offered the same jobs as men. ~~to~~ By ~~there is a point~~ One area where there is a significant number of "missing girls" is in India where they are considered an economic liability as the family have to pay dowry when she gets married.

In conclusion, the policy can be overall be

considered successful, even though some of its guiding features did not go to plan.

L2

Examiner comment – grade A

The definition of natural increase rate is complete. The answer to part **(a)(ii)** gains by being comprehensive in describing the differences between several countries at different stages of the demographic transition. Not all the countries are allotted to the correct stages. However, depth is sacrificed by choosing this approach. Thus, the change over time is only really covered implicitly with reference to demographic transition. The answer to part **(b)**, using the China One Child policy, covers many of the important issues but, in places, lacks some detail. However, the main points are acknowledged. The answer to part **(c)** is comprehensive but the detail is not always accurate and the answer does wander off the focus on occasions. However, it is clear that the candidate does understand the results of the One Child policy.

Mark awarded = 15 out of 25

Example candidate response – grade C

10(b)

Gender selective abortions (giving boys for boys) were restricted but not banned & controlled. If a family had more than one child, they had to pay a "social maintenance fee", and were stripped of any benefit.

Families who had only one child were given a "certificate of honour".

10.

c)

The one-child policy, if looked at objectively, was a massive success. It is estimated that it stopped over 400 million births in a period of just 30 years.

Such a straightforward method of controlling the rate of natural increase has however left some serious problems for China.

The first problem is a gender imbalance. In 2005, males outnumbered females by 43 million. This creates large social problems in terms of partners. This was caused by the need for a boy in the rural areas of China. Men are still deemed more capable of working with agriculture in rural areas and so being restricted to only one child.

to look after them in old age, parents desperate wanted a boy. This lead to the abandoning of many girls.

The second problem was the dependency ratio. Due to the boom in population and then the subsequent cutting of natural increase, the 4:2:1 ratio emerged. ~~With~~ 2 parents, 4 grandparents, could only have 1 child. This 1 child had to look after 6 different people in old age, which caused yet more social problems.

In some cases it can be deemed that the one child policy worked too well. In Shanghai, TFR is < 1 , way below replacement level. In Hong Kong it is just over 1, again below replacement level. The decrease is bringing the rate of natural increase lower and lower, and soon it may start to decrease. The one-child policy has been loosened a little bit in these areas, made (13 exceptions to the one child policy in Shanghai) in order to get TFR to one replacement level. It is however still decreasing due to the cultural mindset of not having more than 1 child - indeed it must be hard to change social norms after nearly 30 years.

P.T.O

Finally, the one-child policy has resulted in millions of new "spoilt" children. Having only one child has led many parents into spoiling their children with gifts and attention.

Whilst many grow out of enjoying these benefits, some do not. This could lead to social problems in the future.

In conclusion the one-child policy was a success. It has however left a painful backlash of effects for China, which they will have to deal with in the future.

L2

Examiner comment – grade C

This is a very unbalanced answer and gets most of its marks from parts **(b)** and **(c)**. Unbalanced answers are often typical at a grade C level. The account of the China One Child Policy in part **(b)** is competent, but lacks detail. The answer is rescued by part **(c)**. It addresses the question with some good, relevant examples and data backup. It is a pity that the earlier parts were not of this standard.

Mark awarded = 13 out of 25

Example candidate response – grade E

- 10) a) i) It means how fast a population is increasing per 1000 per year.
 can be calculated by birth rate - death rate.
- ii) in LDCs such as Nigeria, Bangladesh which is in stage 1, it's a poor country and they need a lot of kids to help working on the farm and take care of them when they are older. So it's increasing due they need kids to survive.
 when in HEDCs such as France have predicted that they need more kids to take care of the older population since their life expectancy is increasing.
 So in EDCs it's in order to survive when in HEDCs it's due longer life expectancies.
- B) Luxembourg is a small population country with a small population only above 500,000 people.
 The Luxembourgish government is trying to increase its population by giving many benefits to families that have above 3 kids. By having 3 kids the government will lower the income tax as low as 20% from the normal 45%. They also offer ~~more~~^{extra} grants for students if the family is there they also offer higher grants to families not if their parents wants to study outside of the country which is very normal. They are doing this in order to attract immigrants but also to make Luxembourg to stay in the country so they can find the older people which have one of the highest life expectancies. Luxembourg is the no. 1 country that offers the most cash benefits for having a large family and also other laws that attracts migrants.

10(c) Over the last 10 years the population has increased by 8%. This is mainly due to large increase with families of 3 or more also Luxembourg's special laws attract many business to Luxembourg especially banking due low tax rates. Luxembourg has one of the highest GDPs in the world, and Salary the average salary is around 43,000€ per year. this makes a lot of the ~~poor~~ population to work in Luxembourg very a good amount of them settles in Luxembourg. Since the economical activity has increased a lot in Luxembourg the last 10 years and demand for construction workers has attracted a lot of immigrants mainly from Portugal. Since the standard of living is higher and better Salary a lot of the ~~great~~ workers settled in Luxembourg. Since the public schools were free for them, due to the low tax it's has a big international community in Luxembourg since it's attracting a lot of jobs. however most of those immigrants move back or to other countries its rare they stay in Luxembourg, tho this is more to do with migration.

Examiner comment – grade E

The natural increase rate is correct. There is no reference to natural increase in the answer to part (a) (ii). This is not an answer to the question. The choice of Luxembourg to answer part (b) is unusual but the detail is relevant if somewhat lacking in detail. It is the answer to part (c) that demonstrates the lack of understanding of the question. This answer is more about migration and does not address the policy of raising the natural increase. Answers at this level often indicate an incomplete understanding of the requirements of the question.

Mark awarded = 10 out of 25

Question 11

Migration

- 11 (a) With the help of examples, describe the ways in which potential migrants receive information about possible destinations. [7]
- (b) For any one voluntary migration, explain how push factors and pull factors combined to promote the movement. [8]
- (c) 'Migration is about taking risks.' How far do you agree? [10]

Mark scheme

- (a) With the help of examples, describe the ways in which potential migrants receive information about possible destinations. [7]

Various ways exist, including:
 government agencies or advertising
 media reports
 tourism/holiday taking
 social networks, e.g. family members, friends
 returning migrants
 hearsay, rumour
 other

A full answer consists of three or more "ways".

- (b) For any one voluntary migration, explain how push factors and pull factors combined to promote the movement. [8]

An opportunity to use an example or case study, at any scale, and to demonstrate understanding of the two types of factors and how they operate. Straightforward explanations of one or other might achieve up to 5/6 marks. Award 7–8 marks for responses which seek to bring out how the factors combined to promote the movement.

- (c) 'Migration is about taking risks.' How far do you agree? [10]

An open statement to allow candidates to use the material they have and respond in the manner they choose. Responses may include material about who stays (age, gender, marital status) and who goes; about managing the risk(s), e.g. through stepped migration or joining family members; about timescale; information, as in (a), or about forced migrations, which may be about avoiding risks (e.g. volcanic eruptions, conflict) as much as, or more than, taking them.

Candidates will probably:

Level 3

Develop an effective assessment of extent, with elements of agreement and disagreement and supporting evidence. [8–10]

Level 2

Provide a response which contains some valid points but which remains limited or partial in detail, development or the assessment made. [5–7]

Level 1

Make one or more simple points, with little or no engagement with the idea of risk-taking, or support. Take a descriptive, rather than an evaluative approach. Fragments and notes remain in this level. [0–4]

Example candidate response – grade A

- II a) migration involves the change at home, moving from one area to another. It can be permanent, temporary, or overnightly.
 Migrants can receive information about possible destinations to migrate to in many ways. People in the North of England heard prosperous South of England and it market through the news as well as newspapers. When England joined the EU it was all over the radio, newspaper as well as television, in this way the people in the North had heard about the possible destination they could migrate to. Not only that but they heard about the possible destination through people who had moved to the south first and then had returned to the North to send or give remittances or money to their families as well as start businesses.
 Potential migrants mostly here or receive information about possible destinations from people within the community. In England for example in the 1950's the Jamaicans would go back to Jamaica at retirement age and would tell others about opportunities in England thus convincing them to move there to fill the gap in the labour market as well as to open businesses to be able to provide for their families.
- l.8 Potential migrants also receive information about possible destinations from government, this may be possible as governments tell people about a certain area so that the gap in the market can be filled there, or so that the city can be developed more. An example of this is the Tanzanian government encouraging more people to live in Dodoma, the new capital city so that it can prosper and businesses can be developed and flourish.
- II b) Pull factors are the attractions or factors that make a certain place attractive for migrants to go there. And push factors are the factors

11b)

the less unattractive features of a settlement that encourage people to migrate elsewhere.

In England voluntary migration occurred, it was internal and it involved people migrating from the North of England to the South of England due to a number of factors.

The push factors of England that encouraged people to move are as follows. The weather was cold, and this was not what people wanted.

Manufacturing industries such as coal and iron industries died, leaving many people unemployed thus forcing them to move to the South where employment rates were higher.

Another push factor of the North included the dearth of trade with Americas due to the death of industries, so the North was deteriorating slowly economically thus forcing people to move.

Another reason as to why people moved for the push factors of the North was the lack of insufficient undeveloped transport routes, there were not enough buses or trains to take people around thus promoting movement to the North where transport links like tubes, buses were well established especially the London underground.

The South had a lot to offer, and the pull factors included the warmer less wet weather. This attracted people to move especially those that wanted to retire moving to places like Southampton where it was warmer.

11(b) compared to the cold North.

Another pull factor of the South was the "buzz" of living in a city like London, that was becoming known worldwide, where many offices were opening thus leading to the availability of jobs at high wages.

Another pull factor of the South was the development of industries or the economy due to the new EU market, so this prompted people to move as they wanted to be close to the scope of things; there were many new European markets at this time.

And last but not least, a pull factor of the North, possibly being the major one was the proximity to meet the closeness. People moved to areas like Devon, Southampton where it became easier to take a boat to Europe to countries like Paris etc.

11(c) Migration involves the movement of one person from one place to another, it can be either permanent, temporary, voluntary or forced. People migrate due to a number of reasons.

Migration involves leaving their home where they are comfortable and moving to a place they are unknown to, having to meet new people and start a life, this is risky as not always does this work out. This can be due to the fact that the person is different culturally and may be looked upon differently. An example of this is arbeit in France,

11(c) women covering up there is not allowed as they appear to be dangerous by the French, and as seen a law is passed that they should not cover up or will be fined, so others or muslims moving to France can't, as they have to be prepared to be different, and culturally suppressed due to the fact that they will not be allowed to dress up the way they want to.

Migration is a risk, as a person might move to a place whereby he/she is not familiar with the language thus forcing them to learn which may take long, but in the long run this risk pays off as the migrant can establish themselves more.

Migration is about taking risks as one leaves a place in the search for a better life, sometimes uncertain of whether they will get a job or not, which in the case the person does not get a job, money he could have saved would have been wasted on migrating to a place whereby dividends have not been received.

However at the same time, migration is not about taking risks as a person may only migrate to a place just for work, and they are assured a job, so the person is not risking anything if not he/she is aiming as they are making a higher salary.

Also to add on to that, is that when a person migrates they are sure of where they are going, what they are going to do and so forth, thus decreasing the risk at least as the migrant has a plan.

In my opinion, as all in all migration is about taking risk's as there are constraints that a

person may come through such as cost of migrating being too high, or barriers like being unable to gain a visa or legal document to enter an areas as you do not qualify. So migration is a risk as a person goes out of their way to look for a job to live a new life all in the hopes of getting more money and living a life at high standards.

June 2
2017

Examiner comment – grade A

This question requires three essay-type answers so the focus and detail are important. Overall, this answer is consistent in its quality with a slight drop in quality in answering part **(b)**. The question also requires quite a breadth of knowledge and understanding. The answer to part **(a)** is lengthy and comprehensive with a range of information and relevant specific examples. The choice of example to use in the answer to part **(b)** is crucial. It is advisable that the example is well understood by the candidate. The choice of England is unfortunate as the candidate demonstrates an incomplete understanding of the geography of England. This detracts from the focus of the question. The answer recovers in part **(c)** with another lengthy answer about risks involved in migration. The answer is quite well balanced with both sides of the argument being discussed. The detail could be better in places, but the candidate does attempt to answer the question.

Mark awarded = 15 out of 25

Example candidate response – grade C

1) a) Potential migrants may receive information about possible destinations by a proposal from their current job, giving them an opportunity to move to a different country and to work there. This usually happens and is common among families. Information can also be received by family or friends who live in another country. If the potential migrant is looking for new jobs possible destinations ~~can be found~~ can be found in job advertisements in a newspaper. Information can be shown over the internet and also ~~on~~ television programmes about different houses in a different country.

3/

b) Migration to look for new jobs can include various push and pull factors. Push factors can include how poor the housing is and the standard of living is in the present country. Also if there are not enough available jobs and if there is ~~a~~ poor quality of ~~education~~ education this can lead to being attracted to a new country and its benefits such as how well paying the jobs are and the levels of available jobs in a given country. Other pull factors can include the quality of ~~housing~~, the and the price of houses.

11) c) Migration is a common proposition in many peoples' lives today. Migration can be very risky as the possible migrant may have no knowledge of that country or its culture and can be completely different to first expectations. The possibility of leaving behind friend and family can be a great risk. Moving to a different country can be very complicated if there is a completely different language spoken which can cause huge barriers in communication. If the possible migrant moves from an urban environment to rural in another country, again the migrant may not like it. The main risk can be considered finding a job. Many jobs may not be available and being unemployed for an unknown period of time could become dangerous to finance. However, the experience of migrating to a different country may not have to be a risk as long as housing, jobs are prepared. Migration can be moving back to a childhood birthplace where friends, family and language will remain the same.

Examiner comment – grade C

The answer to part (a) is relatively short, but is succinct and does cover a variety of ways. The question only asks for description, so there is no need for a lengthy discussion. This clarity of thought is not present in the answer to part (b). There is no specific example and merely a reverse repetition of push and pull factors. This is a very limited answer. The answer recovers a little in part (c) but does not possess the succinctness of the answer to part (a). A limited range of issues is discussed although there is an attempt to balance the answer with arguments for and against the statement. The overall answer is variable but with sound knowledge and understanding in some parts.

Mark awarded = 12 out of 25

Example candidate response – grade E

- II a Potential migrants might receive information about possible destinations by word of mouth, T.V., internet, or ~~magazines~~ in magazines. A potential migrant might have friends or family members who have moved to a different region and have told them how great it is there. The media shares pictures and reports of what is going on in different regions. ^{Example?} and might be appealing to the potential migrant. 4/7
- b One huge voluntary migration was the gold rush. A push factor was the lack of work in the settlements, so some people needed to leave. The major pull factor was gold in California and in the west, so the incentive to get rich was there. Push factors are negative conditions making someone leave a place. Pull factors are positive conditions causing someone to want to move to a place. 5/5
- c I agree wholeheartedly that migration is about taking risks. When a person migrates to a new country they might not speak that country's language and have to learn it. They may not have a job already there and have to find one while trying to live off of the only money they brought. They also most likely don't have a lot of friends or family in their new environment, and have to learn to make friends even though the cultures might be totally different. And they may look way different. I believe migrating is all about taking risks. L1 2/10

Examiner comment – grade E

This answer becomes less coherent and focused as it works through the three parts. Perhaps this indicates that the question is a good discriminator. The answer to part (a) does describe a number of relevant ways of obtaining information, but lacks specific examples. The example chosen for part (b) is perhaps not the most appropriate. Push and pull factors are not developed. For part (c) only a very limited range of issues is discussed, without much detail. It is also a very one-sided argument. Overall, there is limited knowledge and understanding, both of the topics and the needs of the question.

Mark awarded = 9 out of 25

Question 12

Settlement dynamics

- 12 (a) Explain why shanty towns (squatter settlements) develop. [7]
- (b) Why is it difficult for the authorities to manage shanty towns (squatter settlements)? [8]
- (c) Assess the extent to which shanty towns can be seen as positive forms of settlement. [10]

Mark scheme

- (a) Explain why shanty towns (squatter settlements) develop.

[7]

Candidates will probably see this as push and pull forces creating rural to urban migration. More effective answers will develop why such cheap housing is needed (poverty, sheer volume of migrants but also the inability of urban authorities to cope).

There is no need for separate explanations of creation and growth but credit those answers that do make the distinction.

Suggest that a full answer develops at least two explanations supported with effective and appropriate examples or deals with more in less detail. For a general account with no effective example, **max. 5**.

- (b) Why is it difficult for the authorities to manage shanty towns (squatter settlements)? [8]

The rate of growth is so rapid that it overwhelms the limited resources (financial, services, technical) that central or local governments have. There should be some focus on the problems of managing such large dynamic developments – they are often illegal, people live there to avoid being managed (or taxed), they are structurally very confusing and often shanty dwellers are hostile to the authorities. Higher responses should look at both the problems of the authorities and the complex nature of such settlements.

Credit attempts to support explanations using appropriate examples.

Mark on merit. Answers may take a wide range of reasons or develop a few in depth.

- (c) Assess the extent to which shanty towns can be seen as positive forms of settlement.

[10]

This is rehearsing the argument of whether shanty towns are areas of hope or despair. They provide cheap (often rent free) flexible housing, strong community spirit, can be upgraded as a family prospers – they are merely an early stage in rural-urban migration. They also are seen as negative due to hazards such as fire or disease, easily collapse, lack basic services e.g. sanitation, violent or crime ridden, no legal right to live there.

In reality the extent may vary over time, location, extent of the shanty and with the viewpoint of who you are in society.

Candidates will probably:

Level 3

Make a good assessment of the extent to which shanty towns are a positive form of settlement – making the point it isn't a simple answer but it could vary over time, space etc. May point out shanty towns are far from uniform in their characters. Well supported with effective examples.

[8–10]

Level 2

Provide a sound response but possibly limited in evaluation being one sided (agreeing or disagreeing) and limited in range/depth of exemplification.

[5–7]

Level 1

Make an answer largely descriptive which offers little or no evaluation. Limited knowledge, with few, if any, examples.

[0–4]

Example candidate response – grade A

C	Section C
12.	
a)	<p>A Shanty town is a settlement, where they most commonly form in LEDCs. They are made of salvaged materials and most are built on illegal land. Shanty towns develop because there are* lack of housing within the CBD, so people who also can't afford housing move to the outskirts of the city where the land is cheaper or to a certain extent 'free.' There is are high population densities in LEDCs, so due to the overcrowding there is little space available so the available land is in Shanty towns. They also develop as many people migrate to the urban areas from the rural areas to find jobs and so that contributes to overcrowding. The materials that are used for infrastructure include corrugated iron, so this is cheap and doesn't need to be maintained or repaired. Shanty towns develop on unstable, dangerous land which is too dangerous for other people to use so people decide to live there. Shanty towns are for people with low incomes and live a very cheap, low-order life. Shanty towns develop for access purposes, as they are</p>

can be done instead of transport use that has to be paid for. Communities are built up within shanty towns, so they extend as friends and families want to be near each other. People who do the process of rural urban migration are looking for a higher standard of living, perhaps because their farm has failed or not enough income, so they look for jobs. There are a few jobs that can be produced in shanty-towns such as a rubbish collector.

have enough to care.

- (b) It is difficult for authorities to manage shanty towns because the government and authorities decide to spend money in the CBD where Elites live and so there is less money to be spent in shanty towns. So in other words, the order of importance decreases the further away settlements are from the CBD. Another point is that there are so many people for example in Lima, Peru, 1 million people live in shanty towns, therefore it is densely populated, so if the authorities are to put in helping schemes for example top down schemes or site and service, then this would only affect a certain amount of people. This could cause an unequal distribution which could cause violence and social unrest. So many people would move to the area where there have been improvements and put strains on those for example better health care or a water supply that was clean and not contaminated, so the sudden increase in

demand would put lots of pressure, then the improvements may break down or not become to any use. For instance the Sewerage System could contaminate the water supply. Shanty towns can be so large that it could be hard for the authorities to know where to start. Also, for different age groups, people may need different services, goods and facilities. For example the elderly might need incontinence nappies whereas, because in LEDCs, the majority of the population are young, there maybe an 'unfair divide' of benefits. Health care is a major component that needs to be provided so that needs to increase as many people are dying younger due to these infections and parasitic diseases such as HIV and AIDS. There maybe a lack of money for the authorities to use, that is a major problem and difficulty for the authorities. Because many people are moving into these shanty towns, they are expanding uncontrollably so there are larger areas to cover. Also due to very high birth rates in LEDC shanty towns, there is a lack of education and contraception, so these people are unaware of the constraints and burdens they put on water supplies, lack of housing, rubbish and sewerage, which is another factor that authorities find hard to manage shanty towns.

6
8

- c) If there are many disadvantages to shanty towns such as lack of space, overcrowding, pressure

on health care, sewerage systems, water supplies, high rates of crime. However, shanty towns can be seen as positive forms of settlement. Communities can be made, which include friends and members of families, so people can feel at home and happy. Games of football, for example can be played which are free or low cost and because there are many children in shanty towns, they can make a group of friends. Because people form a community, they can work together to form a 'work force' to improve the infrastructure of their homes and streets, so they can work in teams and can form self-help schemes. This can increase their quality of life, which can be seen as positive aspects.

Also, because of the densely populated area, there are high levels of unemployment so people form an informal sector. This is when people form their own type of employment which is not registered. For example shoe laces, prostitution and washing. They do earn income, but it is still very little. So on a positive aspect, employment can be created. Shops can be built and provide essentials such as bread and water which is necessary for survival. People can look out for each other and take care of other people's safety e.g. from robbery of their homes. People can share things like clothes, building materials and cook meals for each other, so friendliness can increase. If some people are lucky enough to be educated, then they can pass some of their skills onto other people and teach them. So there are many positive aspects, although there are still many negative aspects. Therefore shanty towns can be seen as positive forms of settlements.

Turn 18.

Examiner comment – grade A

In part **(a)** there is a good definition and description of a shanty town with the role of population growth and in-migration noted. It stresses the lack of resources and peripheral location of many shanty towns. It wanders off the question at the end and lacks specific examples. A comprehensive range of issues are discussed in part **(b)** but there is a tendency to list rather than explain. However, it is a good answer. It must be remembered that even answers at grade A could be lacking in some respects. The key characteristic of grade A answers is a balance between all components of the parts of the question and all elements within the parts. This answer exhibits these characteristics. Thus, the answer to part **(c)** is well-balanced with an integrated argument. The issues raised are many and varied and the only aspect lacking is the use of specific examples.

Mark awarded = 17 out of 25

Example candidate response – grade C

12.

a. Shanty towns, or squatter settlements, develop due to poor people migrating from rural areas to urban areas. When they arrive, they can't afford to either purchase or rent a house or apartment, so they are forced to build their own accommodation. Since all the developable land has already been used by the city for, the migrants are left with a very limited choice of where to build their home. They can either build on land that has been deemed unsuitable by the cities residents for building, such as areas with a very steep gradient, or a swampland area, or they can build on the outskirts of the city. Over time, these shanty towns grow into a sort of city of themselves with a huge population density, and soon numbers growing up.

b. It is difficult for the authorities to manage squatter settlements as they are often 'no go' areas for outsiders, with a large amount of crime. It is also very difficult to keep track on the population of the shanty town since they don't pay taxes or have any dealings with the authorities.

Unless the authorities force the people to move when the shanty town is just beginning to be set up, it will be very difficult to make

the shanty towns go away, due to the sheer number of people ~~are~~ you would have to re-build and this releases.

Since the shanty towns are illegal dwellings, law doesn't have much effect on the residents, as the government ~~do~~ can't have any much of an impact on the settlement without evicting a huge amount of ~~as~~ funding it therefore.

e. Shanty towns can be seen ~~to~~ as a positive form of settlement for a number of reasons.

Firstly, they are ~~hugely~~ efficient space use, with a huge number of people for a tiny area. They are also built on unwanted, unused areas of land, not on valuable land, ~~and~~ for growing crops or raising livestock.

Secondly they are very 'green' settlements. They manage to recycle just about everything from plastic bags to oil drums. In Dharavi, for example, there are whole groups of people who's job is to hunt through the rubbish dumps hunting for any remotely valuable scrap. The people have a waste not want not attitude, and it ~~never~~ appears all through daily life. From recycling waste to eating everything, not throwing it away.

Lastly, the shanty towns tend to have a great community spirit, where everyone bands together and helps one another. Everyone is happy with what they have, they don't complain about how hard their life is, or what they wish they had, they just get on with it. They don't have much, but they are happy. That is something everyone should aspire to, not being happier as materialistic items.

Examiner comment – grade C

This question barely reaches the standard for a grade C but does exhibit all the qualities of answers at this level. The answers tend to be short, but not without merit. Detail is often lacking. Thus, the answer to part **(a)** is short but has some merit. The characteristics of shanty towns are described but there is little discussion of growth. The answers to parts **(b)** and **(c)** are also short and do not develop the ideas. However, there is again merit in the answers. In part **(c)**, the ideas presented are sound but only examine one side of the question. The phrase 'to what extent' is not covered.

Mark awarded = 11 out of 25

Example candidate response – grade E

Section C.

12. a) In poorer countries and LEDCs, not everyone has somewhere to live, as they often cannot find a job to earn a regular income, therefore they can't afford a house. These countries are often also overpopulated, so there is a lack of housing, and a lack of resources in general, but there are too many people. Many of these people who can't afford housing, or who have been evicted or kicked out, have families, with(young) children. They need housing, shelter and somewhere to live, so they use the resources they can find, and they build a shelter for their family. More and more people then do the same, and a small shanty town ^{where??} is created and developed, as thousands of other homeless people gather and try to find shelter. Some people who have travelled from another country to find refuge also develop a part of a shanty town, as they need some shelter, and this costs nothing and is easy compared to trying to get a job and buying/renting a house.
- b) As there are so many people living in shanty towns, the authorities would have to deal with thousands of people if they were to destroy a shanty town. In Rio de Janeiro and São Paulo, there are shanty towns with over 100,000 people living there, so if they were destroyed, authorities would end up with hundreds of thousands of angry, homeless, poor people. Their 'homes' would be destroyed, and the authorities wouldn't be able to get them all housing, especially not cheap or free housing, so at

least if they are in shanty towns, nobody else has to deal with them or worry about them. As the shanty towns are built on such a large scale, it would take a long time to wipe one out, and to clear it of all people. There would then be many complaints - from both people who live in these shanty towns and the wealthier people who don't want poorer homeless people on their streets - so authorities do not want to have to deal with all that, especially not if the shanty towns are out of the way and don't cause any trouble, and they just look bad for a country, as they can live with that. These people could also riot and protest if their 'homes' are destroyed, as they need some form of shelter, so the authorities cannot easily manage shanty towns, as it's quite complicated.

c) Shanty towns could be seen as positive forms of settlement, as so many people are given shelter from a shanty town, and they cannot live anywhere else, so it's either this or nothing. In Paraisópolis favela in São Paulo, around 100,000 people live in the poor conditions, as there are only around 20,000 - 40,000 'homes' built there. It has been there since the 1970s, and has helped give around 100,000 shelter. This is positive, as they would all be on the street otherwise, or trying to find another place to sleep which isn't out in the open. The inhabitants of the Paraisópolis favela, or a favela in Rio de Janeiro, or any other shanty town that has given many people shelter, would agree that it is a positive form of settlement, probably, as

they would have nowhere if they didn't have this. However, the conditions of shanty towns are extremely poor; usually there is no electricity or access to clean water very near, they are made from any rubbish that was available on the streets, they are cramped and squashed together, to fit in more people, and the people living there are not protected from anything or anyone. Crime rates are often high in these areas as there are many young criminals and people who are in gangs or who own weapons there. Living in a shanty town is very dangerous, as the only really positive thing about them is the people living there is that it is a form of shelter. There are a couple more positive points for governments, authorities and people who are wealthier who live nearby, such as it keeps over 100,000 people off the street - and that is only Paraisópolis favela alone, but there are many more. It also means the authorities don't have to deal with these people, they can just leave them to it. As these people have built their own 'homes' and shelter, the government doesn't need to worry about building some sort of accommodation for these people, which would take up time and money. Shanty towns are one of the lowest, dirtiest, most dangerous, not ideal, cramped forms of settlement there is, and the conditions are extremely bad, and almost unbearable. However, they are free and give shelter. There are a couple of positive arguments, but they are weak compared to the negatives. It's good that so many people have shelter, as it's a necessity, however it cannot really be seen as a positive form of settlement to anyone not living in them,

as the government and authorities, and inhabitants of houses nearby can only call it a positive thing as it keeps the homeless people out of the way, even though that is quite harsh, and it means authorities do not really have to deal with them. The people living in them must see it as a positive form of settlement to an extent, but overall, it can't be included as a 'positive thing' to anyone, as the conditions are just so poor.

Examiner comment – grade E

This, overall, is a very 'wordy' answer with little specific detail. In part **(a)**, there is a very basic analysis with few specific points. Rural-urban migration and the growth of shanty towns are not mentioned and there is no specific example. The detail in the answer to part **(b)** is slightly greater but the answer still lacks precision. The opening paragraph, about the size of shanty towns causing problems for the authorities, is the best part of the answer. Specific examples are mentioned which makes the omission of examples in part **(a)** somewhat puzzling. The rest of the answer is about the problems relating to eviction of squatters, which is not the main focus of the question. The answer to part **(c)** is lengthy but repetitive and not always focused on the question. It is a series of general statements which rarely touch on the many pros and cons that could be discussed.

Mark awarded = 8 out of 25

Paper 2

Section A

Question 1

Tropical environments

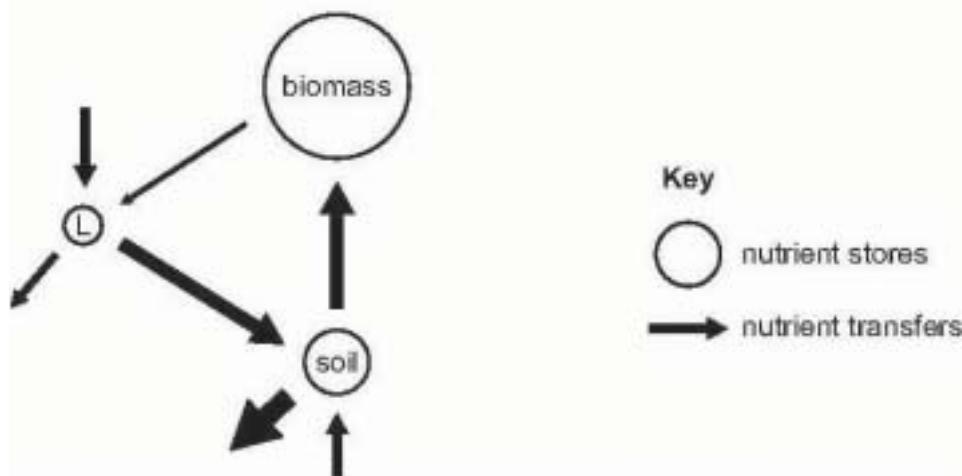
Only one question may be answered from this topic.

- 1 (a) Using Fig. 1 describe and explain the movement of nutrients in a tropical rainforest ecosystem. [10]

- (b) Describe the nature of the vegetation in tropical rainforests. To what extent is this influenced by climate? [15]

Fig. 1 for Question 1

Movement of nutrients for tropical rainforest



Mark scheme

- (a) Using Fig. 1 describe and explain the movement of nutrients in a tropical rainforest ecosystem? [10]

Tropical forests exhibit extremely rapid rates of nutrient transfer, due to high temperatures, rainfall and humidity. Biomass (living vegetation, inc. roots) is the largest store of nutrients. Litter or decaying matter is the smallest store because nutrients are processed very efficiently by abundant decomposers including bacteria, fungi, and termites (fuelled by availability of nutrients and high temperatures). Nutrients are transferred rapidly from litter to the soil and almost immediately absorbed by vegetation. Nutrients are not stored in the soil for long; however they can be lost by leaching if the forest is cleared.

- (b) Describe the nature of the vegetation in tropical rainforests. To what extent is this influenced by climate? [15]

Nearly constant high temperatures and high rainfall (2000 mm) allow evergreen trees to grow all year round. Rainforest plants have many adaptations to their environment. Structure is influenced by exposure to sunlight. The upper canopy of 30 m trees allows light to be easily available at the top of this layer. Emergent trees are spaced wide apart, and are 50 m tall with umbrella-shaped canopies that grow above the forest. Because emergent trees are exposed to drying winds, they tend to have small, pointed leaves that are dark green, small and leathery to reduce water loss in the strong sunlight. These giant trees have straight, smooth trunks with few branches. Their root system is very shallow, and to support their size they grow buttresses.

With 2000 mm of rain per year, plants have made adaptations that help them shed water off their leaves quickly; many plants have drip tips that allow rain to run off and some leaves have oily coatings to shed water. This keeps them dry and prevents mould from forming. The lower canopy consists of 20 m trees and is made up of the trunks of canopy trees, shrubs, plants and small trees. There is little air movement. As a result the humidity is constantly high. This level is in constant shade.

The forest floor is usually completely shaded, except where a canopy tree has fallen and created an opening. The forest floor receive so little light that few bushes or herbs can grow there. To absorb as much sunlight as possible leaves are very large. Some trees have leaf stalks that turn with the movement of the sun so they always absorb the maximum amount of light. Some trees will grow large leaves at the lower canopy level and small leaves in the upper canopy. Other plants grow in the upper canopy on larger trees to get sunlight. These are epiphytes such as orchids. Many trees have buttress and stilt roots for extra support in the shallow, wet soil.

The heat and humidity help to break down the litter. A shrub layer receives about 3% of the light that filters in through the canopies.

Level 3

A thorough description of the vegetation nature and structure with an emphasis on the role of climate. Good appreciation of the role of climate in the adaptations made by plants. Reference to climate will include air movement, humidity, sunlight, temperature and rainfall. Structure will include mention of areas of tree fall creating openings. (12–15)

Level 2

The vegetation structure will be described and related to the climate in simple terms. e.g. evergreen trees are able to grow all year round because of nearly constant high temperatures and high rainfall. (7–11)

Level 1

A simple account of vegetation structure in a tropical rainforest, with no assessment of the role of climate. Concentration will be on structure; emergents, upper canopy, lower canopy and shrub layer. (0–6)

Example candidate response – grade A

- 1a) The Beishnel diagram outlines the movements of nutrients within a tropical rainforest ecosystem as a cycle. This means that there are additional inputs to the cycle, store and loss through certain outputs.
- The largest ~~output~~^{store} within the nutrient cycle is the biomass. This is due to the fact that vegetation in these areas has a tendency to be thick and grows in large amounts. Nutrients within this state are usually taken up from the soil ~~atmosphere~~ (Magnesium, Iron, Aluminium). Others may be received from the air while others such as glucose are formed within the plants. Leaves that fall from the trees provide nutrients to litter. However it is vital to notice that as shown in Fig. 1 that the arrow of transfer is broken. This means that the least nutrients are given to transferred between these two store from the whole cycle.
- When litter is nutrients are stored as litter, some may be lost from the system. This occurs when precipitation takes place and surface runoff caused some litter to be washed away. The remaining litter is usually rapidly decomposed by fungi and later transferred to the soil. As no arrow in the diagram points out, this is the second largest transfer mainly because all the litter which is not washed away eventually decays and transfers all the remaining nutrients into the soil.
- The soil which is the second largest store within the cycle may also lose nutrients

after receiving tree grain litter. ~~11~~ ¹² Nutrients are decomposed and transferred to the soil. When precipitation occurs, rapid infiltration causes leaching of minerals which is a high percentage which are translocated to the weathering front. However because of the shallow roots of vegetation, these nutrients cannot be reached. Rapid weathering within the soil usually excludes nutrients. These are the extra input which are absorbed by the soil. The biomass ~~is~~ later takes up the nutrients to store them within. As the nutrient cycle is continuous, the whole process repeats itself over and over again.

In conclusion, the movement of nutrients in a tropical rainforest ecosystem can be summarised as flow, stores, inputs and outputs. However as there has been increased human interference within these systems, Fig cannot fully describe the actual processes occurring because it refers to an undisturbed ecosystem.

1b) Vegetation of Tropical rain forests is usually said to have reached a stage of climatic climax. This means that ~~it~~ the ecosystem has reached its maximum natural development without anthropogenic interruptions. Trees within this regions are usually 'deciduous' and have an all-year-round growing season. This may be attributable to the fact that diurnal temperatures range only three degrees celsius. Moreover daily rain and thunderstorms provide sufficient moisture to ensure the trees are green for the whole year. However, the trees still shed leaves as litter but not seasonally like savanna regions. This can be seen with the constantly present leaf and bacterial litter on the forest floor.

The tropical rainforest system consists of thick vegetation which is multi-layered. Trees in these areas may usually grow to a height of 100 meters. The thickness of these trees are caused by adaptations which force trees to compete for sunlight required for photosynthesis. As the climate has created conditions that allow high productivity of ~~only~~ hundreds of different tree species, the growth rate is high. The resultant thickness within the forest causes trees to adapt to the survival of the fittest theory.

+ Epiphytes are very common in tropical雨林
Butress roots which are very common to trees within these systems may be a result of the high water quantities received which do not need to stretch below the surface. Other plants are also characterised by having wide leaves and drip tips. This is usually to allow the

easy flow of water downwards so as not to block the stomata. The epidermis itself consists of large apertures which ~~large~~ are needed for maximum sunlight. In addition the fact that the forest floors have no vegetation may be an adaptation as only 5% of the sunlight ever reaches this area.

On the other hand vegetation is also influenced by other factors, ~~weathering~~ Chemical weathering within the soil usually releases certain nutrients such as calcium which are absorbed by the biomass, hence speeding up the growth process. Also the availability of nutrients right above the causal to development of buttress roots.

~~Mosses~~ from Buttress roots on trees are also caused by the huge height of trees. They develop as an adaptation not mainly because of climate, but in order to support the tall trees. Also epiphytes ~~which~~ such as lianas cannot survive on their own and have to grow on other trees for support.

In conclusion there are numerous factors such as weathering and forest thickness which ~~are not~~ affect the nature of vegetation in Tropical rainforests. However they are a consequence of climatic factors such as temperature and precipitation. This being said, Climate therefore affects the development of vegetation within tropical rainforest to a very large extent as it does trees both directly and indirectly.

Examiner comment – grade A

(a) Uses the Gerschmehl diagram to describe a system with inputs, outputs, stores and flows. These are developed in the context of the TRF. The scales of the stores and flows are overlooked.

(b) The climatic parameters are outlined and the TRF vegetation is described in terms of both structure and characteristics. A limited attempt is made to assess climatic as against other influences. The answer could have been enhanced by a more detailed description and exemplification of the nature of the vegetation.

Mark awarded = 17 out of 25

Example candidate response – grade C

a) In Fig. 1 the movement of nutrients in a tropical rainforest ecosystem is shown. In the diagram nutrients are taken up in the soil. These nutrients found in the soil are then absorbed by biomass, such as plants, and animals to produce energy needed to sustain life. Some of the energy gained is stored in leaves and other parts of the plant while others are lost when the tree shed their leaves or die. This forms a layer above the soil that consists of dead leaves called the leaf litter. This acts as a nutrient store, whereby it provides nutrients for other living organisms. Some of the nutrients from this store is returned to the soil, while a small amount is lost completely and an adequate amount is gained from the surrounding atmosphere. In the diagram, it is also seen that the soil loses more of the nutrients than it gains, while the biomass gains more than it loses, contributing to its size. Leaf litter is the smallest nutrient store as it loses more than twice the amount it gains. This cycle shows how nutrients are gained and lost from the tropical rainforest ecosystem as well as transferred through it.

B) In the tropical rainforests, there are five main layers in its vegetation. These layers are a direct result of the climate in these areas as the trees adapt to the conditions available to them. The first of these layers are the Evergreens. These trees grow the tallest and can exceed 30m in height. These trees grow toward the sun light and have tall, slender, branchless trunks. These measures provide safety as animals cannot climb them and damage them. Their roots are buttress, and may raise as tall as 5m above ground level and provide support of the trees. These roots also provide a safe home for small animals. The second layer is that of the canopy. These trees are fairly shorter than the evergreens. They get their name from their interlocking branches which creates a canopy over the forest ground. These inter-locking branches provides a home for small animals, such as monkeys and parrots, that take shelter in the branches. Because of their height, these trees also require additional support by the means of buttress roots. They grow towards the sunlight in order to produce food, through photosynthesis.

The third level of trees is that of the sub-canopy. These trees are much shorter than the canopy and are fighting to gain what little light, from the sun, that is available. These trees, though many, are not as clustered as the canopy, but still provides shelter for lower lying organisms. These trees may reach 16m in height and as a result do not need buttress roots. The lower level trees are called shrubs. These low level trees consists of small trees, grass and bushes. They have adapted to living in the shade of the larger trees and thriving on what little light is allowed to pass through the canopy and sub-canopy. These trees have short roots that quickly absorb any water in the soil, and chose to the surface, unlike the larger trees, whose roots go deep into,

the earth to absorb any available water. The last level of trees are the buttress trees, which consists of rotting leaves and remains of dead organisms. This layer provides shelter for ground dwelling animals, such as snakes, as well as providing nutrients for trees and preventing soil erosion. Some plants, such as the epiphytes, attach their selves to the large trees and pull them selves up away from the hot, wet, sheltered forest bottom in order to gain light from the sun. Some of these plants pose no danger to the taller trees, while others rob them of needed sun light / nutrients. This shows that in tropical rainforests, all plants adapt in order to survive.

Fig.1 Showing levels of vegetation in tropical rainforests



Examiner comment – grade C

(a) Uses Fig.1 to follow through the flows and stores. The description is reasonably accurate but the answer lacks coherent explanation of the nature of nutrient cycling and the role of stores and flows.

(b) A developed account of the structure of TRF vegetation with some detail of adaptions such as different rooting systems. The main weakness of the answer is the lack of any reference to climate and its influences. To gain higher marks the candidate needed to evaluate the influence of the climate on TRF against other influences on the vegetation.

Mark awarded = 13 out of 25

Example candidate response – grade E

I (a) First of all there is a transfer of nutrients from weathered parent rocks into the soil. Due to the large vegetation cover in the tropical rainforest, there is a large transfer of nutrients from the soil and stone in trees as biomass. There is a large store of biomass. Weathered leaves fall out from trees and decay. Therefore there is a transfer of nutrients from the biomass to form the litter store. The transfer of nutrient is small due to a smaller arrow. The soil obtains an amount of nutrients from the litter. Rainfall also helps transfer nutrients to the litter store. A large amount of nutrient is transferred out of the soil by leaching.

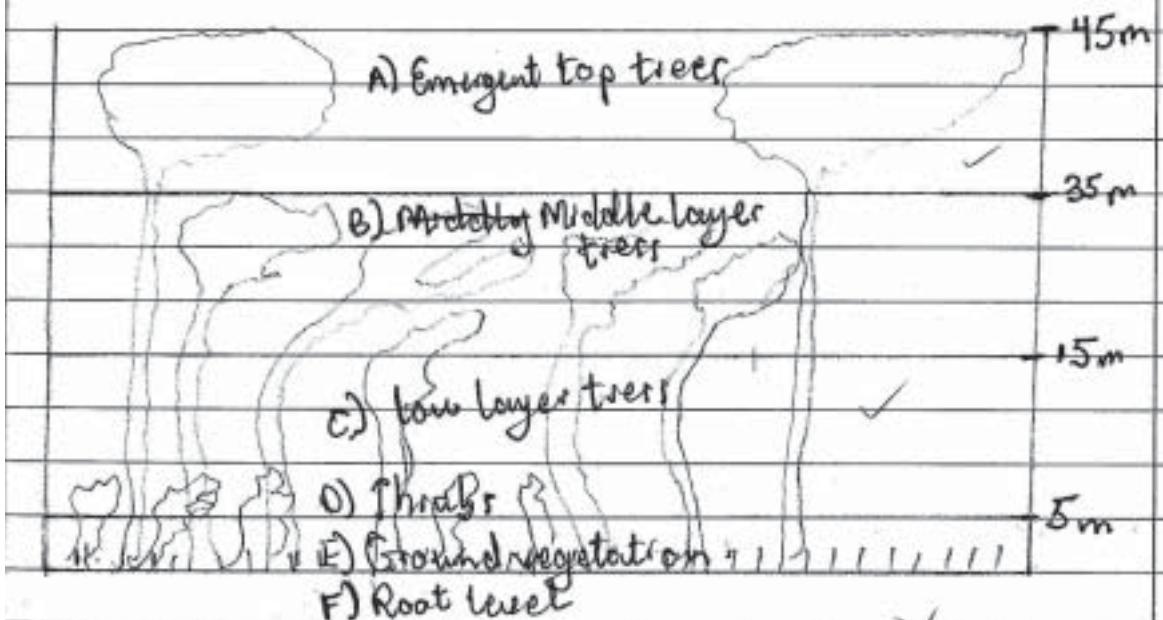
The tropical rainforest has a large biomass store due to large amounts of vegetation.

(b) Tropical rainforest have high annual temperature ($25^{\circ}\text{C} - 26^{\circ}\text{C}$) and high annual rainfall (2000 mm). The rainfall in the tropical rainforest are intense and convectional. There is also high humidity in the tropical rainforest.

Vegetation in the tropical rainforest are evergreen to obtain sunlight for photosynthesis. Due to the high temperature in tropical rainforests, the vegetation are evergreen to obtain light for photosynthesis. The vegetation in the tropical rainforests are in layers and also the crowns waves at each layer. The tropical rainforest also has a very

productive ecosystem with NPP 2200g/km². There is a large biomass store due to the high rainfall in the tropical rainforest therefore more vegetation develop and store a lot of nutrients.

The trees in the tropical rainforest grows to a height of 45 metres to be able to trap sunlight. The tree in the tropical rainforest also has broad leaves to be able to loose water and obtain sunlight. Due to the large amount of rainfall in the tropical rainforest, the vegetation are dense.



The diagram above shows the structure of the vegetation in the tropical rainforest. Example of vegetation in the tropical rainforest are Fig trees, Mahogany and shrubs.

Examiner comment – grade E

(a) A very sparse description of Fig.1 that does not explain the nature of nutrient cycling in the TRF or how this is represented by the flows and stores shown. There is some recognition of the relative sizes of the stores and losses through leaching.

(b) A basic descriptive account of the structure of TRF vegetation with a useful diagram. There is little description of the characteristics of the vegetation or of any climatic adaptions.

Mark awarded = 11 out of 25

Question 2

Tropical environments

Only one question may be answered from this topic.

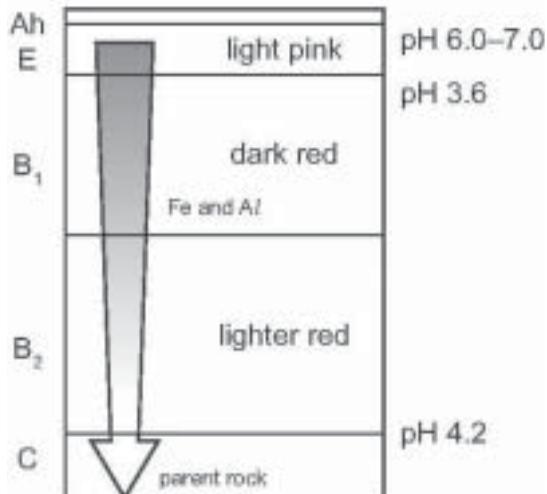
1 Fig. 1 shows a typical soil profile in a tropical environment.

(a) Describe and explain how soil forming processes lead to the development of such a profile. (10)

(b) For either the tropical rainforest or the savanna ecosystem, discuss the extent to which a sustainable approach to management can be a success. (15)

Fig. 1 for Question 1

Tropical latosol



Mark scheme

Fig. 1 shows a typical soil profile in a tropical environment.

- (a) **Describe and explain how soil forming processes lead to the development of such a profile.** [10]

The high annual temperature and high annual rainfall leads to rapid chemical weathering of bedrock. This leads to a deep profile, up to 30 m deep.

In addition, the continuous leaf fall in the ecosystem provides a substantial litter layer. However as the decomposition is rapid the humus layer is thin and is quickly incorporated into the soil. There is high fauna activity which leads to the mixing of the organic matter.

The iron and aluminium give the soil the red colour through the process of hydration.

There is a lack of soil horizons. This is due to the continual leaching (of silica and other minerals). The high translocation results in much material being moved through the profile by water.

- (b) **For either the tropical rainforest or the savanna ecosystem, discuss the extent to which a sustainable approach to management can be a success.** [15]

A sustainable approach to management helps to ensure that the ecosystem is able to replace itself at a greater rate than it is being destroyed. However this is not always possible, as some damage is difficult to overcome. In addition there are a variety of approaches to management, depending on what the case study has drawn out. The level of sustainability can be judged also on the management of other areas connected with the ecosystem discussed; for example local crafts and economy, breeding programmes and ecotourism. Thus management may encompass a reduction in the harmful use of the ecosystem or the protection and enhancement of the social and economic conditions which enable a decrease in the dependence on non sustainable practice. The examples used may draw out the conflicts that occur with the variety of strategies to management as well as how success could be measured.

Level 3

A full appreciation of the issues and success or otherwise of various schemes. Reference to examples or a detailed case study would be characteristic of this level. (12–15)

Level 2

Some appreciation of the extent that managing an ecosystem can be a success. Aware of some of the limits to the management. (7–11)

Level 1

A simplistic grasp of the ecosystem, with an outline of what a sustainable approach consists of. (0–6)

Example candidate response – grade A

Tropical environments

(a) Tropical soil is notably known as ancient soil which has suffered from long periods of weathering (both physical and chemical, or even biological). Thus the soil is infertile and most of nutritions are stored in the ~~biotic~~ organisms such as trees rather than in the soil.

The litters and other organic materials decomposing on the topsols can help to nutrient the tropical latosol. However, due to the higher precipitate rate than the evapotranspiration rate in the tropical rainforest, the leaching process ~~has~~ quite significant effect on the soil. So the soluble minerals may wash off by the surface run-off and minerals such as ~~Silica~~ ~~SiO₂~~ Silica top could reach to the lower layer of the soil profile.

Iron and Aluminium may be left on the higher layer and form ~~hydrous~~ ~~lepidocrocite~~ sesquioxide. The sesquioxide can concentrate together to form ~~lepidocrocite~~ a material which is soft when moistured but tends extremely hard when drying out. Due to the high concentration of the iron ions in the high layers of the soil profile, the horizon B₁ is usually form a dark red colour appearance. In B₂ horizon B₂, the iron ions may react with water and ~~be~~ hydrated and oxidated to form yellowish or ~~be~~ lighter red compounds.

Since more and more soluble ions leaches down the soil profile, the pH values tend to be increasingly acidic down the soil profile.

The lowest layer of tropical latosol is known as parent rock or bedrock which can supply the upper layer of soil and provide some nutritions?

b) Sustainable development is defined as the ~~usage of current~~ production at current stage and the usage of resource in current generation would not affect the interests of next generations. Currently, ~~a~~ tropical rainforest have generated great amount of problems and pollutions? A suitable sustainable management approach is fairly essential to tropical rainforest since the tropical rainforest plays an important roles in ~~test~~ resource supply, global hydrological cycle and tropical ecological system.

Let's use the examples in the development of Madagascar to analyse the success of the sustainable development approach.

Madagascar has lost 90% of its tropical rainforest during the past 1500 years and the poor agricultural practice, increasing population pressure, fuel wood collection tradition, low economic development and logging have ~~pushed~~ made Madagascar suffer from serious deforestation, soil erosion, soil pollution and disruption in ~~test~~ ecosystem. It's estimated that if the government does not take actions to regulate the unhealthy development, the rainforest of Madagascar may vanish in 15 years.

Usually, the farmers in Madagascar burn the rainforest for better fertile land to grow crops. However, the land can quickly turn infertile after single harvest so the farmers have to burn other areas for farming. This not only accelerate the process of deforestation, but also cause the desertification and severe loss of soil. To solve this problem, the government of Madagascar has set up agroforestry program that farmers are encouraged to growth more sustainable cash plants like rubber trees and fruit trees instead of ~~rice~~ rice. In this case, the farmers do not need to burn the forest any more. Also, the improved irrigation systems are introduced and a group of expertize come to teach the farmer to plant more sustainably.

There are also different NGOs working in Madagascar seeking better methods to develop agriculture sector in Madagascar.

To protect the rare and valuable rosewood which usually act as fuel wood for the residents of Madagascar. Laws have set to ban the usage of rosewood as fuelwood. However, this method is work not effectively in remote areas since it's hard to be ~~discovered~~ spot that people living in remote areas are unlikely to be discovered to cut rosewood and be punished.

Other sustainable method to develop Madagascar should be ^{growth} customization. The government favour this approach strongly. Firstly, GDP and employment can be generated and local people can be educated the importance to protect the rainforest area. Secondly, due to good ~~area~~ design of national Park, which restrict the agriculture practice or other human activities in the area, the species as well as the ecosystem can be better protected. However, e.g. in some area of Madagascar, it's reported that the areas outside the national park or conservation area have suffered worse damage since more intensive grazing and agricultural practice have been forced to distract within these areas.

The Madagascar also put 5% of its total government revenue to ~~afford~~ for Aforestation. So many areas of the rainforest have developed into playgrounds. plants. And there are also restriction on cutting trees. Only companies with the permission can cut these trees in certain area. Only the trees higher than 12m and older than 5 years can be cut. Thus the deforestation pressure can be relieved a little bit.

Although there are many sustainable approaches being practice in the TRFs, and the governments and people have improved awareness to ^{both} ~~protect~~ the TRFs, the TRFs ^{are} still facing severe challenges and ^{the} ~~great~~ amount of pollution and degradation of environment. One still ~~are~~ ^{are} urge problems waiting to be solved. Many INCs or foreign companies only ~~focuse~~ on the self-interests and profits without considering the destiny of the environment. But we can also see that many improved management ~~and~~ methods have been effective for countries

like Madagascar and benefit both the countries and the tropical environments.

Examiner comment – grade A

(a) An account of the soil profile that attempts to indicate the soil forming processes that are at work. The explanation is limited but does demonstrate some understanding.

(b) A well-worked example of an attempt to sustainably manage a TRF ecosystem in Madagascar. Although sustainability is kept in mind there is only limited evaluation made of the levels of success.

Mark awarded = 17 out of 25

Example candidate response – grade C

a) The soil profile shown in Fig 1 shows how the pH level of the soil ~~decreases~~ with depth so that deeper in the profile the soil becomes more acidic. The reason for this is water's ability to infiltrate soils ~~more~~ in a more effective manner than nutrients in litter which may contain alkaline substances. As the ~~in~~ tropical environments experience large amounts of annual precipitation it is understandable how acid rain could infiltrate to this extent. The first section of the soil profile has a pH of 6.7 (practically neutral) however directly under that in the second section the pH is stronger (3.6) because water can infiltrate soil better than the alkali which may be in other substance resting in the 1st section. The second section of the profile is described as dark red and as having iron and aluminium it is in this section where a soil will ~~most~~ have the most nutrients and therefore this is where vegetation will locate their roots. This is because after this section infiltration becomes more and more difficult for substances such as leaves. They will here have broken down over a period of time by both rain water and other weathering hazards and then buried by a new layer of litter.

V. Wd. 10as | 2/12

b) Sustainable management in the tropical

rainforest is can be successful but only to an extent. Laws regulating areas where vegetation can be cut as well as the amount which can be cut by various large profit industries or possibly TNCs is certainly extremely helpful in preserving rainforests. Regulations such as this if planned properly can result in a large and beneficial economic industry for the forest area which the rainforest is in, but can at the same time as ensuring that vegetation is not harvested at a rate from which it cannot recover or continue to grow. However for industries to in countries which have TRFs such as much of South America there can be competition between nations - Brazil and Bolivia for example to attract the attention of timber harvesting industries. Being in competition with each other countries or areas with TRFs may not thoroughly consider their policies on insuring that their management of the tropical rainforest is sustainable. They may for example (as has happened in Brazil) allow industries or TNCs to cut down more than the forest can recover from and insist as a condition for this that two trees are planted for every one which is cut. This is not sustainable however as many of the forests nutrients will be in vegetation which has been cut and harvested for other purposes which means

that any new tree which is planted will have considerably less nutrients in the soil from which to grow as there will be the trees which through their leaves and eventual decomposition over time would have enriched the soil with nutrients will have been cut and used for other purposes.

This arresting factor will mean that any forest which is grown from soil which has had its nutrients cycle disturbed by the cutting of trees which in them held a considerable proportion of the forests nutrients will never be able to grow to the height and diversity and density of the original forest.

The management of wildlife in the ecosystems of tropical rainforests are also made difficult by an areas choice to allow timber industry however the money brought in by industries harvesting the rainforests could be used to create wildlife conservations for to ensure the wildlife is safe from losing too much of their natural habitat.

In General it seems that management of the tropical rainforest can only be successful to an extent as competing areas ~~for control~~ with TRFs make it easier for corporations to exploit their resources and make it more difficult to sustain them.

Areas with more money who ~~do~~ will not need this timber industry as much as others and therefore will be more at liberty to create policies which insure that ^{if} no more trees are cut than are naturally

replaced however regardless of the policy.

The harvesting of the forest and the removal of the nutrients in the trees from the ecosystem has a negative effect on forests growth and so will eventually become unsustainable.

Examiner comment – grade C

- (a)** The account tends to repeat material directly drawn from the diagram of the soil profile such as pH value, colour and mineral content without adding any explanation or interpretation. There is only a limited appreciation of climatic inputs.
- (b)** Sustainability is not defined but there is some appreciation of the limits placed upon exploitation by the nature of the TRF ecosystem. This is illustrated by the use of examples of lumber extraction in Brazil and Bolivia. These examples, however, are not well developed either in terms of management strategies or sustainability, but still a much better response than part **(a)**.

Mark awarded = 12 out of 25

Example candidate response – grade E

a). In describing and explaining how soil forming processes lead to the development of such a profile, it is of significance to first identify the factors which attributes such formation. In brief, the ferrallitic (latosol) soil can mostly be found in the premise of rainforests. The typical rainforest is characterised with an annual amount of high rainfall, though it is also exposed of high insolation rates, putting into consideration the equatorial location of such rainforests. Both heavy rainfall and large amount of received sunlight results in the increased humidity of rainforests on ground level.

Starting off from the very top of the soil layer is the litter layer. The latosol soil has a much thicker humus than, for instance, the sub-tropic ferruginous soil, due to much of the litter falling down unto the soil (e.g. leaves, animal droppings, etc.). There is also a rapid decomposition which occurs via decomposing microorganisms which thrive on humid areas. The humus layer is decomposed and will eventually become a part of the top soil (Ah-F), which is the most

fertile part of the tropical latosol structure.

The transition of color from light pink into dark red and lighter red is mostly due to the oxidation process. In the layers of B1 - B2, iron and aluminium accumulates at this certain level. When iron is exposed to air, it oxidizes and develops the red coloration of this soil layer. Both iron and aluminium can go further down the soil through percolation of water, which can be attributed by the high amount of rainfall that exists in the tropical rainforest. When the percolating water reaches the bottom, parent material, it will trigger a chemical weathering, typically with granite, breaking it into kaolin after water reacts with feldspar.

To conclude, the formation of the latosol soil is mainly attributed by the factors of climate, parent materials and the active organisms. Climate, however, seems to be more of a defining and more significant factor compared to the others, as it is the key for other factors to contribute in the soil formation.

Humification:

b). In discussing the extent to which a sustainable approach to management can be a success, it is first important to identify the type of location where such approach will be carried out.

The tropical rainforest seems to be an appropriate choice in this discussion, with the Amazon Basin (South America) as an example to further analyze the extent of success of the management. As a brief introduction, the tropical environment of the rainforest is characterized with the wide array existence of trees, supported with plenty of rainfall and sunlight. Though vegetation is evergreen, the tropical rain forest is, however, called as a 'desert of trees' due to the actuality that the soil is in fact, lacking nutrition. As such, a sustainable approach to manage this issue has at least been carried out in a number of ways.

One of such method is the shifting cultivation, involving those cultivating crops to move to new locations within the rainforest when the soil they previously utilize is no longer fertile. The Amerindians of the Amazon Basin has used this method in a long period of time to gather rations for themselves. The

extent of success in this method is somewhat unreliable, however. While it does allow farmers to utilize the soil and letting the soil 'rest' for it to gain back fertility, it has been argued by recent researchers that this method is actually negative in the long-term, causing much soil fertility to decline in the long-run.

Another method for sustainable management is through selective logging. The Amerindians have applied this within the Amazon Basin, to an extent, by which they keep emergent trees standing whilst cutting down only a few to make a clearing for their cultivation.

The success of this method may be likely to be high. In particular, this type of management can sustain a number of vegetation, as well as sustaining the soil to prevent it from being completely barren in the case where forests are entirely logged. The only downfall to this method is that it does not necessarily improve the fertility of the soil, unless the trees are burned for producing ash.

As a final evaluation to the discussion, the extent of success of a sustainable management approach is relatively dependant on the type of method used. While a shifting cultivation may have low rates of success, the selective logging approach, on the other hand, may have higher success.

Examiner comment – grade E

- (a)** An account that traces the movement of water through the soil with only a very limited appreciation of any soil forming processes. The candidate has knowledge, but does not necessarily apply it to the question set.
- (b)** Although a case study is not employed, the answer attempts to illustrate management through the practices of shifting agriculture and selective logging. Some attempt is made to assess these in terms of general sustainability, but the answer could have been improved by use of exemplification and greater explanation.

Mark awarded = 11 out of 25

Question 3

Coastal environments

Only one question may be answered from this topic.

- 3 Photograph A shows an area of coral reef off the coast of Antigua.

(a) Describe the distribution of coral reefs shown in Photograph A and explain the conditions needed for such coral growth. [10]

(b) Using examples, explain the factors that can produce variations in cliff profiles (cross section form). [15]

Photograph A for Question 3

Coral reefs in Antigua



Mark scheme

- (a) **Describe the distribution of coral reefs shown in Photograph A and explain the conditions needed for such coral growth.** [10]

The photograph shows discontinuous fringing reefs developed in shallow, tropical waters off the coast of Antigua. Some may describe the coral as a combination of fringing reefs and the discontinuous type of barrier reef. Reward any relevant observation drawn from the photograph.

The main conditions for coral growth include

- Temperatures – tropical coral only lives in water with a temperature over 18 °C but ideally between 23 °C and 25 °C – hence coral is generally restricted to tropical environments. In Bermuda, however, they are found due to the Gulf Stream bringing heat further north. They are generally absent on the west side of tropical continents due to the presence of cold currents.
- Light – coral feed on tiny algae and these need light to photosynthesise. Hence coral tend to form in shallow water where there is more light.
- Clear, oxygenated water – sediment in the water affects coral's ability to feed and decreases the amount of light. Hence reefs are rarely found close to river mouths.
- Coral cannot live for long outside water so they are rarely found above the low tide level.

- (b) **Using examples, explain the factors that can produce variations in cliff profiles (cross section form).** [15]

There are a number of factors – each should be supported with examples.

- Rock type – resistant rocks such as granite and basalt may form steep cliffs. So too can less resistant rocks such as clay.
- The rate of supply of sediment (cliff erosion) and removal is important. If removal equals the rate of supply, a steep cliff is formed. If supply is greater than the rate of removal a gentle cliff profile is produced.
- The orientation of bedding planes can produce steep or gently dipping cliffs.
- Climate and sea level change may produce beveled cliffs or slope-over-wall cliffs.
- A cliff with an extending wave cut platform may be protected from marine erosion and become gentler in profile through sub-aerial weathering.
- Sub-aerial processes may break down rock to produce scree like material at the base of cliffs.
- Mass movements can produce slumping and create complex cliff profiles.
- Human activity can alter cliff profiles, reprofile them or try to preserve them.

Level 3

Balanced account of a range of factors and supporting examples of different types of cliff profile. Likely to emphasise physical rather than human factors. Good levels of explanation.

(12–15)

Level 2

A more generalised account of factors that are only partially related to cliff profiles. Support less strong. Description likely to be stronger than explanation.

(7–11)

Level 1

Basic descriptive account of coastal erosion lacking in detail or support. Partial account. Of profiles or a misconception of profile.

(0–6)

Example candidate response – grade A

Corals are formed by tiny marine living organisms known as polyps. These polyps are formed by excretations which are made up of calcium carbonate. These polyps grow together forming a huge mass of rock, thus the coral reef.

In photograph A, the coral reef shown is a fringing reef. This is because it is has not characterised formed very far off from the coast of Antigua. It is characterised by a shallow lagoon and this is evident from the photograph since there are no areas of darkness between the coast and the coral reef. It has a seaward side that is not very steep and its platform, that is the distance the coral forms before the lagoon is flat.

For such a coral growth, there are various conditions needed to support the growth. Corals grow in areas of where the temperature is between 20°C to 30°C . As for the reefs of Antigua, they grow in the eastern side of continents and especially where warm oceanic currents are present since the required temperature is present.

The corals off the coast of Antigua also grows at a depth of not less than 2.5m of the sea water. This is because in order for the corals to

grow and survive, they need to be under submerged conditions though they can be exposed above the water surface for a very short time for example in the event of a low tide.

For corals to grow, the water needs to be salinity of about 27-40 parts per thousand so it will be impossible to find corals growing at the place where the river enters the sea because the river carries sediments which bring about muddy areas and the sun cannot penetrate the muddy areas to provide heat energy for the growth of corals. The salinity will also help in the formation of calcium carbonate.

Th-

There also has to be presence of sunlight which will help in the photosynthesis process of planktons which the corals feed on to survive and grow. The sea water such as the one in photograph A should be well oxygenated and this is brought about by strong wave action for corals to survive.

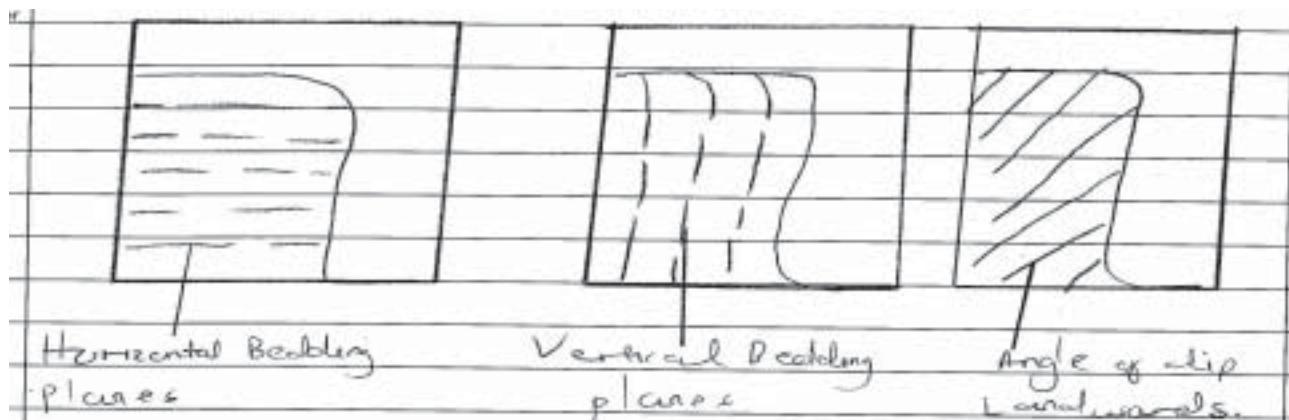
All those conditions will help in the growth of corals.

3.(b) Cliff profiles are the general formation of cliff from top to bottom.

A cliff is a steep, rock face that is formed along the coast. There are four main types of cliff classifications and they can be produced by erosion, weathering and mass wasting processes since the cliff is an erosional feature.

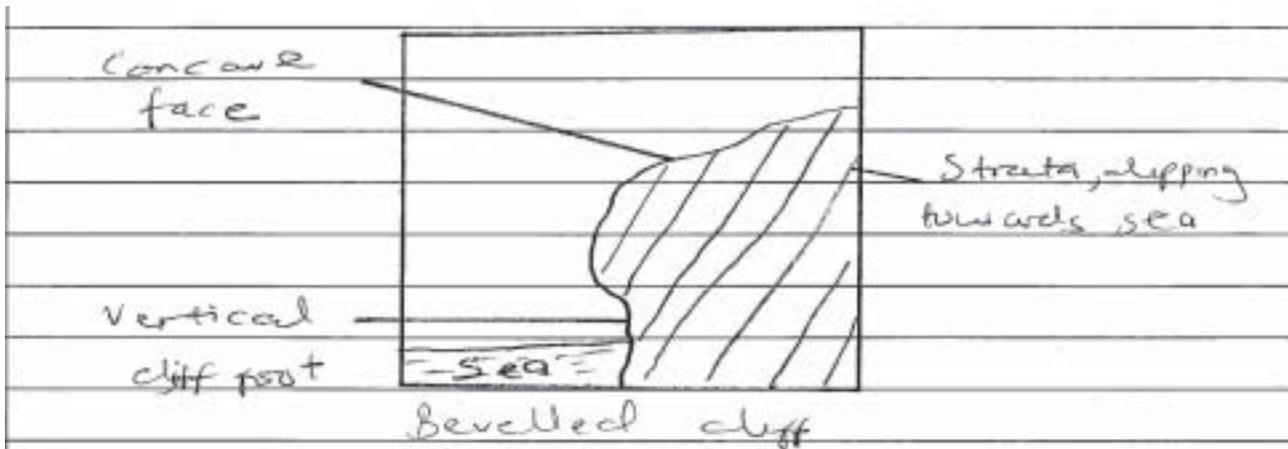
The vertical or cliff foot processes cut the base of the cliff and cliff face processes at the top of the cliff will determine the cross section form of the cliff, accompanied by various factors.

For a vertical cliff and its profile will be determined by the type of rock which is homogeneous, that is, it is made up of one type of rock. In order for this type of cliff to form, the bedding planes should be either vertical, horizontal or the angle of dip should be facing landwards. This is so that when erosion processes such as hydraulic action where the water compressed or wave scouring or corrosion act upon the cliff foot, a wave-cut notch is formed and it is the overhang collapses, forming a vertical cliff.

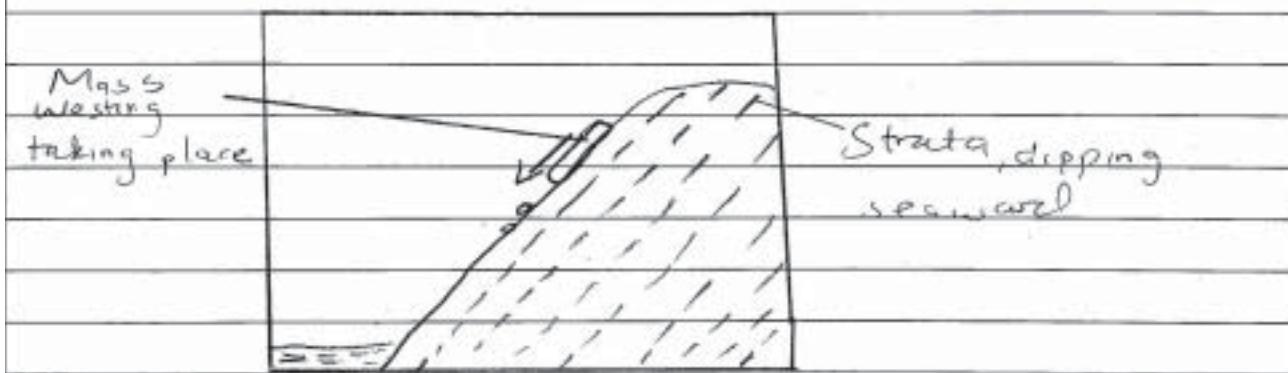


Another cliff profile is the bevelled. It normally forms by mass wasting and weathering at the cliff face and erosion at the cliff foot. When there is a drop in the sea level and the cliff foot processes are not possible, the cliff becomes bevelled. Mass wasting and weathering acts on the cliff face which forms a ~~concave~~ concave profile on the cliff face. This mass wasting and weathering are also encouraged by the angle of dip which is seawards thus erosion happening faster.

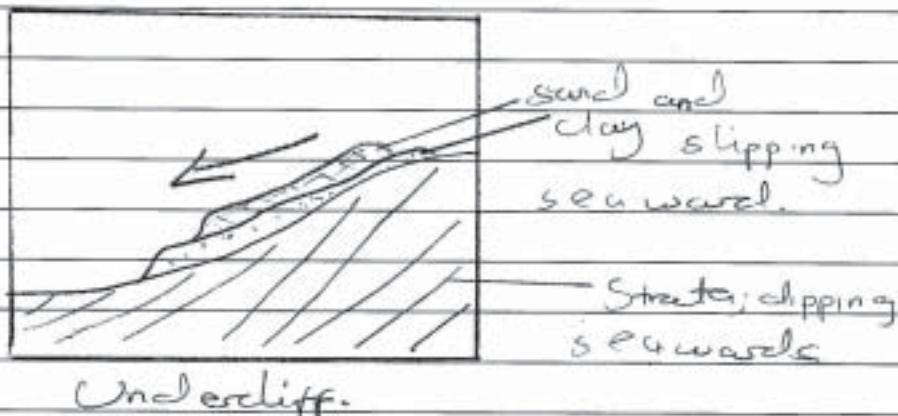
Once the sea level rises, the cliff foot process is reactivated and erosion ~~is~~ will occur on the cliff foot for example wave pounding ~~action~~ where the cliff is eroded by the sheer forces of the wave forming a vertical profile on the cliff foot. This is due to the rock being homogeneous and having rock joints, ~~bedding~~ and angle of dip towards the sea.



The Hog's back profile of the cliff is affected by mass wasting and weathering processes where the whole cliff is concave shaped. This is because of the strata and angle of dip is towards the sea. Heavy rainfall for example can add weight to the rocks and the gravitational forces will exceed the resistive force of rocks and there will be mass wasting forming a hog's back cliff.



The undercliff profile will depend on factors such as the type of rock where a cliff may be formed such that its face is made up of clay and sand. Emerging springs from the cliff can saturate the sand and clay increasing the positive pore pressure which results to the internal cohesiveness of the rock sand and clay particles to decrease therefore erosion takes place.



If the rock is more resistant, erosion will slowly take place but if it is less resistant it will take place faster. Other factors such as human activities for example building on cliff top or growing vegetation where its roots loosen rocks can contribute to erosion resulting to different cliff profiles.

Examiner comment – grade A

- (a) Good use is made of the photograph to identify the locations, context and type of coral reef. Conditions for coral growth are described and fully explained in terms of the development of coral polyps.
- (b) The answer concentrates on differing types of cliff profile with each type being illustrated by appropriate diagrams of such profiles as bevelled cliffs and hogs back. The role of rock type and structure is described and the contribution of marine and sub-aerial processes assessed.

Mark awarded = 22 out of 25

Example candidate response – grade C

3a)

Coastal environments

The coral reefs in photograph A are placed within a lagoon and they vary with their positioning. Most of the coral reefs that are seen are a short distance from the shore, showing that they are probably quite young and they are mainly fringing reefs. They are also in the shallower waters which is another indication that they are relatively young. There are a couple of coral reefs that are more centered in the lagoon, in deeper water & one furthest away from the shore meaning they are more likely to be barrier reefs.

Coral reefs need a specific set of conditions for them to grow to optimum levels. For example they need warm water which is why they are normally found within tropical ~~temperate~~ seas. Their temperature cannot go below 18°C or above 26°C otherwise the corals will begin to die.

Reefs also need a firm base to begin to grow on (a rocky

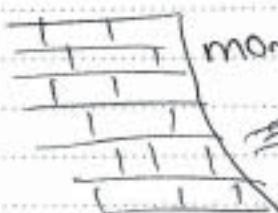
surface or the sea floor) & they need clear waters. They need a constant flow of water to prevent clogging via silt deposition. A good amount of sunlight is also required which is why they are never found very deep below the water surface. The sunlight is needed for photosynthesis to allow the coral to stay alive.

Coral reefs also need to have clean waters that are free e.g. pollution & reef bleaching otherwise they will die & become extinct. Numbers are also required for a coral reef to keep on growing. The coral reefs also need to be covered by sea water & cannot be exposed to the atmosphere for a long period of time otherwise they die.

- 3b) There are many factors that produce variations in cliff profiles. The most important factors are probably the rock type & the rock structure. For example a less resistant rock will be eroded more easily & more quickly e.g.

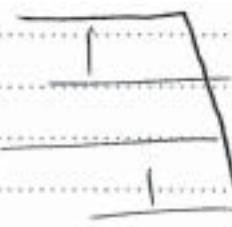
Chalk found at Muirrow Cove, Dorset than a cliff that is made up of a very resistant rock type e.g. Portland stone. The less resistant cliff will therefore be further back on the coastline & is more susceptible to rocky landforms such as caves, strand, shumps.

The rock structure will have an effect on the profile of a cliff. For example a cliff profile with more joints & bedding planes will be more easily eroded & will be more unstable & susceptible to types of marine erosion e.g. hydraulic action, abrasion.



More joints & bedding planes - less resistance to high energy waves
e.g. found at small bay, Dorset.

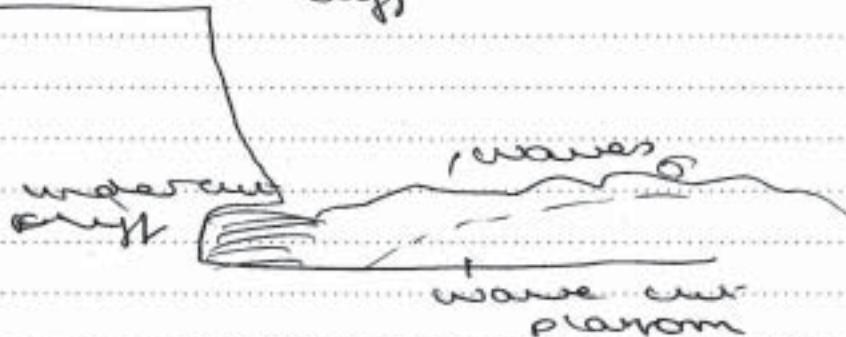
Whereas a situation which has less bedding planes & joints will have a stronger more stable cliff profile. It will be more resistant against high energy waves & forms e.g. marine erosion.



less bedrock planes &
joints = more resistant
e.g. kilimodo cave.

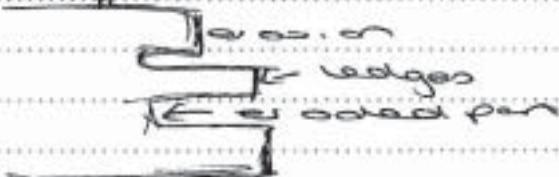
The energy of the waves & coasts will also affect the cliff profile. If a cliff is being exposed to higher energy waves then it is more likely to be eroded faster & have a less stable profile. It may also result in a wave cut platform being formed, where the bottom of the cliff is being undercut by the high energy in the waves.

- cliff



Whereas if a lower energy wave was hitting the cliff it would be affected not much, because it could withstand that energy.

Marine erosion can also influence the profile of a cliff. As I said before if a cliff has no a coherent structure, it will be more susceptible to the different types of marine erosion, hydraulic action, abrasion, attrition, corrosion. This erosion can form ledges & overhangs in the cliff profile as seen cliff in the diagram.



Sub-aerial processes can also have an effect on the cliff profile.

Examiner comment – grade C

(a) Uses the photograph to identify a fringing reef close to the shore in shallow water. The conditions for coral growth are described with some limited explanation. Quite a good response.

(b) Although an attempt is made to illustrate cliff profiles with diagrams all the profiles possess the same shape. They are only weakly explained in terms of either rock type and structure or in terms of marine and sub-aerial processes.

Mark awarded = 15 out of 25

Example candidate response – grade E

3(a) The coral reefs shown in the photograph are quite close to the island that it surrounds. Although, the coral reefs are a bit of a distance from the land and not physically attached to it. The reefs aren't connected to each other and appear to be quite spread out.

Coral are very fragile organisms that will ~~soon~~^{only} survive under certain conditions. From the photograph, the climate appears sunny and thus must be warm. Coral ~~can~~^{require relatively warm} temperatures of about 26°C . They require temperatures of about 24°C and anything below that will be detrimental to them. In addition to the warm sea temperatures, they will require the presence of sunlight. This is because the corals feed on zooplankton which require the sunlight to photosynthesis. As such, the sunlight is necessary so that the coral can feed.

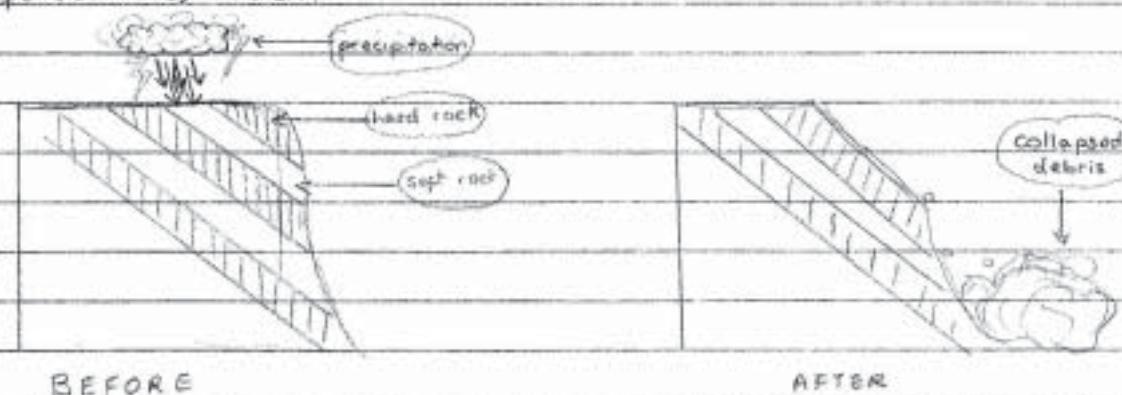
In addition, the coral will only survive in shallow water. This is because at deeper depths there is insufficient sunlight for the zooplankton. Therefore, they may starve. The deeper waters may also have colder temperatures which is ~~bad~~^{harmful} to the coral reefs. Coral reefs ~~survive~~ Most importantly, coral reefs will only survive in sea water. The sea water contains calcium carbonate which the

coral uses to form its exo-skeleton. Without the saline waters, the coral will not survive.

However, some coral reefs may be found at deeper depths below 50m. This is because at one point in time the coral grew, but the sea level has risen over the years. As such, the coral may have died and hardened but still continued to grow as it adapted to changes in the sea level.

- (b) Cliffs are exposed physical features. As such, they are subject to various natural activities which will affect the profile of it. There are processes of weathering, ^{climatic change,} erosion or wave action that can alter the shape of the cliff. This, however, depends on the geology and the layout of the rocks.

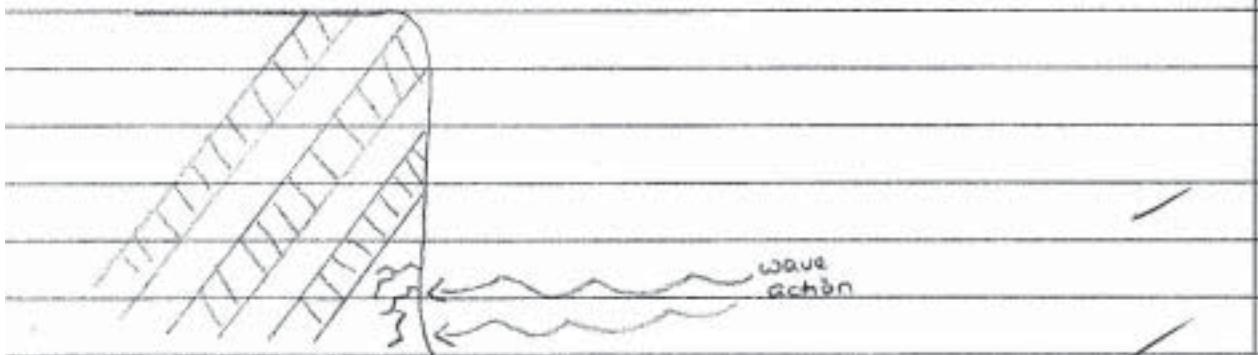
To illustrate how sub-aerial processes can produce variations in cliff profiles, I will use a diagram showing alternating bands of hard (resistant) and soft (weak) rock.



The hard and soft rock are alternating diagonally in a

downward manner. After a period of rainfall, the precipitation will infiltrate the cliff and store moisture in the weak soft rock. The so incohesive layer of soft rock will no longer be able to support the harder rock above and will thus give way and slip, thus changing the profile of the cliff. Have aces In addition, wave action at the base may also cause undercutting, thus making a cliff unstable and eventually causing it to collapse.

This can, again be illustrated below



The intense wave action will erode the base of the cliff. In my diagram, I have changed the way the rocks are alternating to emphasise my point. By Furthermore, wave processes such as hydraulic action will increase the rate of erosion as air is compressed and suddenly released. After the base is eroded, the profile of the cliff may change slightly, as it will be more stepper.

Examiner comment – grade E

- (a) Very little use was made of the photograph, earning little credit. A partial range of conditions required for coral growth are given but without any explanation.
- (b) The answer does identify the importance of rock type and structure in the production of cliffted coasts and does describe the operation of subaerial and marine processes. The weakness of the answer lies in the failure to apply this in any significant way to different cliff profiles.

Mark awarded = 11 out of 25

Question 4

Coastal environments

Only one question may be answered from this topic.

- 4 (a) Explain how different types of wave are generated and describe their effects on beaches. [10]
- (b) Describe and assess the success of attempts to manage sustainably a stretch or stretches of coastline. [15]

Mark scheme

- (a) Explain how different types of wave are generated and describe their effects on beaches. [10]

Waves are generated by friction between wind and water and hence are dependent on fetch, duration of wind and water depth. This produces an orbital movement of water inducing a wave. The waves can be of various types, amplitudes and wavelengths. Swell, storm, breaking waves, etc. although most will concentrate on the type at the coast – destructive or constructive. These help create the beach profile with the constructive waves pushing material up the beach and hence steepening the profile, whilst destructive waves comb material down the beach, lessening the beach profile.

- (b) Describe and assess the success of attempts to manage sustainably a stretch or stretches of coastline. [15]

This is an opportunity for a case study or a set of examples discussing attempts at coastal management. This could encompass far more than mere coastal protection and may well involve managed retreat and the destruction of coastal protection to allow the re-establishment of salt marshes as in Essex. Inevitably many will see this as an opportunity to develop examples of protection from coastal retreat, but this should involve actual examples and include some assessment of the level of success. Probably few will approach sustainability in depth.

Level 3

Well chosen case study or examples that embrace management rather than just protection schemes. There is assessment of success (or failure) and of sustainability. (12–15)

Level 2

Examples or case study described with some accuracy and some attempt to see the scheme(s), rather than the management in terms of cost and benefit. (7–11)

Level 1

Random examples of coastal protection methods (groynes, gabions, sea walls, etc.) with little specific location or assessment. (0–6)

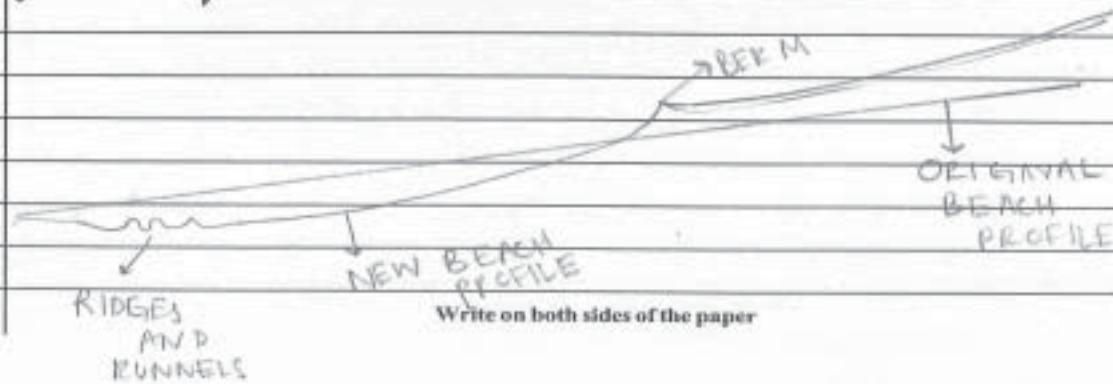
Example candidate response – grade A

(a) Geographers have explained the marked effects that different types of waves can have upon beach shapes. The factors involved in generating different types of waves is ~~are~~ important in understanding their effects upon beach profiles.

Where there is a long fetch (the distance of water that wind has blown over is large), ~~greater~~ less wind velocity, and a greater depth of water, constructive waves are likely to be generated.

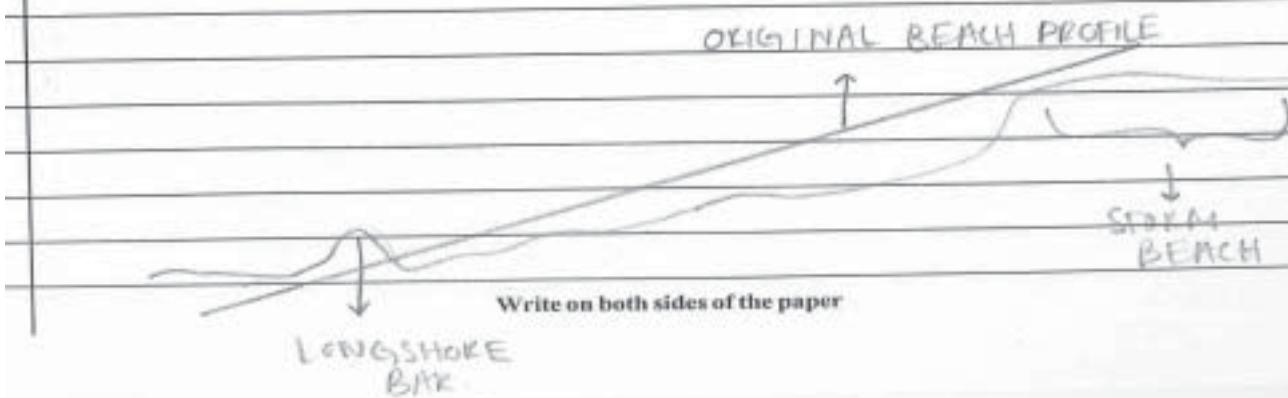
As the transfer of energy ~~is transferred~~ from wind to these waves is less, they are likely to have a greater wave length, lower wave height, and lower wave frequency. They are known to be formed from "swell" and usually approach beaches with a more gentle gradient.

As a result, their energy is dissipated across the beach in the form of a swash (foaming water that runs up the beach), and the returning backwash has a negligible amount of energy. The energy of the swash causes material to be moved up the beach, increasing the beach gradient over time; material is deposited above the low water mark to form a berm, and successive tides may form ridges and runnels on the beach.



In the diagram, the straight line marks the original beach profile, while the more irregular line shows the increasing gradient and the development of the berm.

In stark contrast to constructive waves, waves that are formed locally (from "sea") where there is a shorter depth, but shallower water and where there is greater wind velocity (such as during a local storm) are known as destructive waves. These waves have higher energy, a greater height, ~~and steepness~~ and steepness, lower wavelength and higher frequency. As they are likely to approach beaches with a steeper gradient, their energy is concentrated upon a small area, and ~~expands~~ the backwash returning down the beach contains most of the wave's energy. This powerful backwash carries material down the beach, decreasing the gradient over time and leading to the formation of longshore or breakpoint bars, a depositional feature below the lower water mark. However, destructive waves are capable of hurling large amounts of material up the beach during the swash, and a storm beach may be created above the high water mark.

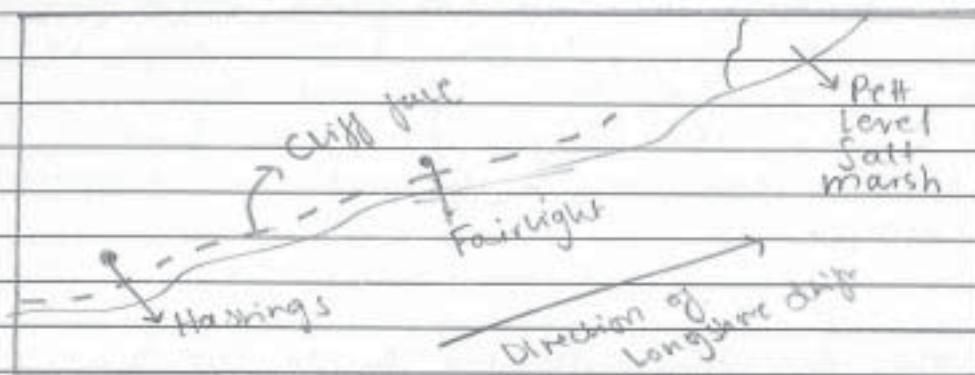


The diagram shows the deepening beach gradient and the longshore bar and storm beach, in contrast to the original beach profile marked by the storm beach. When compared to the profile of the beach formed by constructive waves, it may be seen that different waves can affect beaches in distinctly different ways.

- b). In 2002, it was estimated by the UN that over half the world's population lived less than 60 kilometres away from a coastline. The increasing interaction between humans and coasts, which are extremely vulnerable to human intervention, have led to people and governments imposing coastal management systems upon coastal areas. Rising sea levels and a lack of funds make it increasingly difficult to sustainably manage coastlines.

The East Sussex coastline that is inhabited by many people is susceptible to cliff and beach erosion; throughout the ~~last~~ twentieth century, the government has been putting in an effort to sustainably manage the coastline. While most of the coastline is made up of a cliff face that directly faces the sea (such as in the ~~two~~ coastal resort town of Hastings and the smaller coastal village, Fairlight), the cliff ~~face~~ has retreated in some areas, exposing ~~beaches~~ and the ~~Sack mouth~~ ^{town of} ~~an open~~

level to the sea.



The building of groynes and a harbour at Hastings successfully prevented erosion of its beaches, but also worked as a sediment trap, making the waves approaching Fairlight more erosive in nature (as they carried less material). Rapid undercutting of the cliff at Fairlight resulted in homes being evacuated in 1989. The ~~was~~ ~~the~~ government ~~for~~ committed an artificial reef at Fairlight ^{in 1990} to ~~pt~~ make waves break further from the shore, and thus protect the cliff from erosion. While this was a success, the reef did not dissipate wave energy ~~best~~ and instead trapped sediment, leading to excessive erosion further ~~down~~ ~~the~~ east at the Pett Level marsh.

Being a salt marsh, Pett Level is extremely vulnerable to flooding; the government has built an embankment to protect it, and also engages in beach nourishment. However, ~~with the~~

Increasing erosive power of waves is increasing the cost of protecting Pett Level, which is an economically less well off area and depends upon funds from the central government. Future prospects for the protection of Pett Level are therefore poor.

Thus, while the coastal management of particular areas on the East Sussex coast such as Hastings and Fairlight have been successful in protecting their individual beaches and cliffs, the management strategies have created problems at Pett Level. The saltmarsh faces the threat of flooding and its protection is growing increasingly economically unsustainable. I would therefore conclude that the efforts to sustainably manage the East Sussex coastline have largely failed, as they have relied on traditional methods (such as building groynes) that ~~were~~ negatively impact other parts of the coastline. More sustainable, long term techniques such as managed retreat may enable ~~protect~~ the East Sussex government to protect its coastline ^{as well as} the welfare of its people. 10+

Examiner comment – grade A

(a) Although the answer is limited to constructive and destructive waves, their generation is accurately described. There is a very comprehensive and accurate explanation of the impact of such waves upon the development of beach profiles.

(b) The East Sussex coastline is effectively employed to demonstrate the problems of sustainable management of this stretch of coast and some attempted solutions are assessed. The coastal landforms characterising this coast are described and the strategies used for their protection are assessed in terms of their sustainability.

Mark awarded = 23 out of 25

Example candidate response – grade C

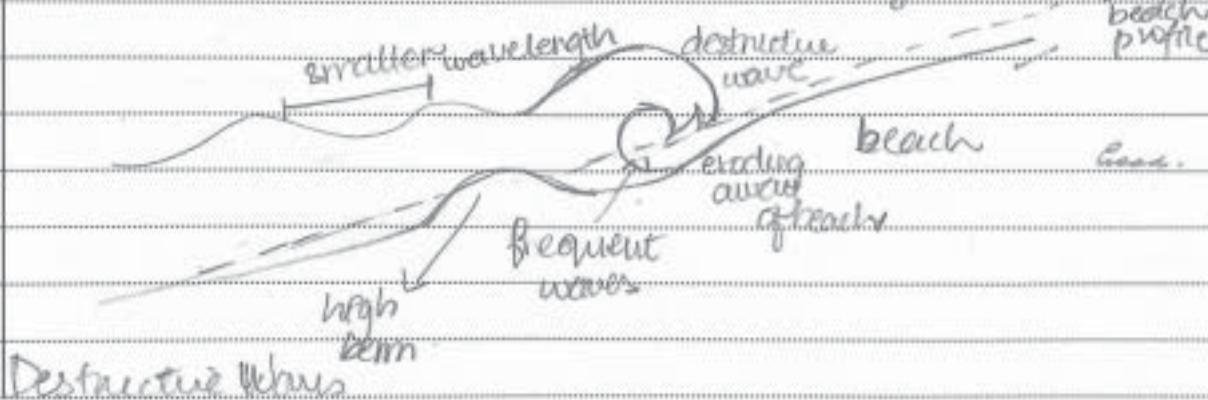
S_{4(a)} Waves may be mainly of two kinds namely destructive and constructive. Waves are generated due to the ~~prevail~~ frictional drag of the prevailing winds on the surface of the water.

Destructive waves are generally low energy as they have a smaller fetch distance and are associated with a small wave length and ~~but~~ hit the shore more often than constructive waves. Destructive waves hit the shore with an immense amount of force and although they have a relatively smaller ~~wash~~, the backwash is greater and this may wear away the beach profile but lead to the formation of a high berm at the low water mark, due to the accumulation of beach material, worn away from the foreshore.

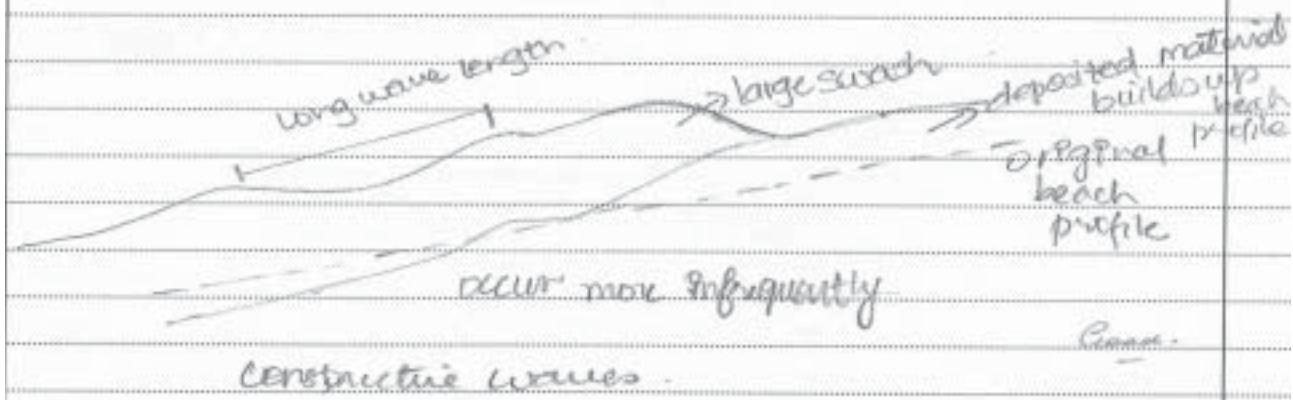
~~Chances written are correct,~~

~~names are wrong.~~

~~original
beach
profile~~



Constructive waves on the other hand are associated with a long fetch and are influenced by large wind current such as the trade winds. They, therefore have a large wave length and although are not frequent, perhaps only 8-12/min, have a large swash and of them which build up the beach by pushing material eroded from elsewhere, up the beach, increasing its profile. Constructive waves are therefore associated with a high beach profile. The breaking is generally low and as the wave gradually 'spill' onto the shoreline little material is eroded, hence berms formed are of a smaller height than those formed by destructive waves.



Hence, constructive waves, build up the beach and make them steeper through depositions as well as increase the beach ~~to~~ beach so that waves break further off shore. On the other hand destructive waves wear away the beach through erosion and hydraulic action.

b) People may choose to protect a coastline from ~~erosion~~ ~~and~~ ~~erosion~~ depleting due to coastal erosion, due to ~~the~~ the pleasure of ~~to~~ settlements at the beach the environmental importance of the coastline and due to the fact that the beach maybe a tourist attraction which gives the government an income from the tourists wanting to visit a wide sandy beach. In many parts of the world, ~~coastlines~~ ~~coastlines~~ have been protected by artificial hard and soft defences. For example hard defenses have been built or installed along the coastline, these may include ~~walls~~ ^{groynes} which encourage deposition on the coastline and thereby protect the losses from wearing it away. Sea walls ~~are~~ ~~by~~ artificial type ~~are~~ built of stone and and stones with hollow steps allow wave energy to dissipate and therefore keep from ~~the~~ attacking the coastline. In ~~a~~ ~~a~~ many states including Texas and North Carolina, ~~walls~~ concrete sea walls were built 10-30m ~~at~~ in height in ~~in~~ order to protect the coastline.

On the other hand, in places such as the Danish island, soft defenses such as the dumping of ~~a~~ rock material and sand was practised on coastlines along with the more sustainable rock sea walls made of ~~too~~ too loose rock ~~we~~ were also used, ~~as~~ on the ~~a~~ eroding waves were a danger to the ~~the~~ spit which was ~~was~~ a habitat for many ~~to~~ plants and animals and home

to animal rescue and up to local businesses. However, these protective measures were ~~wearing~~ wearing away the coastal landforms south of east of the Dawlish Warren spit. Furthermore, planning, ~~coast zones~~ laws and restrictions may also be used to sustainably manage a coastline, as this involves not only the stretch of the beach area suffered by the coastal erosion but also the human activities which may ~~be~~ adversely affect the coast by polluting it. Therefore, ~~strict~~ heavy fines may be imposed on littering on the coastline or the dumping of waste there. Furthermore, laws can be made to restrict the development on coasts which not only disrupts the coastal habitat for the fauna present there but is also ~~be~~ harmful for the buildings due to the erosion of the coastline. In addition building on headlands ~~or~~ or cliffs which ~~area~~ may have less resistant rocks may ~~also~~ weaken the coastline ~~so~~ not making it more vulnerable to coastal erosion.

Examiner comment – grade C

(a) Constructive and destructive waves are described with some indication of their impact upon beaches. The account lacks any reference to wave generation.

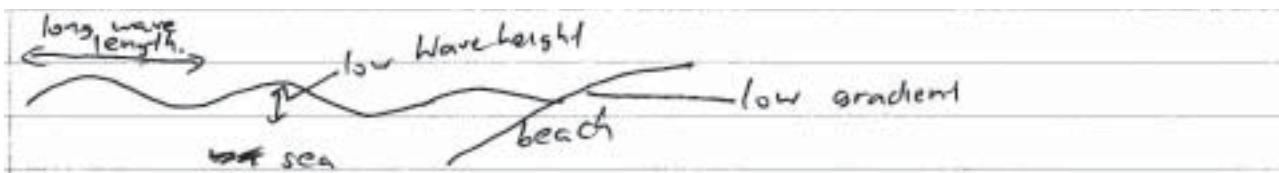
(b) A rather generic account that deals with general means employed for coastal protection. These are not assessed as to their sustainability and the problems of coastal management are not developed. The answer could have been improved by the use of either a case study or of exemplification.

Mark awarded = 13 out of 25

Example candidate response – grade E

4. a) In waves, there are two types; constructive and destructive.

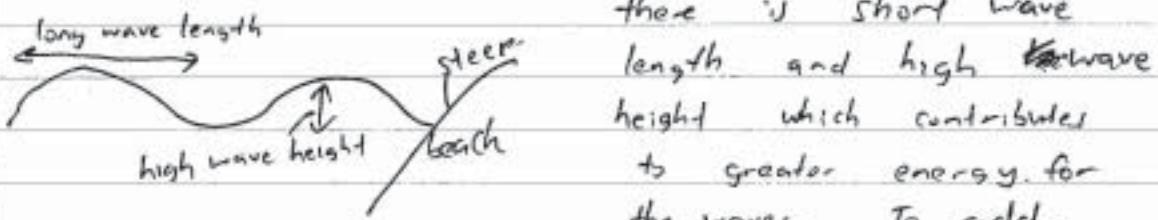
For constructive waves, this occurs when swash is greater than backwash. Because swash is bigger, it deposits more materials up the beach, it is called a depositional wave. In swash, there are about 6 to 8 waves per minute ^{due to low energy} at low gradient beach profile. (see diagram)



Because of low energy, beach's materials do not get eroded away ~~very~~ much. To add, constructive waves consists of long wave length and low wave height which contributes to low energy on waves ~~thus~~ thus making it ~~construction~~ constructive.

In destructive waves, backwash is greater than swash which leads to ~~more~~ amount of materials gets eroded away from the beach.

Thus, it is called a erosional waves. In destructive,



there is short wave length and high wave height which contributes to greater energy for the waves. To add,

because beaches are in high gradient, it is easier for the ~~backwash~~ to flow outwards from the beach carrying with them the materials such as sands and shingles, therefore making backwash to be greater than swash.

~~Due to successive incoming waves, 'berms' can be formed as more and more materials are transported up the beach and goes up the beach.~~

b) In East Riding Coastline, UK, there is two legislation from the government; 1991 Land Drainage Act and 1949 Coast Protection Act. These were made to prevent encroachment of waves and protect the land from flooding.

In 1996, Environmental Agency took over the responsibility of looking ~~at~~ after the coastline. Because it ~~didn't have~~ didn't have enough finance, it was financially aided by DEFRA (Department of Food and Rural Affairs).

These are what they have done:

First, approximately 9.2 Km of ~~frontage of coasts~~ ~~coastal~~ ~~were~~ were protected by hard engineering works such as sea walls and rock armour structures. Other hard engineering works were adopted as well such as groynes to intercept longshore drift, offshore structures to break the wave energy offshore, revetments to prevent subsidence ~~erosion~~ and finally, sea walls to prevent overtopping and flooding. Environmental Agency also adopted soft engineering as well such as flood ~~bank~~ banks to prevent flooding and sand dunes.

Second, they annually maintained all the things that had problems and monthly monitored ~~the~~ whether the ~~works~~ ^{works} were functioning properly. Not only their made ones, but Environmental Agency (EA) also checked privately invested ones to ensure that stretches of coastline were managed. They also recorded down all the faults that occurred so that they know ~~to~~ what to do when new ideas with new functioning works were to be produced.

The success of this protection was obvious. Firstly, the cost of maintenance in Hornsea for instance, one part of ~~area~~ coastal stretch which is protected, declined. In 1970s, the cost was £1.7 million. In 2000-2003, the cost fell to £70,000 which proved that the works ~~are~~ functioned more and more properly. Second, the managed frontages' ~~assessments~~ erosion rate was 0 which showed huge success. Finally, in South of Alwick, which are partially protected, their erosional rate fell to 1.75m per year.

However, the problems were that ^{when} ~~when~~ there is a huge natural disaster such as storm surges, it could bring up to 40,000 m³ of sands so deposition would boost up. Second, ~~the works~~ ^{the works} were ~~assessments~~ mostly still in 1970s design because it's hard to replace them ~~for~~ i.e., sea walls with new functions.

But, East Riding coastline protection project was relatively successful.

Another attempt made was in Tanzania, United Nations Environmental Programme, government and Integrated Coastal Management (ICM) decided to designate areas such as Tanga Islands to protect corals by reducing the ~~high-grade~~ erosional rate to make sure there is just enough sediments for corals to grow. They patrolled speed boats with water cannons and ~~not~~ in Chole Bay for instance, made sure no one goes there so there is not much erosion from human activities. Due to this, Tanga Island's coral cover rose to 32% which was very successful.

Therefore, both schemes/projects were very successful in terms of managing ~~safely~~ a stretch of coastline.

2

Examiner comment – grade E

(a) There is no account of wave generation and that of constructive and destructive waves is very outline in nature. The impact upon beaches is limited to the addition or removal of sediment.

(b) A case study is given of the East Riding coast with a rather imprecise description of coastal protection through the employment of hard and soft engineering methods. The effects of such methods were only partially described and there was little attempt to make any assessment of their success or sustainability.

Mark awarded = 11 out of 25

Question 5

Hazardous environments

Only one question may be answered from this topic.

5 Fig. 2 shows the distribution of areas affected by hurricane (tropical storm) activity.

(a) Describe and explain the distribution of areas at risk of hurricanes.

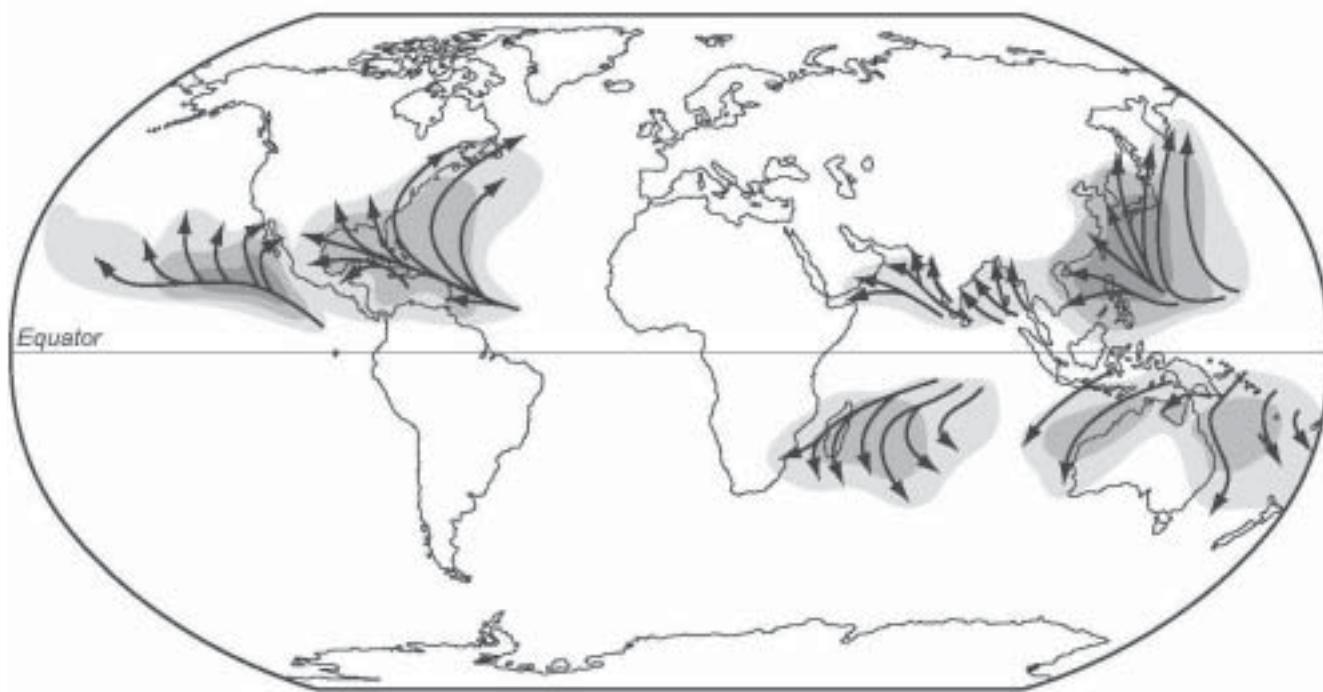
[10]

(b) To what extent is it possible to manage the hazards posed by hurricanes?

[15]

Fig. 2 for Question 5

Distribution of areas affected by hurricanes (tropical storms)



Key

0.1–0.9 per year

1.0–2.9 per year

3.0 and more per year

→ average tracks

Mark scheme

- (a) **Describe and explain the distribution of areas at risk of hurricanes.** [10]

Hurricanes are generally found in tropical and sub-tropical areas, mainly on the eastern side of continents. Not found within 5 degrees N & S of the equator due to coriolis effect. Highest frequencies occur off East Asia, the Caribbean and the Indian Oceans, plus eastern Pacific N of equator. Explanation should be in terms of the high sea temperatures generated in these areas supplying sufficient latent heat for the development of these large intense low pressure areas. Movement is predominantly east to west making low lying eastern coasts the most vulnerable.

- (b) **To what extent is it possible to manage the hazards posed by hurricanes?** [15]

The main hazards include high wind speeds, high tides, storm surges and flooding – these are summarised in the Saffir-Simpson scale and how they vary with different categories of hurricane strength.

There are a number of ways in which this could be tackled e.g. how individuals could respond pre-hurricane, during the hurricane and after the hurricane. Alternatively, it could be seen as what a government or planning authority might do. For example,

Government and disaster agencies are likely to be involved in **monitoring** the hurricane and **predicting** where it is likely to make landfall so as to provide warnings. On a longer-term basis they are likely to be involved in **land use planning**. This is designed to control land use so that the least critical facilities are placed in most vulnerable areas. Policies regarding future development may regulate land use and enforce building codes for areas vulnerable to the effects of tropical cyclones.

A master plan for **flood plain management** should be developed to protect critical assets from flash, riverine and coastal flooding.

Reducing Vulnerability of Structures and Infrastructures

- New buildings should be designed to be wind and water resistant. Design standards are usually contained in Building codes.
- Communication and utility lines should be located away from the coastal area or installed underground.
- Improvement of building sites by raising the ground level to protect against flood and storm surges.
- Protective river embankments, levées and coastal dikes should be regularly inspected for breaches and opportunities taken to plant mangroves to reduce breaking wave energy.
- Improved vegetation cover. This helps to reduce the impact of soil erosion and landslides and facilitates the absorption of rainfall to reduce flooding.

Level 3

Balanced account of a range of ways of managing the risk of hurricanes. Likely to include short-term and long-term measures. May recognise the differences between the individual's methods and governments. Support likely to be present. (12–15)

Level 2

A more generalised account of measures. Likely to be unbalanced with a greater focus on either individual or government role. Support less convincing. Description likely to be stronger than explanation. (7–11)

Level 3

Basic descriptive account lacking in detail or support. Partial account. Unbalanced. Descriptive. (0–6)

Example candidate response – grade A

5(a)

Those areas at risk of hurricanes are typically found between 5° - 30° north and south of the Equator, as shown in Fig. 2. The main reason for this is hurricanes are fueled by the release of latent heat energy from evaporation, and in order for this to occur, sea temperatures at the surface must be above 26°C , otherwise evaporation cannot take place. This is the reason that hurricanes are only rarely found further than 5° - 30° N/S of the Equator – because sea surface temperatures are too low either to lead to the formation of a hurricane, or to sustain one for a significant period of time if one does travel that far. Sea surface temperatures become cooler away from the Equator because the sun's rays become less concentrated and more diffuse, and so less solar radiation is absorbed.

The reason, then, that the diagram shows no areas on the Equator to be affected by hurricanes, is due to the Coriolis force / the curvature of the Earth means that it has no effect at the Equator, and so there are few atmospheric disturbances – a necessary prerequisite for hurricane formation, to give the winds the energy for circulation around the central eye. The diagram also shows that the average hurricane travels west from its point of origin – this is because of the impact of the NE Trade winds that occur around the sub-tropical highs where hurricanes typically form – this westerly movement means that

areas such as the west coasts of both Africa and South America are shown to be unaffected by 1 hurricanes. Of course, those areas that are most at risk are coastal regions, such as those bordering the Gulf of Mexico (which typically experience more than three per year).^{11/12} This is because hurricanes cannot ~~not~~ penetrate very far inland as they lose their supply of moisture.
 water supply of warm, rising air. ^{8/10}

5(b)

There are a number of hazards posed by 1 hurricanes, and various attempts to manage them have met with different levels of success. LEDCs, due to their relative economic and social disadvantages, are usually affected more than MEDCs because, ^{hazard} management is met with a number of problems. In India, the 1990s were a particularly bad decade for tropical storms, and one of the most devastating was Orissa OTB in 1996, taking over 20,000 lives and leaving millions homeless. Since that event, the Indian government has tried to find strategies for coping.^{13/14} Rural infrastructure is very limited, and only 30% of villages have a suitable evacuation road. By comparison, Hurricane Andrew, which hit the US state of Florida in 1992, caused billions of pounds in damage, but took just nine lives because the evacuation program had been ~~so~~ so successful.

The difference there was down to a matter of prediction - the USA has a large amount of

capital, and has spent money on building weather stations that can issue advance warnings of more than two days. Since Andrew, the US government has increased its funding of hurricane prediction, and has also helped to set up education in preparedness for those coastal regions most at risk.

However, while evacuation can help to save human life in MEDCs, property damage is a big problem. The main risk comes from flooding - storm surges combined with heavy rainfall can reach up to 2 km inland, and it isn't viable to restrict coastal development to that extent.^{so? 1}

The Indian government has introduced a number of building schemes for concrete shelters with raised foundations - these buildings may be structurally safer, but rural populations in LEDCs are often wary of top-down, government-controlled solutions, and this also poses a problem in terms of educating people about hurricanes. Prediction in LEDCs is often very unreliable or non-existent, and in coastal India, only 20% of the poor fishing population have a radio, so it is very difficult to alert people in times of danger. The low pressure associated with hurricanes can cause swells & a rise of 1m per hour - which can cause serious flooding on a localised scale.

In the Caribbean, following the devastation of Hurricane Mitch, regulations have been introduced to try to limit the risks. Deforestation had contributed to soil ~~wash~~^{erosion}

to increased soil erosion which led to mudslides, so the government introduced controls on logging. Crop dependency still poses a huge risk, as LEDCs rely on the export of primary products, so their export capabilities can be seriously affected by a hurricane leading to crop destruction. *11 Good*

Even in MEDCs, prediction can be very difficult, as hurricane tracks are highly erratic, and they can change direction very quickly. It is difficult to protect the track because we cannot measure atmospheric conditions within the hurricane itself. In MEDCs there can still be huge loss of life - as occurred in Hurricane Katrina when it hit New Orleans in 2005 - because of the difficulty of prediction, but organised evacuation programs can often prevent this. In LEDCs, where little access to capital means that both prediction and awareness of hurricanes are more limited, and population increase often means there is a lot of pressure on land, it is very difficult to manage hurricane hazards.

* sensible discussion using relevant examples; it displays knowledge of the hazards in places! 13. *12/15* (2)

Examiner comment – grade A

(a) A good understanding of the distribution of hurricanes that makes full use of the figure provided. The explanation of hurricane formation is adequate but does not discuss the vital role of latent heat.

(b) A good discussion of the different types of hazard that are consequent upon the passage of a hurricane. It employs effective examples. Some assessment is made of the types of response that have taken place.

Mark awarded = 20 out of 25

Example candidate response – grade C

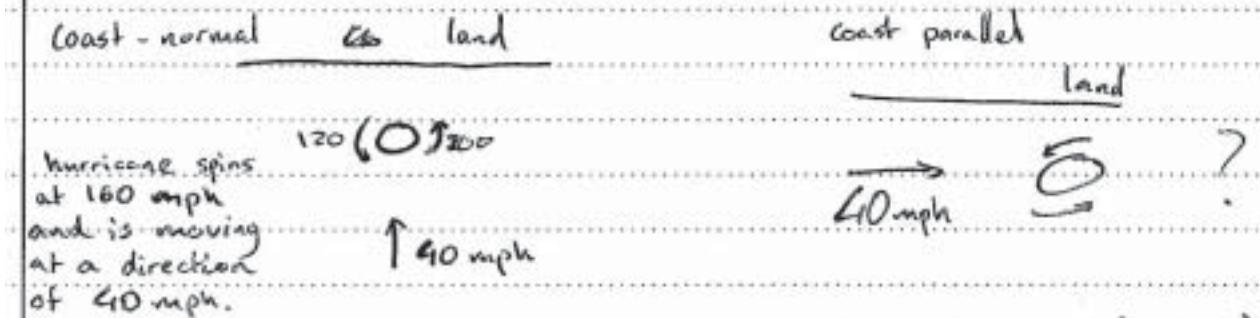
5.a) Hurricanes form on the west side of Oceans due to the coriolis force (the wind direction curving due to the earth's orbital motion). The formation is between 5° and 15° north and south of the equator, due to the fact that the coriolis force doesn't come into effect in the first 5° , and generally this is where the sea is warmest. Which leads on to the next point, that is, they have to form over a body of water. Because the air becomes saturated, it is warmed by the sea and therefore rises (in an anti-clockwise direction), causing it to become unstable. It has to maintain this warmth and moisture content to be effective in destruction.

Areas most at risk from hurricanes are therefore low-lying, coastal areas. As the hurricane sucks air up, it causes storm surges (relative sea level rise), meaning that coastal areas are most at risk when this occurs at the same time as spring or high tides. Therefore one would suggest that MEDCs would be more protected than LEDCs because they can afford to build expensive sea defences, such as levees. It is generally said that densely populated areas are also in the top band of risk (obviously those that are near the coast), due to the fact there are increased chances of informal, unstable housing. For the reasons above, Bangladesh is one of the most vulnerable places for hurricane damage in the world.

5.b) There are several factors determining the extent to which it is possible to effectively manage hazards posed by hurricanes. It can extend if depends are on the attitude taken, whether whether you have a acceptance - deterministic view, which means that nature/environment is in control. OR whether you share a adaptation - dominance view, supporting the fact it is possible to mitigate against hazards.

Some think that the hurricane damage can directly be linked to the economic wealth of the country involved. This is true considering MEDCs, such as America, can build levees to deal with the sea level rise, and build life-safe buildings that can withstand high winds. As well as having aid available to repair, and well train emergency services. All of which could be said that LEDCs don't have up to standard (maybe due to other economic priorities). However this was not the case when Hurricane Katrina hit New Orleans on the 29th August 2005. Storm surges breached the levees comfortably and funnelled up the canals in the inner city, causing wide spread flooding. 1,800 people died, and thousands were made homeless. Survivors rushed to the Super Dome Stadium, which was one of the few areas higher, so it hadn't been flooded. America is an extremely wealthy country, but yet response was slow. There was a lack of food and water which lead to violence and looting. Illness spread and there were no doctors to treat it. The health service worked on insurance, which not many people had, considering 1/3 of the people were under the poverty line. Many blame the government for ~~predilection~~ prejudice as it was claimed they thought New Orleans was of lesser economic value. Of course the hazards

posed by a hurricane can depend ~~a lot~~ on its characteristics. In this case, it was a coast-normal hurricane (not a coast parallel), meaning the effects were worse (as explained below).



So the 40 mph speeds up the right hand side ($120 + 40$), but works against the left hand side ($120 - 40$). This means there will be more damage in the area hit by 200 mph winds. Whereas in a coast ~~normal~~^{parallel} hurricane, the coastal settlements will only suffer 120 mph winds.

Hurricanes ~~are~~ are easy to predict, because of satellite images. Obviously there is nothing that can be done to prevent them. So residents in a potential area of threat can be warned and evacuated. However the nature of hurricanes means that they can change direction quickly, so one can never be sure exactly where they are going to hit. Warning people is one of the few ways to decrease / mitigate against hurricane disaster. Educating of emergency procedures also helps to reduce the impact. An ~~evacuate~~ and ~~down to~~ address

Examiner comment – grade C

(a) Deals with the general conditions required for the formation of hurricanes but does not relate these to the distribution shown on the figure provided which is largely ignored.

(b) Hurricane Katrina is used as an example to illustrate the impact of a hurricane but there is little attempt to address the problems of hazard management. The account is largely of the effects of the passage of Katrina.

Mark awarded = 14 out of 25

Example candidate response – grade E

5

(a) The distribution of hurricanes are relatively spread out across the earth with tropical storms being formed across central America, Australasia as well as in South-east Asia. Although widely distributed, tropical storms are found at the tropics, both north and south of the equator. This is because, tropical air is humid and unstable in nature, which are the main characteristics required in terms of atmospheric disturbances, for hurricanes to develop. The location of all tropical storms being found over tropical waters is crucial to their development as tropical sea waters ranging from ~~22°C~~ 26°C - 29°C are required as the rising moisture from the sea water contributes to their development in terms of providing the moisture needed to supply energy to the storm through the later release of latent heat, through convection.

By author is form of disturbance of
Hurricane No. 10

(b) Hurricanes (tropical storms) are formed at the inter-tropical convergence zone (ITCZ) within the tropics, the region of where the majority of atmospheric disturbances are found. Certain climatic conditions are necessary for the formation of a tropical storm such as high levels of moisture, low pressure and warm

sea waters. For example, tropical storms forming off the west coast of Africa will make use of the southern Atlantic Ocean in terms of a source to provide the moisture, through evaporation, to drive the storm. The hazards posed by hurricanes consist of heavy rainfall, storm surges and strong winds.

Heavy rainfall is a hurricane hazard that poses secondary hazards which include the potential of flooding and landslides. In order to manage the rainfall hazard, hard-resistant design can be used in low-lying hazardous areas in order to prevent flooding. For example, during Hurricane Katrina in 2005, the city of ~~New Orleans~~ New Orleans was safe-guarded by flood barrier walls. These barriers were used to control the areas of flooding by preventing water from flowing inland, thus minimising the potential direct hazards such as injury or property damage. This method of management is generally successful in most circumstances, however a significant build up of water behind these barrier walls may result in the structure collapsing due to the increased stresses from the accumulation of water.

In terms of dealing with storm surges, specified development plans for land-use can be implemented so that no housing or other constructions are developed in storm surge prone areas. For example, in

Bangladesh, local storm management agencies use land-use planning in order to identify areas at risk as Bangladesh is a country under threat from potential hurricanes due to the fact that it's a low-lying area. Land-use planning has been one of the most successful tropical storm management methods globally.

Finally, the management of strong winds can be achieved through the use of strict building codes and hard engineering such as the use of window support structures to prevent structural damage to buildings. In Manila, widespread attempts have been made to implement building codes in order to minimise damages to people, property and the environment from tropical storms.

Overall, techniques have been developed in order to minimise the effects of the hazards induced by storms with most methods working successfully to some extent.

Examiner comment – grade E

(a) Little use is made of Fig. 2 with only the vaguest of descriptions of the distribution shown (e.g. 'the tropics'). There is a limited appreciation of the general conditions required for hurricane formation.

(b) Hazards associated with hurricanes are described in a generalised and rather unspecific manner. Attempts to limit the impact of these hazards are described only in terms of engineering methods. No account is given of the success of these methods, nor is there any discussion of attempts at hazard management.

Mark awarded = 11 out of 25

Question 5

Hazardous environments

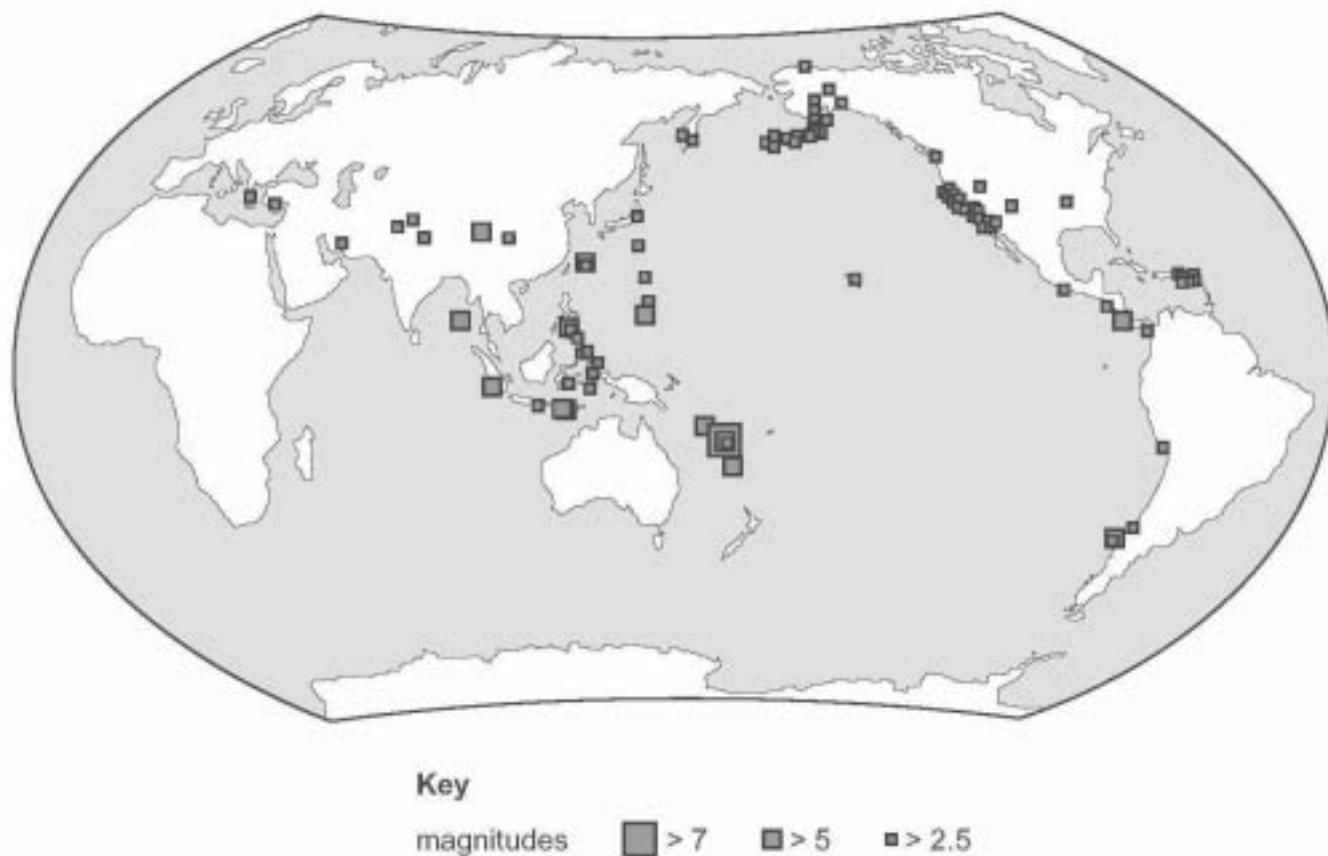
Only one question may be answered from this topic.

5 Fig. 3 shows the location and magnitude of earthquakes in one week in June 2010.

- (a) Use Fig. 3 to describe the world distribution of earthquakes in June 2010. Explain how an earthquake may have been generated at one of the areas shown. [10]
- (b) Describe the types of hazard created by volcanic eruptions. What measures can be taken to reduce the hazardous effects of volcanic eruptions and how effective are they? [15]

Fig. 3 for Question 5

Location and magnitude of earthquakes



Mark scheme

- (a) Fig. 3 shows the location and magnitude of earthquakes in one week in June 2010.

Use Fig. 3 to describe the world distribution of earthquakes in June 2010. Explain how an earthquake may have been generated at one of the areas shown. [10]

Distribution: principally the Pacific ring of fire, a line through the Caribbean, one along the eastern Indian ocean and a few scattered others. Explanation of one occurrence: probably the San Andreas (credit accurate detail) or the more usual convergent plates with subduction, as along the west coast of South America. Allow divergent plates from any located in mid-oceans even though they may not be diverging in practice!

- (b) Describe the types of hazard created by volcanic eruptions. What measures can be taken to reduce the impact of such hazards and how effective are they? [15]

Types of hazard: balance quantity against accuracy of description. Expect three types for full credit from pyroclastic flow (nuées ardentes), lava flows, mudflows, pyroclastic and ash fall out, gas clouds. Also allow effect on local weather and world climate.

Measures to reduce impact and effectiveness: prediction with evacuation, diverting / bombing lava flows, building construction plus the list of 'education, first aid support, infrastructure with effectiveness linked to LEDCs v MEDCs, and so on.

Level 3

Well balanced answers with relevant detail backed up with examples. An understanding of the degree of hazard posed by different types of eruption and their products. Precision and detail in the measures taken to reduce the impacts with their effectiveness well addressed.
(12–15)

Level 2

Coverage of the demands of the question but lacking accurate detail in some areas and limited use of examples. Description of types of hazard more likely to be well answered than measures to reduce their effects.
(7–11)

Level 1

Weak detail/precision in describing the hazardous effects of types of eruption and coverage limited. Inappropriate, or lack of, examples. Lacking accurate detail of measures to reduce the impact of the hazards and very limited or no evaluation of their effectiveness.
(0–6)

Example candidate response – grade A

5. a)

In June 2010, as expected, earthquakes generally occur around the ~~Pacific~~ Pacific Ring of Fire where continental plates and oceanic plates meet and ~~sides~~ subduction of the oceanic plate occurs. The earthquakes tend to occur in clusters, on the South of Alaska, the West coast of the US, around Indonesia, to the right of Australia. This indicates that earthquake ~~activity~~ activity occurs at the plate boundaries where pressure is currently released.

An earthquake occurs, ~~at~~ such as at the West coast of South America, around Indonesia, and Japan, through release of pressure of subduction zones. Oceanic plates meet continental plates at destructive plate boundaries. Oceanic plates are heavier and sink subducts under the continental plate. Pressure is generated and stored in this subduction zone when the downward movement of the oceanic plate becomes stuck, causing a build up and accumulation of kinetic energy. When plate movement occurs again part of that energy is released in the form of earthquakes, the oceanic plate becoming unstuck and a thrusting, pushing movement of the plate can occur, creating an earthquake which travels in waves from the subduction zone.

5.b) Volcanic eruptions create many types of hazards. Pyroclastic flow is one of the main causes of destruction, and flows down the slope of the volcano at high temperature and speed. This flow of rock material, ashes and gases, are deadly to life and can also destroy agricultural land and settlements. When mixed with rain ~~fall~~ such as from a typhoon in Mt Pinatubo case in 1991, pyroclastic flow can turn into a lahar which can engulf a town in high temperature muddy materials.

Lava flow is slow and can be outrun by humans generally, but their high temperature causes buildings to catch fire and burn, become destroyed. Because the flow is of such high temperature little can be done to save immovable assets such as houses from being destroyed by lava flows. A good example of this is the lava flows of the volcanoes of the Hawaiian Islands where lava viscosity is high therefore flow rate is low, ~~but~~ not a threat to human life, but immobile properties cannot be saved.

When lava flows into the sea it also turns into pillow lava. This is of no significant threat to humans as pillow lava will travel under water and hardly comes into contact with humans.

5.b)

continued

Ash clouds and plumes, as well as rock material released into the air can be very hazardous. Lava bombs and rocks can land on people or properties and kill or damage extensively. Ash ~~about~~ hot ash when breathed in also damages the respiratory system and cause death. Ash clouds, and volcanic materials released into the air, gases, can also disrupt weather patterns and alter global temperature, such as Mt. Pinatubo's eruption in 1991 which caused crops in the area around the Philippines to fail, and global temperature is affected by gases released.

Little can be done in terms of actually reducing the hazard of volcanic eruptions. The scale of size and temperature of erupted materials is beyond what scientific tools can effectively minimize. However, since volcanoes give early warning signs in the form of tremors, small eruptions, and release of sulfur gases, hazardous damage to life and resources can be reduced by effective evacuation plans. This is ~~effectively~~ implemented in volcano-prone cities of Japan, where evacuation and early warning systems have to be put in place to reduce damage to lives and assets. Still, there are always things left behind that cannot be saved, such as houses and other immobile assets, which cannot withstand violent eruptions.

advancement

Because of effective scientific advancement in reading volcanic warning signs in sulfur gas levels, magnetic field levels, seismic activity and aerial photography & to detect swelling from accumulated magma in developed countries human life is generally not at much risk when evacuation can be implemented in time, compared to earthquake hazards which are much more difficult to predict. Still, the temperature changes, climatic alterations ~~tsunamis~~ tsunamis from pyroclastic material falling into the sea, lava flows, and other volcanic hazards cannot be prevented or disrupted, and the only way to reduce damage to resources from these hazards is to move the resources away from the hazards before they occur.

Another hazard caused by volcanic eruption is a tsunami caused by rock materials such as pyroclastic flow or a destroyed side of volcano falls into the sea and displacement of water occurs to create a tsunami. An example of this is the eruption of Krakatoa in the late 19th century.

Examiner comment – grade A

- (a)** A limited description of the distribution of earthquakes shown on Fig.3, but one that does attempt to organise the groupings of earthquakes into a pattern that fits with associated plate boundaries. Earthquakes consequent upon subduction are briefly explained.
- (b)** A good coverage of the types of hazardous materials that result from volcanic eruptions. Types of response to these hazards are discussed in the context of the importance of prediction and evacuation with good assessment of the limitations imposed upon human attempts at limiting the hazardous impacts.

Mark awarded = 19 out of 25

Example candidate response – grade C

(a) Fig 3 shows that recent earthquakes of June 2010 seem to be concentrated in clusters of activity along the edges of continents or continental plate boundaries. Smaller magnitude earthquakes of 2.5 or more are the most common, particularly in the areas of the Caribbean islands, the west coast of the United States, the Aleutian Islands and the ~~the~~ Phillipine and South-east Asian islands. Anomalies to this general correlation include the two earthquakes in central China that do not seem to be along any known major fault line as well as a minor earthquake in Turkey of less than magnitude 2.5 or over. The largest earthquake of Magnitude 7 or more ¹⁹⁵⁷ occurred in the south pacific ocean north of New Zealand. The smaller surrounding earthquake readings are likely to be after shocks of this large earthquake. An earthquake may have generated at one off the areas shown in any of three ways owing to the different types of plate margins in the world. At a conservative plate margin such as the ~~south~~ San Andreas fault where two plates slide laterally past each other, tension builds up due to friction between the two moving plates. The release of this tension causes an earthquake. On a constructive margin, fewer powerful earthquakes occur as there is ~~less~~ less friction than other margins because the plates are moving away from each other. Destructive margins create the most powerful and violent earthquakes as they generate the most tension because one plate is being forced under another plate. This process is called subduction and it creates and releases large amounts of tension creating earthquakes. An example of a ~~fault~~ destructive margin is the Pacific and South American plate.

b) Volcanic eruptions create many hazards such as Mud flows, pyroclastic flows and lava flows as well as emitting vast quantities of poisonous gas such as carbon monoxide and sulphur dioxide. On May 18 1980, Mt. St Helens erupted ~~violently~~ violently causing mud flows and pyroclastic flows. The pyroclastic flows extended 8 kilometres north travelling at 80 kilometres per hour and killing 57 people. Hazards caused by the mud flows included the clogging of lakes and rivers. The Columbia river depth was reduced by 8 metres causing 31 ships to be stranded. 2.4 kilometres of railway and almost 300 kilometres of road was destroyed by the mud flows. Pyroclastic flows destroyed over 200 homes.

However, Mt. St. Helens was a predicted eruption and although the northern pointed blast was not anticipated, many precautions were taken to reduce the eruptions hazardous effects. By May 18 all residents within a 5 mile radius were evacuated and logging work stopped. Train services and vehicles were not permitted into the area and so human casualties were minimized. The cause of the 57 deaths was due to people ignoring warnings as well as the fact that the northward blast breached its estimated range and destroyed houses roughly 8 kilometres directly north of the volcano.

As for property, there is little that can be done to preserve buildings and trees from a volcano blast zone and as a result, 9.4 million cubic metres of lumber was destroyed by the volcano blast.

Studies show that the northerly blast of Mt. St. Helens could have been predicted due to the significantly visible bulge that was growing on the north side of the volcano ~~not~~ prior to the eruption as well as the ~~longer~~ known history of Mt. St Helens' tendency to erupt laterally north instead of vertical. This means that although few lives were lost comparatively owing to the size of the eruption, but more lives could have been saved had scientists predicted the nature and direction of the eruption. So, prediction and evacuation are the main methods of reducing the hazardous effects of volcanoes and if accurately predicted, they can ~~and~~ greatly reduce the death toll of a volcanic event. However, ~~for~~ there is little that can be done to reduce the hazardous impact of volcanic eruptions ~~on~~ on property such as houses and trees as has been seen ~~in~~ in the case of Mt. St. Helens.

Examiner comment – grade C

(a) A good opening account of the distribution of earthquakes, that makes effective use of Fig. 3. The generation of earthquakes is simplistic and less well accomplished.

(b) The answer concentrates upon the eruption of Mt St Helens, but unfortunately does not adapt this case study to the demands of the question. Thus the types of hazardous materials are not detailed nor are the efforts to reduce their hazardous effects. This illustrates the importance of applying case studies to the demands of the question.

Mark awarded = 14 out of 25

Example candidate response – grade E

⑤ Fig 3 shows a spread distribution of the earthquakes happening in June 2010. We can appreciate that those of higher magnitudes were registered in the centre of the map. There are some points where earthquakes seem to be frequent but not so severe such as the north ^{west} of North America and mid-west of it. In Europe most of the earthquakes are concentrated in the south part of the continent and there are fewer than in the rest of the world. Important to mention, that there's an absence of earthquakes in the South American Plate, ~~and~~ Australia, Arabia ^{and} north of Europe. An earthquake happening in, for example, the Philippines might have its explanation on the sliding of the Euro-Asian plate moving towards the Philippines? plate and ~~pushing~~ ^{pressing} it at the point where they meet a sudden ^{release} ~~explosion~~ of energy resulting in a not very severe earthquake due to the zone of constructive margin we find this place? Another possibility, is the release of pressure as a result of the Euro-Asian plate sliding on top of the Philippines plate.

V. Limited

✓ 5
10

⑥ There are different types of hazard resulting from a volcanic eruption. Expulsion of great amounts of ash and smoke into the atmosphere is probably one of the most worrying ones as its effects can be devastating. For example, in Mt Pinatubo's eruption, there was a layer of ash after the eruption of 50 cm thick in places surrounding the volcano and up to 10cm thick in places even in a radius of ~~detonation~~ ^{detected} 50km. As a result, lots of buildings collapsed, cars broke and fields were ~~damaged~~ ^{destroyed}. The second hazard is related to ash also, as sometimes the heat that the volcanoes produce when they erupt, (eruptes) produces torrential rains that make the ash ^{still} contained in the air fall in form of thick mud drops that also contribute to the damage produced in lands (crops destroyed and cattle badly injured/affected), roads (as they can't

cope with some much weight) and buildings collapsing.

A third hazard resulting from this one is the mudflows when all this mud has fallen to the soil, flows of mud sweep away every single thing they ~~swept~~^{meet} in the way. As a consequence, houses are swept away (as well as cattle), people drown or suffocated and the instability created could even cause mass movements in mountains.

A different type of mud-flow called Lahars can also take place after a volcanic eruption happens. All the ash deposited in land, can be swept away after ~~more~~^{heavy} precipitation takes place. In difference with the mudflows, Lahars take place when all the ash has been deposited on the land and then there's been rain, but it is not formed as the precipitation falls, mixing itself in the way with the ash. *

Lots of different measures have been taken and have been thought to be taking. However, not all of them are effective, as the magnitude of a volcanic eruption, as well as the exact moment in which it takes place, are very difficult to determinate.

Prediction can be the best way of reducing the effect of a such a hazardous event and an important decrease in loss of life.

Use of seismographs to detect ^{little} earthquakes that could hint a ~~an~~ eruption are a way to protect a place from the effects.

Studies on the regularity of these events will also be really helpful to prevent more serious effects. For example, ~~in~~ in Italy, the effects of one of the most and important and damaging eruption could ~~had~~ been reduced dramatically, if people hadn't had forgotten them even though the volcano had been inactive for ~~over~~ a century; it didn't mean that they should not monitor any anomalies in it.

Observing water levels, gaseous ^{temperature} expansion, and sometimes even animal behaviour can also anticipate the hazardous event.

These are measures are very important and effective, but they are predictive measures after all, so building houses away from the bedges of volcanoes, in education for population and good plans

evacuation could help definitely in ~~the~~ reducing the effect.

* Changes in climate (~~soil~~) and land~~soil~~ could also be called hazard as they change dramatically after volcanic eruption. Climates might get warmer and drier and the land~~soil~~ might become more fertile, but also ~~falling~~ trees and vegetation would have to be re-planted and might take decades to reforest the damaged areas (deforestation).

Examiner comment – grade E

(a) A general description of earthquake distribution without any indication of scale or any indication of what might underpin the distribution. A very garbled account of earthquake generation.

(b) A disorganised descriptions of volcanic hazards that centre on volcanic ash and lahars. Pyroclastic flows and lava are not developed. Whilst the importance of prediction is recognised that means of achieving it or of the actions taken are not developed or explained.

Mark awarded = 11 out of 25

Question 8

8 (a) Describe how plants are adapted to drought conditions in hot deserts. [10]

(b) What are the main sources of water in hot deserts? How might these influence sustainable development in these areas? [15]

Mark scheme

8 (a) **Describe how plants are adapted to drought conditions in hot deserts.** [10]

To survive, desert plants have adapted to the extremes of heat and aridity by using both physical and behavioural mechanisms.

Xerophytes (adapted for aridity), such as cacti, usually have special means of storing and conserving water. They have few or no leaves, to reduce transpiration, shallow root systems, ability to store water in their stems, spines for shade and waxy skin. Phreatophytes grow extremely long roots, allowing them to acquire moisture at or near the water table. The creosote bush is one of the most successful of all desert species because it uses a combination of many adaptations. Instead of thorns, it relies for protection on a smell and taste which wildlife don't like. It has tiny leaves that close their stomata (pores) during the day to avoid water loss and open them at night to absorb moisture.

Other desert plants, using behavioural adaptations, appear during seasons of greatest moisture and/or coolest temperatures. These are usually perennials, plants that live for several years, and annuals, plants that live for only a season. Perennials often survive by remaining dormant during dry periods of the year, then springing to life when water becomes available. Most annual desert plants germinate only after heavy seasonal rain, and complete their cycle in a matter of weeks.

Deserts are actually diverse environments and comprise of a multitude of micro-climates changing from year to year. Desert plants must respond quickly when heat, moisture and light levels are suitable.

- (b) What are the main sources of water in hot deserts? How might these influence sustainable development in these areas? [15]

The seasons are generally warm throughout the year and very hot in the summer. The winters usually bring little rainfall. Rainfall is very low and/or concentrated in short bursts between long rainless periods and falls in the form of sudden, violent thunderstorms. Evaporation rates regularly exceed rainfall rates.

There may be several storms in a year, or none for several years; average rainfall is, therefore, deceptive. Deserts receive runoff from ephemeral, or short-lived, streams fed by rain and snow from adjacent highlands.

A few deserts are crossed by 'exotic' rivers (such as the Nile, the Colorado, and the Yellow Rivers) that derive their water from outside the desert. Such rivers infiltrate soils and evaporate large amounts of water on their journeys through the deserts.

Aquifers underlie many deserts with water passing through permeable strata from areas outside of the arid zone or they may contain water from when the current arid areas were much wetter. The limited amount of water from rainfall received by a desert is eventually either lost by evaporation, or percolates through loose sediments and permeable layers below the surface of the earth giving rise to groundwater. Deserts may also have underground springs, rivers, or reservoirs that lie close to the surface, or deep underground (oases).

Dew and fog may play an important role, especially where dew fall exceeds rainfall during periods of drought – e.g. Namib Desert.

Sustainability needs to be addressed in terms of water usage to sustain agriculture and life such that the use of water does not exceed the supply, though this may well be happening with ancient aquifers. Dams upstream of deserts may reduce flow of water (Colorado) and so make agriculture unsustainable. On the other hand the Aswan dam provides water to irrigate the desert. Some discussion of salinisation would be expected of good candidates

Level 3

A good appreciation that desert water supply is not just reliant on infrequent rainfall, but that ephemeral streams, exotic rivers, aquifers and dew are important. Relates water availability to sustainable use without damaging supply or environmental degradation (salinisation etc.).

(12–15)

Level 2

Will be an awareness that rain rarely falls in deserts and if it does, it usually falls in the form of sudden, violent thunderstorms. Some appreciation of other sources. Limited relationship between water supply and sustainability.

(7–11)

Level 1

A simple account focusing on lack of water supply in hot deserts. Emphasis will be on lack of rainfall and a simple definition of deserts. Little, if any, idea of sustainability.

(0–6)

Example candidate response – grade A

8 a) Plants are adapted to drought conditions in hot deserts through means of ways. As desert areas have extreme climate, as lack of rainfall the nature of the soil makes it even more difficult for plants to grow.

Soil in hot desert areas lack in humus they also lack in biomass which shows that there are very little nutrients in the soil. There are lots of organic material as well. They have shallow regolith which shows the thin surface layer of the soil above the rock. They have very low water table which is not an ideal condition for plants to grow. Usually capillary action occurs which creates salt, saline condition. Also soils are alkaline. Water are not found through the tight porosity but the soil colour and the natural can show the parent material e.g. erosion and mechanical weathering of resistant rocks.

Due to these reasons and the high temperature and lack of water plants have adapted to this condition.

Firstly, ephemeral plants are ones which are adapted through growing and actively forming during the episodic rainfall, shown which are especially short period of rain in hot desert areas. This plant can have a short life span. They germinate during the rainfall and the germinated seeds will not grow until the next rain comes.

Secondly, drought xerophytes are plants which have developed to adapt drought conditions. These are

two types of Xerophytes, succulents and phanerophytes. Succulents are plants that have adapted through their stomata being closed to reduce ~~exp~~ transpiration from their leaves. Also they store moisture in their stems and leaves because examples of a succulent plant are cacti. Cacti also have adapted by having sharp hairs to prevent losing water to animals. Phanerophytes are plants which have adapt adapted by having long root systems to reach into the soil low water table. The roots will be long to reach and find the small amount of water available to them.

The final type of plants are halophytes. These are plants that have adapted to saline conditions. This is important as desert areas are quite often often very saline.

The adaptation of plants will also depend on the different deserts as climate and factors affecting the desert and creating the climate will differ. The plants will have to adapt the extreme temperatures and lack of rainfall but also to the individual characteristics of deserts.

- b) Water sources in hot desert areas are extremely rare. Rainfall does not occur very often and it is not frequent. Topographic rainfall are unpredictable and are unreliable in some ways as a sole source. However the few types of water sources will be the few waterfalls, oasis and rivers/streams e.g. Nil river. sustainable development in this region are extremely difficult and the water sources available might not lead to to a sustainable management in all cases. In which case sustainable development is especially important in semi-arid regions to avoid further degradation of desertification and to keep the land to be land healthy. There are many ways to ~~be~~ for sustainable management.
- Firstly managed and control grazing and cultivation is important. In many cases the sustainable development in desert areas are important in control with grazing population of grazing and cultivation must be done through through control planning to not exceed carrying capacity. If there are done over carrying capacity then it will destroy the water of the soil vegetation and will completely change the land. Also it also will lead to mis management of the water resources. It can lead to erosion and degradation which is not sustainable development. Also different methods of grazing crops can be introduced.
- Secondly, labour availability can be one key factor for sustainable development of course water is key to the plants need water to grow. Hence if there is less labour it may lead to increase in transpiration.

and infiltration which can build up the water table and even because of the vegetation evaporation from the ground can be reduced.

Finally education is important. Educating people of the use of water reuse and growing more planting trees and most importantly the use reuse if good it can bring if sustainable development does not occur.

Irrigation in many cases have lead to sustainable development. Through more water being available it has helped with sustainable development. The two main ways of irrigation is through extracting water from the water table and channeling. In Egypt they built the dam along the river Nile which helped them with sustainable development. It gives positive outcomes and contributes to sustainable development - with the increased in water supply more agriculture can be done.

However it being case irrigation does not contribute to sustainable development and the lack of water makes it even difficult for this to occur. Irrigation is artificially increasing water supply. With this loss it affects the natural ecosystem and also can give a heavy impact on flora and fauna. Animals and plants will die due to the lack of water and in the short term it might be seen to be bringing with positive but it will be over long term to a negative impact. Also because of lack of rainfall it's extracting water through irrigation can not last.

Long...

The lack of water does make it difficult for sustainable development in desert areas. It is difficult to do anything without much or very little water since the location of the fixed areas such as roads make it difficult to source from sources of water. The lack of water will lead to drought conditions and as it is difficult to grow crops or animals. Sustainable management should be aimed at semi-arid regions in order to stop the spread of desertification and to avoid more areas being exposed and become hot deserts.

The methods of sustainable development should be changed instead of concentrating on trying to conserve scarce like rare vegetation, afforestation and education. Eco-tourism and developing national parks will contribute as it will also avoid human activities in already looking in semi-arid regions. Industrially developed areas are extremely difficult and with the lack of water scarce source it makes it even more difficult. Using irrigation due to the lack of water scarce will not contribute to sustainable development and so should be avoided when deciding as it can lead to a further negative impact on the area in the long run.

Combination of methods should be used for sustainable development and to ones which can be well placed and arranged and will bring positive outcomes not as methods that might improve the situation but further destroying as that is not sustainable development. Areas must be kept and not destroyed for future generations as well as current generations.

Examiner comment – grade A

- (a) Plant adaptations in deserts are set within the context of both climatic aridity and soil conditions. The various types of plant adaption are categorised into those consequent upon episodic rainfall (phreatophytic), aridity (xerophytic) and soil conditions (halophytic). The answer could have been improved with a little more explanation.

(b) Water sources are described very briefly and without elaboration. The main part of the answer concerns the sustainability of various generic types of arid area development such as grazing and irrigation. Whilst the limitations upon development of water supply are touched upon they are not developed and the answer could have been considerably improved by exemplification.

Mark awarded = 18 out of 25

Example candidate response – grade C

Q8a) Drought conditions are characteristic of arid and semi-arid areas where rainfall is variable and summer temperature can go as high as 45°C such as in the Sahara desert.

This environmental stress leads to specific adaptations by the plants for their survival. These plants are mainly xerophytes. Cactus for example has thick stem and leaves which allow storage of water to take place. This is further aided by the presence of spines that check excessive water loss through evapotranspiration as a result of the high temperature.

Other plants such as maize keep their enzymes protected by moving them away from the cell surface. These are C₄ plants and prevent photodissipation of their energy source.

Another adaptation is the development of deep root systems that can penetrate deeper below the soil surface to reach the

ground water. Tonic chemicals are used to kill competitor plant roots to ensure that these drought resistant plants can meet their photosynthetic raw material requirement.

There is also a substantial reduction in the surface area of the leaf to prevent the ~~the~~ high rate of water loss due to high heat intensity.

The presence of sun knot stomata also minimizes the loss of water and the presence of minute hair around stomata to reduce the diffusion gradient by maintaining humidity because vegetation is sparse in hot deserts and there is no barrier to winds which are dry, hot and tend to increase the rate of water loss from the plants.

(b) Sustainable development occurs when the needs of the present generation are met without sacrificing the needs of the future generations.

In deserts the water table is a source of water but it is not reliable since the volume of water is low. So, basically irrigation via diversion canals from rivers, dams are the sources of water in hot deserts. For example, Egypt is a vast expanse of desert. The only way it gets its water is through the Nile River. The Aswan and the Aswan High Dam have been providing the water supply to Egypt. This has

allowed agricultural production to take place via diversion canals.

Where the land was previously infertile it has been recovered by the use of water from the dam. This allows sustainable development to take place.

On the other hand deserts such as the Gobi desert in Mongolia rely on the minimal amount of rainfall that takes place, this is insufficient to meet the needs of the present generation.

The Sub-Saharan Africa, especially the Sahel have suffered due to this lack of water supply. In arid-based countries such as Africa, lack of reliable sources of water supply further causes the removal of organic matter from the desert soil, sandy soil is poor in holding water and tends to dry up quickly. The high rate of evaporation in hot deserts does not leave enough water in the soil surface to be used for sustainable development.

However, it also depends on the state of the economy for example the USA through extensive irrigation managed to reclaim Arizona which was a desert.

Therefore, reliable sources together with financial resources allow for sustainable development to take place, where these are lacking the degradation of the environment is widespread.

Examiner comment – grade C

(a) A very disorganised account of plant adaptations that described xerophytic plants and others that were not identified but appeared to refer to phreatophytes. There was little explanation of the adaptations.

(b) The answer described the lack of water that occurs in desert areas rather than the sources of water that do occur. There was some limited attempt to assess how the lack of water might inhibit sustainable development.

Mark awarded = 14 out of 25

Example candidate response – grade E

Under drought conditions, there are ~~five~~ four fire ways for plants to adapt the condition.

First of all, plants in hot desert can use deep root to extract water underground, these kinds of plants are called phreatophytes. Due to capillary action, water table in hot deserts usually ~~is~~ ~~the~~ is high, these plants can use deep root to ~~not~~ direct extract water from water table.

Moreover, plants in hot desert, ~~that~~ their stem & leafs are adapted to reduce water loss. These leafs usually are needle shape in order to reduce water loss. These kinds of plants are called xerophytes. These plants usually have a thick wall which can reduce evaporation of water from the surface.

In fact, plants in hot desert have a water storage system in trunk such as cacti, baobab and so on. When there is flash flood or they absorb underground water, they will store most of the water in the trunk. When they suffer serious drought, plants can use these storage. They are drought-resistant.

Furthermore, ~~drought~~ seeds of these drought-resistant plants can extend its growing period. It can dormant to stay at a location, when there is flash flood or it is near to the water-table, it will bloom immediately and grow up, they will fully utilise moist in the air. After they spread new seeds, they will die. However, the next generation will can dormant a to stay ~~near~~ at a specific location and wait for next flash flood.

Finally, these kind of plants are salt-resistant. Due to strong evaporation in hot desert, there will be a salt crust on the surface. Some plants, however, have a filter in their organism. When they absorb water on the ground, they will filter these salt on the surface.

b) There are two main sources of water in hot desert. They are underground water and flash flood respectively. Due to capillary action, there will be a pressure on in the soil which will results in high rise of water table. These underground water may come from thousands of kilometres from the mountain.

Sometimes, there will be flash flood in the hot deserts. In hot desert, flash flood usually comes from sudden rainfall at a particular region, they comes fast but they also vanish immediately. Due to strong evaporation, they will soon disappear.

However, these two main sources of water provide ~~water resources~~ for shifting cultivation, tourist spots and factories in the hot desert. It can maintain a balance between economic, social ~~and environmental~~ development. High rise of water table sometimes will appear on the surface of hot desert. Due to abundant supply of water, there will be lots of

plantations at the spot. These are called green island. Farmer can practice shifting cultivation in these different ~~the~~ places of green island. In Sahel, farmer will practice shifting cultivation since there is abundant nutrients of soil. After they practice in a place for certain years, they will move to another green island. This is one of the sustainable development in Sahel. They will also practice grazing like donkeys, sheep and so on. It can protect local culture in the region.

Also, these green island is one of the major tourist spots in Northern Africa, they provide station or place for tourists to take rest and it can stimulate tourist development in Northern Africa like Nigeria, Egypt and so on. These green island is also a kind of famous spot for tourists. It can promote ~~eco-tourism~~ eco-tours in the region and promote sustainable development. It can enhance awareness about environmental protection.

L.L. sustainability

In fact, there are abundant spaces in hot desert. We can build factories or production which require security and large spaces like defense industry or car-making industry. In Central America, there are lots of many military industry or car-making industries located at the desert in Central America, they provide job opportunities and fully utilise the area. Space Station in America also settle at desert, it can stimulate economic development. They usually locate at the desert in which ~~Hence~~ they can extract water for human.

Hence, these main sources of water help to maintain sustainable development in the region.

Examiner comment – grade E

(a) A competent description of some desert plant adaptations including xerophytic, phreatophytic and halophytic. Explanation is very limited and there is no exemplification.

(b) Two water sources are identified – floods and underground supplies. Neither are explained or developed. Water supplies are linked to the rather inappropriate examples of shifting agriculture, tourism and factories. Green island agriculture in the Sahel could have been developed but appears only as an afterthought and even here there is no indication of the problems of water supply.

Mark awarded = 10 out of 25

Question 8

- 8 (a) Outline the possible causes and consequences of desertification. [10]
- (b) Using examples, assess the extent to which it is possible to manage an arid or semi-arid environment. [15]

Mark scheme

- (a) Outline the possible causes and consequences of desertification. [10]

There are many potential causes of desertification. Some are natural – such as long-term climate change and prolonged drought – but there are many that are human-related. These include the sedentarisation of nomads, increasing numbers of livestock for subsistence, deforestation for fuelwood and population growth, for example.

The consequences include reduced agricultural productivity, reduction of vegetation cover, soil erosion, soil compaction – in general the spread of desert-like conditions into areas which were previously productive. Candidates may develop consequences in human terms such as malnutrition and even migration.

- (b) Using examples, assess the extent to which it is possible to manage an arid or semi-arid environment. [15]

There should be some indication as to how an arid or semi-arid environment can be managed in the long-term. An example could be the use of diguettes or earthen dams in the Sahel, the production of prickly pear in the Eastern Cape region of South Africa or mineral development in Botswana. The use of such areas for tourism and game reserves may provide a better return than farming. There may need to be some control through planning.

Level 3

Provide a suitable case study or case studies/examples that illustrate how it is possible to manage arid and semi-arid environments. They are likely to investigate some problems and potential solutions and deal with general management issues. (12–15)

Level 2

Example(s) selected may refer to mis-use of the environment rather than management. However, there could be some explanation of why the use proved poor. (7–11)

Level 3

A generic answer which does not deal with the management/cause-effect but merely considers human use of arid and semi-arid environments with little regard to the question.

(0–6)

Example candidate response – grade A

8(a)

Desertification is a term that is defined as land degradation in semi-arid areas, causing them to take on the appearance and characteristics of arid environments. The main physical cause of desertification is global warming, which leads to a decrease in precipitation in many parts of the world. This means that the water balance in a particular area will become more of a moisture deficit, and land will become less productive because less vegetation will be able to grow. As a result the soil is both lacking in nutrients and becomes more friable, leading to increased soil erosion by wind and water.

There are a number of human factors that impact on desertification - one of these is over-cultivation. Natural increase rates in LDCs are often very high due to high birth rates and falling death rates - for example in the Sahel, population is growing by 3% but food production is only growing by 2%. This puts increased pressure on farmers to exploit marginal areas of land, and to engage in poor farming practices such as not leaving fallow patches, or slash-and-burn, which reduce soil quality and leave it more open to erosion. Overgrazing is a problem too, as vegetation cover may be quickly removed by animals. LDC governments encouraging cash cropping for export are making matters worse by increasing pressure on the land. Poorly managed irrigation schemes can reduce the water table to the point where there is no natural groundwater, and salinisation has taken place due to salts being carried to the surface through capillary action.

The consequences of desertification impact hugely on agriculture, as farmers find less and less suitable growing land - if it becomes irreversible, then it can result in famine, where large populations are affected. Because there is less

vegetation cover, events of high rainfall may lead to dangerous mudslides, because of the large amount of loose debris on steep slopes - this was the case in Peru, where a mudslide in the Chosica district claimed 100 lives. Desertification affects biodiversity because it limits the number of organisms that can survive in an area, but its impact on farming, and therefore the risk of famine and/or damage to a country's export earnings, is more serious and immediate.

Sound; covers the subject; physical causes - a new addition.

Consequences again less detailed. Human causes predominant.

- 3(b)** Arid and semi-arid environments pose numerous problems to their inhabitants, but people have come up with ways of managing them. One such problem is the lack of water in deserts, which makes agriculture difficult or impossible. We have seen that irrigation can make a major difference - farmers along the banks of the Nile in Egypt (an alluvial river, since it is served from outside a desert region) have over time constructed a sustainable and well-integrated system that allows the growing of dates, among ~~water~~ other crops. However in other L&Es, there are times when it has little impact, such as in Turkmenistan where $\frac{1}{3}$ of water is lost through irrigation before it reaches the fields, and this decreases potential agricultural output by around 25%, also linked to the fact that $\frac{1}{4}$ of the land suffers from salinisation.

In the Sahel region of Burkina Faso, local farmers have been working directly with Oxfam, an NGO, or a grassroots program to help with farming. Aid workers have helped farmers to build 'diguettes' (stone walls), and have taught them how to build along natural contours to ensure that more rainfall is trapped, to give it longer to soak into the ground. They have also been educating people in the dangers of building wells in areas where groundwater is already very low. Since Oxfam got involved, agricultural production in the area has increased by around 40%, significantly contributing to the country's exports.

Such schemes are often much more successful with outside help or assistance, but the settlement of Chiriquitos in the Atacama Desert in Peru is an example of locals working together to manage their environment. By setting up large nets on the hillsides they were able to harvest water from the consistent fogs that come in off the Pacific - 100 nets were constructed, each capable of harvesting 170 litres of water a day from condensation, and the village's overall water consumption more than doubled. While successful, this sort of solution would be much more difficult to implement on a larger scale.

The Draa Basin area in Morocco has been successful in starting a small tourist industry - 8% of the population are employed in it, and tourists can visit sites such as the local markets,

traditional mud-brick architecture sites, and even the site of the Atlas Film company! Almost all of the proceeds go to local people, but what the area really needs is government-coordinated action to help with their water shortage - despite the construction of a dam that releases water for irrigation and also creates HEP, population pressures, like in so many semi-arid environments, are far more difficult to manage.

It seems that on a local level, certain management schemes have the power to be very successful and allow a better, more sustainable way of life in arid/semi-arid areas, but that larger social problems such as overpopulation and land pressure, which many other problems can be traced back to, are far more difficult to deal with, and that it is often difficult to overcome the characteristics of these environments that limit settlement, agriculture and the local economy. Good on scale; better on small scale. Considered management and the co-operation of various interest groups.

Examiner comment – grade A

(a) The response shows a good understanding of desertification. It is a sound response that covers the human causes of desertification well, although the physical causes of drought and climatic change are less well developed.

(b) The response covers a number of detailed examples of attempts at development within semi-arid regions that are made relevant by assessments of the management issues that had characterised them.

Mark awarded = 19 out of 25

Example candidate response – grade C

- Q2) Desertification is the extension of desert-like conditions into areas. It is a combination of both anthropogenic and natural causes. Natural causes are those which are beyond the control of humans which may include lack of rainfall, an increase in temperatures. Anthropogenic causes which happen to be the main cause are those induced by man. Some of them include:
- i) Overgrazing: This is when the carrying capacity of land has been reached. Suitable plants are removed and replaced by undesirable ones. Trampling of the soils reduce the soil structure. This will reduce the vegetation cover.
 - ii) Over-cultivation: This is likely to occur due to ~~an~~ increase in population meaning there are more people to feed. This can wash the ground. Reducing the soil's fertility.
 - iii) Salinisation: Occurs when poor irrigation schemes lead to the accumulation of salt deposits. Plants cannot tolerate salts at conditions hence they die.
 - iv) Deforestation: Removes the protective layer of vegetation. This is a result of over population meaning there are more people to feed.
- The consequences of desertification include increased drought, due to lack of vegetation & rainfall, food shortages; as agriculture may no longer be favoured due to the reasons listed above. Reduction in precipitation levels, global warming and famine. There are a great number of places at risk to be seen. Eg: Sahel countries, etc?

Desert areas

8b) Deserts are hostile environments with harsh conditions. However man has attempted to reduce their hostility by a large number of methods making it more suitable for them to reside. Arid areas ~~Deserts~~ are areas of low & irregular rainfall. Farming is therefore difficult however the introduction of various irrigation systems such as drip irrigation has made farming possible in these areas. E.g. Drip irrigation in Turkana Kenya. Other methods may include the building of dams e.g. the Aswan Dam in Egypt. Arid areas are areas of high wind speed & energy which can lead to sand storms posing a threat to humans life. Attempts in Saudi Arabia have been made to try and reduce the speed of wind by the building of walls to because the wind energy is pouring off it to stop the movement of sand. Sand Dunes are dynamic landforms meaning they can change their shape some ~~sudden~~ even (a little). The moving of these dunes are dangerous as and can destroy an entire settlement. In the Rajasthan desert vegetation was grown on sand dunes to set stabilize them & to discourage movement. Moisture is a major problem in arid areas it is almost non-existent or limited. In the Sahel, concrete lines were built on the ground to collect any available moisture. Today the irregular nature of precipitation limits the growth of vegetation. Attempts have been made in the Rajasthan desert to grow a special breed of shrubs and trees that can survive in the extreme desert conditions to encourage precipitation. Afforestation in the Sahel countries is another example.

However despite all those attempts to manage some and areas these harsh conditions ~~welfests~~ still have the lowest net primary production & produce the lowest amount of organic matter. Whereas others such as Dubai & Saudi Arabi are doing economically good. It is ~~h~~ less therefore to possible to manage effects and areas but not all aspects such as high temperatures. Some factors are beyond human control. It also depends on the economic stability of a particular country & how much the government is willing or can spend to manage arid or semi-arid areas.

Examiner comment – grade C

- (a) Desertification is defined and a number of human causes are identified and described. The consequences are briefly described but possible physical causes are not examined.
- (b) The answer introduces a number of activities that could be employed in desertified areas such as drip feed irrigation and dune stabilisation. The answer is rather disorganised ranging between arid and semi-arid environments. Management issues are not addressed, nor are the limitations imposed upon development by the environmental conditions.

Mark awarded = 13 out of 25

Example candidate response – grade E

8a) The possible cause of desertification can be identified as overgrazing, destruction of plants in dry regions and incorrect irrigation in arid regions. Overgrazing was not so much of a problem a long time ago because the animals tended to move where the rain fell. People would move with the animals. However, today people have a steady food supply ~~and~~ and that means they do not have to move around. So people use fences, which can mean that the animal stay in one place which causes overgrazing.

Secondly, the destruction of plants in dry hot regions can cause desertification to occur. Trees are being cut down as a source of fuel and once the trees are cut down there is nothing to protect the soil. It can turn to dust and is blown away by the wind.

Thirdly, incorrect irrigation is commonly used in poorer communities. Often where there is a lack of water, farmers use canal irrigation and other poor techniques. This type of irrigation causes a build up of salt in soil.

desertification

Finally, human activities can also cause desertification. These include civil wars in Ethiopia and Eritrea and Somalia.

The consequences of desertification are that soil becomes less usable, vegetation is damaged, there is a risk of famine and food loss and people's lives can be affected.

Firstly, the soil can be blown away by wind or washed away by rain. Also, the wind can remove the nutrients in the soil. Salt can build up in the soil which makes it difficult for the plant to grow.

Secondly, desertification can bury the plants and leave their roots exposed. Also when overgrazing occurs, different species of plants may be lost. Also places which experience war and poverty are most likely to experience famine. Drought and poor land management contribute to famine.

Thirdly, a further consequence of desertification is that the soil is not suited for growing food and therefore the amount of food being made will decrease. If population is increasing then this will cause economic problems and starvation.

Finally, desertification can cause flooding, poor water quality, dust storms and pollution. All of these effects can hurt people living near the affected region or area.

An example of desertification is the Sahel Desert. Desertification is becoming a huge problem. In the 1950's people settled into this region in the areas where water was unavailable. This caused overgrazing, which is one of the biggest causes of desertification. Eventually all the perennial shrubs were destroyed because of grazing and they were replaced by annuals. Then the annuals were over grazed which only left bare soil. A lot of the top soil was then washed away and only rocks were left. Furthermore, the silt turned hard when the rain landed on it and the plants could not grow because the roots could not get through this hard layer. Now this region has turned completely to desert but it continues to expand. The long term consequences of this are that the people

could die of starvation. The cattle could die of starvation and the soil may become completely useless.

A bombing event not only kills with human lives.

b) Managing an arid or semi-arid environment has its obvious challenges. As discussed there are large areas affected by the rapid growth and spread of desertification. This means that increased knowledge and education on how to manage these areas is required.

one strategy which could be used in managing this environment is through dune stabilisation. This involves the replanting of trees, grasses and shrubs on sand dunes in order to stabilise the dunes and cover them in fertile farming land. This resulted in the sand dunes becoming stabilised and the community providing invaluable farming land. An example of this is in the sahel in Africa. This involved a project organising community workers and village volunteers becoming trained in dune stabilisation techniques. The planting has been a great success with successful harvests and the return of wildlife. how?

Secondly, an important factor in trying to manage these areas is to attempt to increase the water retention capacity of soils. One way in which this can be achieved is through the

use of mulches. Mulch is organic material that is slightly composted. It is then used as a covering around plants to prevent evaporation of moisture among other things. Regular use of mulches helps drainage and improves the soil. They also cool the soil which reduces the amount of water which is needed particularly during the summer months.

Thirdly, management of these areas can also be helped by the exchange of livestock. An example of this is in Tunisia where a fast growing population and a need to provide more food resulted in the settlement of many nomads in new villages. This increase in population contributed to an increase in livestock which resulted in overgrazing around the villages. Educating the villagers has resulted in the exchange of this livestock for example the proportion of goats to sheep has gone up because the goat will use poorer quality grasses to eat than sheep. This has allowed the areas around the village to recover.

Finally, with regards to assessing the extent to which it is possible to manage an arid or ~~or~~ semi-arid environment, there are a whole range of management techniques including the reduction of salinisation and

the other factors previously discussed.

Many farmers still choose the option of increasing their mobility by travelling to different parts of the country to deal with insufficient amounts of rain, pasture loss and other effects of desertification.

Therefore, in conclusion although many successful techniques and management strategies have been applied to these arid and semi-arid environments there can be no doubt that they have brought many successes. However, overall assessment may conclude that desertification is spreading at an increased rate and although successful management techniques are unable to keep pace.

Examiner comment – grade E

(a) A rambling account of the causes of desertification that only deals with overgrazing and other human activities. No indication is given of the nature of desertification or the role of drought.

(b) Some management strategies for arid areas are outlined in a very unspecific manner. The results of such strategies are not described or assessed and little account is taken of environmental limitations upon development.

Mark awarded = 11 out of 25

Paper 3

Section A

Question 1

Production, location and change

Only one question may be answered from this topic.

- 1 Fig. 1 shows actual and projected trends in world food production, 1995–2018.

(a) (i) Describe the trends shown in Fig. 1.

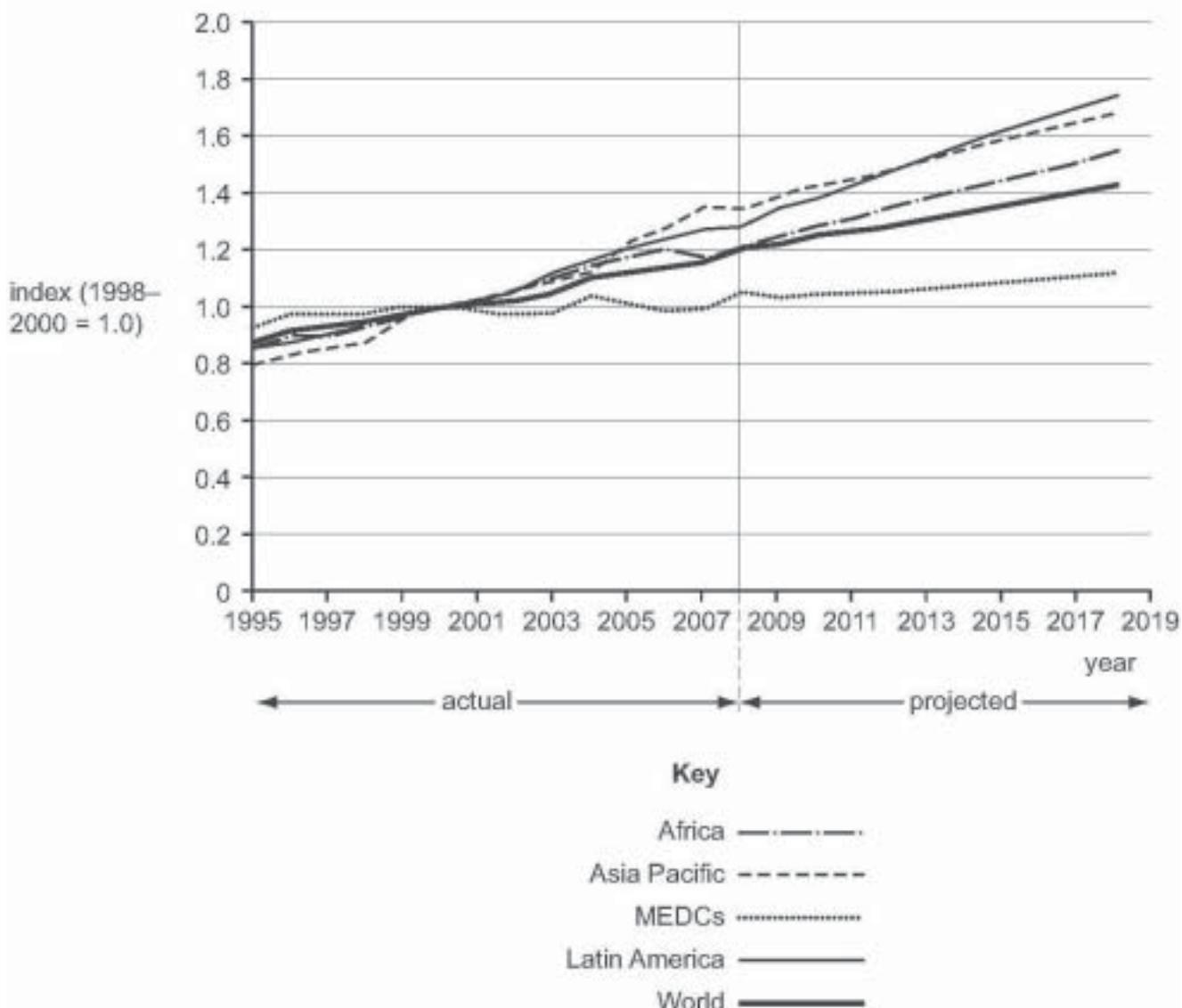
[4]

(ii) Outline three reasons for the projected growth in food production.

[6]

Fig. 1 for Question 1

Actual and projected trends in world food production, 1995–2018



Mark scheme

Production, location and change

1 Fig. 1 shows actual and projected trends in world food production, 1995–2018.

(a) (i) Describe the trends shown in Fig. 1.

[4]

The actual trends increase with fluctuations, e.g. Africa, except for MEDCs which is quite flat. Projections are all of growth, but vary, the greatest in Latin America, Asia Pacific performing strongly, the least in MEDCs, 3, with some elements of data support 1.

(ii) Outline three reasons for the projected growth in food production.

[6]

Credit each reason 2, or exceptionally if well-developed, 3.

For example:

- increasing demand as world population grows
- increased use of irrigation
- intensification e.g., through use of machines, fertilisers
- education, agricultural extension, training
- land reform
- government programmes and incentives

also credit, if offered

- positive representation of data (UN source).

(b) Use one or more examples to explain why agricultural change is easier to achieve in some cases than in others. [15]

An open question allowing candidates to use the material they have. The explanation is itself an assessment. Appeal may be made to reasons such as desire for change, resistance to change, education/literacy, profit motivation, barriers, availability of finance, external assistance, weather, government will, attitudes, food demand, suitability of initiatives, etc.

Candidates will probably:

L3 Provide an effective and comparative overview, identifying reasons and/or factors clearly and supporting their responses with detailed evidence on both sides. [12–15]

L2 Offer an explanation which is satisfactory as far as it goes, perhaps containing good points, but lacking detail or development. May be unbalanced towards "some" or "others". [7–11]

L1 Make a simple response of basic quality which may be general, or descriptive rather than truly explanatory. Focus weakly on "agricultural change". Offer notes or fragments. [0–6]

[Total: 25]

Example candidate response – grade A

1)

a) The trends showed in fig 1 suggest that they would be a increase in food production in all the continents, Africa, Asia Pacific, MEDCs, Latin America which thus increase the world production in the world from 1995 to 2019.

The Fig shows that Africa would have a rise in food production from approx 0.83 in 1995 to a projected rise of food production being set at approx 8.158 in the year 2018.

The figure also shows that there will be a rise and fall in food productions too in most of the continents between 1995 to 2007 but no fall in food production from 2008 to 2019.

The figure also shows a trend that suggest unlike in 1995 to 2007 where Latin America had a rapid increase in food production from approx 0.82 in 1995 to approx 1.3 in 2008. It will have a more rapid increase in food production from 2008 to 2018, 2008 being at approx 1.3 and 2018 approx 1.79.

The fig also indicates that future will be,

ii) The projected growth in food production could be due to several factors.

Firstly it could be due to many continents & countries in the continents) starting to adapt ^{and} green revolution. This encourages an increase in food production as it supplies farmers at poor farmers) farmer with fertilizer and etc in order to making farming more intensive. This thus leads to a ^{rise in} ~~rise in~~ production as soils fertility is increased by this application of fertilizers which means that more food can be grown.

This increase can also be due to the availability of technology in farming in LEDC countries e.g Kenya, with technology and machinery there will be a rise in food production as farming will be faster and more effective with the use of machines such as tractors and oppose to people using hands to tilt, cultivate land etc.

This increase can also be due to more stable

governments in LEDC's. This is so as volatile political environment in places such as Somalia (LEDC) the fighting between rebels bombing land and ambushing each other (warfare) leads to a lower food production. Conversely if conditions are stabilised as in MEDC's more food production will take place.

b) Agricultural change is easier to change in some cases than other due to several factors.

Agricultural change is easier to be achieved in MEDC's such as in Europe with the C.A.P than LEDC's e.g Kenya due to traditions and customs. In cases such as Germany where people are educated and not tied down to traditional customs it's easier to undergo agricultural change as people are more willing for the changes as they know the benefits it holds.

In LEDC's such as Kenya Nomadic pastoralist such as the Maasai of east Africa resist agricultural change as they are against these traditions. for example when they are encouraged to emphasise more on quality rather than quantity of cattle they reject this as their customs believe that a large herd of cattle is a symbol of wealth and respect in the community.

Agricultural change is easier in MEDC's as people are more educated and are

thus more literate. This means they can read and interpret how to apply fertilizers ^{and operate machinery} on their land effectively for types in food production etc. This is why it can catch up to agriculture change faster. In contrast in LEDCs where there is a large number of uneducated people agricultural change is harder to catch up as people do not know how to read instructions on how to apply fertilizers or operate machinery ^{or read books} on new farming methods.

Another reason a agricultural change is easier in MEDCs e.g. Britain is because it is more economically ^{prosperous} ~~poor~~. This means most farmers have a higher income and can thus afford the fertilizers and machinery needed for agricultural change.

This is oppose to Kenya where most farmers find the fertilizers ^{machinery} to be expensive to buy and so are only willing to buy them after they have seen its benefits from richer farmers.

who can afford it.

Another reason agricultural change is easier in certain areas than others is because of harsh conditions. This is so as in favourable agricultural conditions such as those in the Rift Valley in Kenya change is made easier as there is heavy rainfall and the essential conditions favour once agricultural change! This is in contrast to areas in the drier areas in Kenya where it's been suffering drought as agricultural change would have not be effective due to its harsh conditions.

Another reason its easier to carry out agricultural change in areas such as Germany and also other MEDC's is because they already have an sufficient & integrated system with proper settlement schemes in places. This enables that all fertile rich soil is utilized for agriculture and there is enough water to make agricultural change successful.

This is as oppose to ...

Examiner comment – grade A

A good quality attempt, displaying high levels of knowledge, understanding and skills. The description of the trends in (a)(i) is careful and detailed, using data from Fig. 1 taken from both axes and covering a number of named world regions. It is, however, clearly unfinished and the grasp of the nature of the index is not convincing. Full marks are achieved for (a)(ii) for three different reasons, clearly identified and satisfactorily developed. In (b) the candidate contrasts achieving agricultural change in MEDCs and LEDCs, which is one valid approach to the question. The response is balanced and uses detailed evidence to develop each aspect of the explanation, for example in relation to agricultural change in the candidate's home country of Kenya. It shows a solid grasp of the subject area and enters Level 3 by descriptor. As with (a) it is unfinished. It could be improved in a number of ways, for example with attention to factors in another dimension, such as political; more specificity about economic factors; or by an holistic approach to one case of agricultural change to complement the reason-by-reason approach taken here.

Mark awarded = 21 out of 25

Example candidate response – grade C

1.

(26)

(a) Africa's trend was unstable between 1995 and 1997 with an increase and then a decline by 0.05. From 1997 to 2005, it was on a steady increase of about 0.6% but it however destabilised similarly as to the 1995 and 1997 period in 2007. The projected growth a decade after 2009 is expected to be about 0.7% to peak at 1.6%.

Asia Pacific rises from 0.8% to 0.9% from 1995 to 1999 and by 2000 is at 0.9%. After a year and a half of stagnation it rises to 1.3% by 2007 before levelling out till 2009. If projected growth is steady to about 1.7% by 2019.

The MEA's have a wavering growth with an increase and decrease between 0.02 and 0.04 until 2008. They decline by 0.01 as projected by 2009 and have a slow but steadily rise to 1.0% by 2019. This is the lowest projected rate.

Latin America has a vivid and rapid rise up to 2007 from about 0.8% in 1995 to 1.0% in 2007. The projected rise is highest.

The World's trend is almost similar to that of Latin America only that it moves slightly in the 1999-2001 seasons. It rose from 0.9% in 1995 to 1.2% by 2008. The projected to reach 1.4% by 2019.

(ii) The increase in mechanical knowledge in Africa and Latin America promises an increase in food production. Manual labour is one of the main causes of slow growth (over-reliance)

- By learning from past mistakes and adopting working policies, countries and governments are expected to adopt the positive methods such as new irrigation techniques that promising better future harvests.
- Countries no longer depend on scarce water for planting.

especially with cases of global warming. Thus wheat and barley that do not need a lot of rain are being planted in larger farms.

2 partial reasons

- (b) Agricultural change is a necessity as one cannot foresee even the near future. Many countries have embraced agricultural change while many more have not. Mainly because they cannot.

Climate is a reason why agricultural change is easier for example in the U.S.A with Tropical and Sub Monsoon climates in some areas. This allows a change or experimentation of crops from cash crops like flower to food crops like lentils. The same cannot be said for Egypt which is an arid land. It struggled to grow food crops away from the Nile so all its farming/agriculture is focused around there. One cannot experiment with other foods as the lives of the locals will be endangered if results are poor.

The types and fertility of soil also determine where agricultural change is possible. Soil that has been used for maize plantations can later be used for beans and legumes. However once soil is exhausted it cannot be used for agricultural purpose.

Irrigation methods also make it easier for certain agricultural changes to be made. For example, The Ahero irrigation scheme uses the canal method for growing rice and bananas. This allows them to control the water flow. In contrast, the Eastern part of Kenya focuses on banana plantations. They do not use the canal irrigation method and so they cannot produce rice which requires a more stagnant water.

The cultural practises, for example in Kenya, tribes can be distinguished by their main agricultural produce. The Kamba people are known for the bananas. It is not easy to think

them to plant other foods and even if they agree, they hints lack the know-how. In countries like America with a free farm culture, they plant anything anytime for whatever reason.

Political factors

Agricultural change obviously requires funds. Third world eg Kenya, governments even after setting up a plan for the supposed agricultural change always end up lacking enough money. hints This can be blamed on high corruption officials unlike in less corrupt countries like U.S or Finland have more efficient rulers.

Land ownership is a major problem in third world countries especially in Kenya where politicians own unbelievable acres of land that will lie derelict. The risk of agricultural change is too high when farmers have little land to work on. hint

Economic factors

Kenya is a country that relies heavily on agriculture to sustain itself and its inhabitants literally. The thought of making a few adjustments cannot be tolerated. The U.S. is however depends more on the tertiary services. Their failed agricultural experiments are tolerable. IR

Overall finances for research and improved farming methods never seem forthcoming. Despite the government play a role but there is no way to compare Kenya's ✓ economy to the ~~the~~ South African let alone the U.S. economy.

8 ✓

Examiner comment – grade C

A solid attempt overall, with variable quality of outcomes across the three parts of the question. The response to **(a)(i)** is awarded full marks because of the detailed approach taken, the level of data support supplied and the careful attention to and expression of 'trends', i.e. changes over time. In the response to **(ii)** the reasons are skeletal and need clearer identification and fuller development. The candidate attempts to link the first broad reason to two of the regions in Fig. 1, although this was not necessary to achieve full marks. A third reason is difficult to discern in the material offered. The response to **(b)** is of an appropriate length and shows knowledge and understanding of factors affecting agriculture, which the candidate arranges by type. There is however not enough of an emphasis on change although there is potential for this, particularly in relation to some of the content about Kenya. Compared to the previous example response, the attempt to contrast this with other countries (USA, Finland, South Africa) is thin, but the understanding shown is firm.

Mark awarded = 14 out of 25

Example candidate response – grade E

i) The actual world food production trends are not as high as the projected world food production trends meaning that they are projecting an increase in world food production.

MEDCs are projected to have the lowest food production and Latin America on the other hand is projected to have the highest food production. All in all the trends show a prediction of growth in food production for the whole world. partial or from ii
ensure of index & no data included

ii) Three Reasons for the projected growth in food production, are, firstly efficiency in farming, farmers will be well prepared for the farming season and improved farming skills. Secondly due to technology farming machinery would have improved therefore making it even easier to farm on large scale.

Another reason is that the governments will be putting a lot of capital into farming helping the farmers with goods, machinery, pesticides, tractors, everything needed for farming therefore there will be an increase in harvests.

There will be more of commercial farming than subsistence farming.

b) Agricultural change is easier to achieve in some cases than others because for example there are places where farming is being done on a large scale ~~&~~ in Canada in the Prairies all they have ever farmed is wheat, bringing about change in such an area is very hard because that is what they are used to farming and that is what the weather allows.

Another example is Zimbabwe. ~~was~~ before independence, Zimbabwe farms were producing a lot of stuff, Zimbabwe was even known as the Bread Basket of Africa.

However this only lasted for a few years after independence because the government decided to take away farms from the white farmers who were doing very well, and gave them to Zimbabweans some who did not even have an idea of what farming is all about. ~~so?~~

This led to a decline in yields, and because of corruption, the machinery, fuel and other stuff that is given to farmers was not even used on these farms. This ~~has~~ even led to the economy of Zimbabwe being affected because the economy depended on farming too.

Because the distribution of farms is linked to politics and there is political instability in Zimbabwe it is very difficult to bring Agricultural change in Zimbabwe compared to South Africa where it's not about the race but rather one's ability of farming. Thus

Examiner comment – grade E

A basic approach is taken to the interpretation of trends in **(a)(i)**, referring only to the world and the highest and lowest lines (Latin America and MEDCs). Growth is identified but there is no data support and grasp of the index is not clear. In **(ii)** the candidate locates the response correctly in terms of subject content and tries to offer the requisite reasons, but the content is broad, overlapping and loosely worked. Tighter expression of reasons, with some specificity is needed to gain the marks. In **(b)** there is evidence of learning, for example in relation to the Prairies, but the link to agricultural change is unconvincing. The content about Zimbabwe is true but descriptive and not made as relevant to the question as it could be. The closing comment about political instability affecting change is the best point, but briefly made. As a whole the answer is unbalanced and thin and even the content about Zimbabwe remains generalised at the level of the name of the country only.

Mark awarded = 9 out of 25

Question 2

- 2 (a) (i) Define the terms *industrial inertia* and *industrial agglomeration*. [4]
- (ii) Explain the disadvantages that may result from industrial agglomeration. [6]
- (b) To what extent is the informal sector of more importance to individuals than to the economy of a country? [15]

Mark scheme

- 2 (a) (i) Define the terms *industrial inertia* and *industrial agglomeration*. [4]

Industrial inertia is the tendency for industry to remain in its existing location even though the factors which led to its location there no longer apply. This arises as many industries build up local advantages such as skilled labour and an immobility of capital assets, such as plant and machinery, but may also relate to behavioural factors and government support. 2

Industrial agglomeration is the concentration of industry in close proximity when several industries or companies choose the same location. It occurs in order to minimise costs, to obtain external economies of scale through linkages between firms, or to benefit from locational incentives. 2

- (ii) Explain the disadvantages that may result from industrial agglomeration. [6]

They may be social (e.g. breaking of existing relationships with local community); economic (diseconomies of scale, heightened competition, reduced access to local market); environmental (negative externalities such as noise, lack of space, air pollution); or political (e.g. planning issues). If disadvantages described without explanation, max. 3. Credit disadvantages in and beyond the agglomeration.

- (b) To what extent is the informal sector of more importance to individuals than to the economy of a country? [15]

The informal sector's potential for economic growth is limited (most establishments remain small-scale, low turn-over, subsistent). Some areas have seen success through the encouragement of small business initiatives and the input of charities or aid programmes. There is growing recognition of the sector's potential. However few informal firms have the necessary capacity in terms of wages, contracts, premises, registration, advertising, etc. without outside help. Many governments now take a more tolerant approach to it as a way to reduce unemployment and dependency. For the individual it provides an opportunity to earn income, however limited, and thus to ensure survival. It may be particularly important for those with little or no education and therefore little opportunity to enter the formal sector. It is frequently labour intensive and so can provide employment for many.

Candidates will probably:

- L3 Develop a clear assessment of the potential and limitations of the informal sector for the individual and for the economy, based on detailed examples and good conceptual grasp of the sector's operation in the 'big picture'. [12–15]
- L2 Make a reasonable attempt at assessing the informal sector's importance within the economy and/or for individuals. May lack the specific knowledge, conceptual understanding, or skills of assessment to develop it more fully. [7–11]
- L1 Offer only a few simple points about the informal sector in a description that makes little or no assessment of importance to either the individual or the economy. Write in a general way. Offer fragments or notes. [0–6]

[Total: 25]

Example candidate response – grade A

Ans 2(a) Industrial Inertia is tends to a factor influencing industrial location. It means that although the initial locational advantages of locating in a location (usually agglomeration) may no longer exist, but Industries still tend to locate there, although diseconomies, lesser profits, etc may have set in. It may be because of image of an area, road presence or other industries instead of the raw materials, etc. e.g. Sheffield still have steel/iron ore industries despite Industrial Agglomeration is the tendency of raw material exhaustion.

Industrial Agglomeration is the tendency of Industries to locate close to each other/in the same location. This may be due to economies, for linkages and area itself. e.g. Industries in Reading are very concentrated (UK).

(ii) PT.O →

2(a)(i) Industrial Agglomeration, mentioned in Myrdal's (Economic) Cumulative Causation model may lead to disadvantages in the final stage, after growth. It may occur initially too.

One of the disadvantage is high costs of raw materials such as labour, such as oil/steel and labour, even other services - leading to lower profits and higher production costs. This is a result of increased demand for finite, scarce resources available (in the area) resulting in negative

Other disadvantage is associated with externalities of production. Pollution, traffic and congestion may not only increase costs in terms of time, pro health but also health of workers. This may lead to decreased productivity. It may negatively affect industries in the same way.

Another disadvantage is Market Share. If more Industries locate in a particular area, it increases competition among them for markets to sell their products in. They may capture a lower population and sell lower units of a good, and

● profits may decrease.
 After some estimate -

4
5
6

2 (b) Informal sector of Industry is ~~the~~
 consists of the sector not legally registered
 or following formal rules. It tends to
 be small-scale, to hire employ workers
~~check~~ of lower skill, and make use of local
 raw materials.

Informal Sector is of importance to it
 is perhaps of great importance to
 a country economy and individual
 himself/herself. It is more important
 to the individual because they need
 it for their own survival, and income.
 Today, increasingly, governments are
 encouraging informal sector growth.

60% of labour force in developing countries
 works in informal sector which may ~~mainly~~
~~and~~ comprise of shoe-making, fruit-selling,
 distributive jobs such as and others.

In India, the government has ~~not~~
 exclusively (restricted production of 600
 more goods to ~~than~~ this sector.) It
~~reg~~ recognises its role in the country
 income generation.

P.T.O →

In Kenya the government recognises the role of this sector in creating jobs etc. in areas where formal employment is difficult to find. The Prime Minister helped set-up of steel shed protecting the "Tua Kali" from the hot sun. These cater to needs of local people by manufacturing hand-made stoves, cutlery and other steel utensils at cheap prices and using locally recycled materials.

They reduce burden of government to invest in capital, import technology. They are sustainable and well suited to needs of local people.

~~Big~~ Formal Industries often sub-contract small production to informal sectors and this reduces cost. In Pakistan, much of agricultural small-scale cottage industry is informal but it contributes to city to the economy, e.g. Dairying in cities provides milk to urban dwellers ~~and the situation in world market~~.

So Pakistan is famous for exporting traditional Carpets at high prices to developed nations such as USA. These are woven by women in their homes or small sheds. It helps them earn income ~~but it too.~~

Much of agriculture

Much of agriculture in Pakistan, especially at subsistence level is informal where families work. This provides families with food and employment. It also has social advantages, e.g. family relationships are stronger.

Therefore the individual economic, social and sustainable/environmental implications of these sectors is important to the country in every way but ^{more significant} individuals through their own initiatives who have taken own initiatives.

Examiner comment – grade A

The candidate provides two effective definitions in (a)(i), one notably longer than the other for no clear reason. The misspellings and crossings out can be overlooked. The conceptual grasp of both terms is strong and sufficient to achieve full marks. A number of disadvantages are identified and described in (ii) and, whilst the explanation given is correct, it could be more fully developed. The response to (b) begins well with a definition of the informal sector, followed by an initial assessment in the question's own terms. It then develops a number of ideas, drawing on examples from a number of LEDCs. Using the descriptors, in character it is a Level 3 response, and it would be possible to deepen the analysis, especially with respect to the national economy, and the sector's real limitations for both, in order to achieve a still higher mark.

Mark awarded = 20 out of 25

Example candidate response – grade E

- 2ai) Industrial agglomeration is the formation of many secondary industries located close to one another such as components to a car being located closely together, thus saving money on sending goods and receiving materials. Industrial radiation is when companies locate great distances away from one another such as footloose industries.
- ii) B Industrial agglomeration can often be a costly way of creating goods or materials as if the quality of the end product is not at its highest, then the entire assembled product is often sent back to its secondary sector producing positive feedback. The agglomeration often requires a large incentive from either transnational companies or from countries such as trade guarantees or export tax to be cut, often many places will not provide such a luxury and so agglomerated areas can be of high cost.

umber

- 2b) Many families rely off the informal sector, which is mostly dominated by women and children of a young age.

In Kenya, there is an informal sector called 'Hot under the Sun' in Swahili. Women and children collect scrap material from the streets and melt it down to its pure form and then sell that on the streets or to the large industries in Kenya. The Kenyan government and banks have realized the importance of this sector and are even offering small loans to the workers.

The informal sector is an entirely private working sector and doesn't contribute a large amount of money to the government in the form of tax or otherwise. The informal sector's profits are made up of mostly small change that are given to shoe polishers, street-food sellers or entertainers. The informal sector obviously isn't granted the same amount of government incentives as trans-national companies are, so many are not given the opportunity to expand.

Many governments have allowed the informal sector to expand further than their original state, such as Kenya, who see the low-money business as a way of keeping up to 60% of the population employed.

The informal sector only really contributes to the individual person/father than the country as a whole, as informal products or services are often ones

that cannot be exported or be sold at a competitive level.

Many communities rely off the informal sector as they sell shoes or buff metal so they can afford to eat.

Examiner comment – grade E

The overall quality of this response is a little better than a grade E. It is included for what it demonstrates in terms of characteristics. The definition of the two terms in **(a)(i)** is not in the order they appear in the question. The grasp of industrial agglomeration is firm and sufficient, whereas that of industrial inertia is wrong and not worthy of any credit. Candidates may be asked to define any term which appears in the syllabus and definitions are also useful in parts **(b)** in order to shape and direct the writing. There is little substantive comment in the response to **(a)(ii)** beyond a hint about cost in the final sentence. To score more marks a response based on the effects on production and considering different dimensions, as in the mark scheme, is needed. In **(b)** the candidate agrees with the question and does not develop the aspect of the economy of a country adequately. The material about Jua Kali is realistic and well-directed, but the answer remains relatively undeveloped and more explanatory than truly evaluative in approach. It could be improved by a more balanced analytical treatment or by the inclusion of further exemplar content, if known.

Mark awarded = 11 out of 25

Question 3

Environmental management

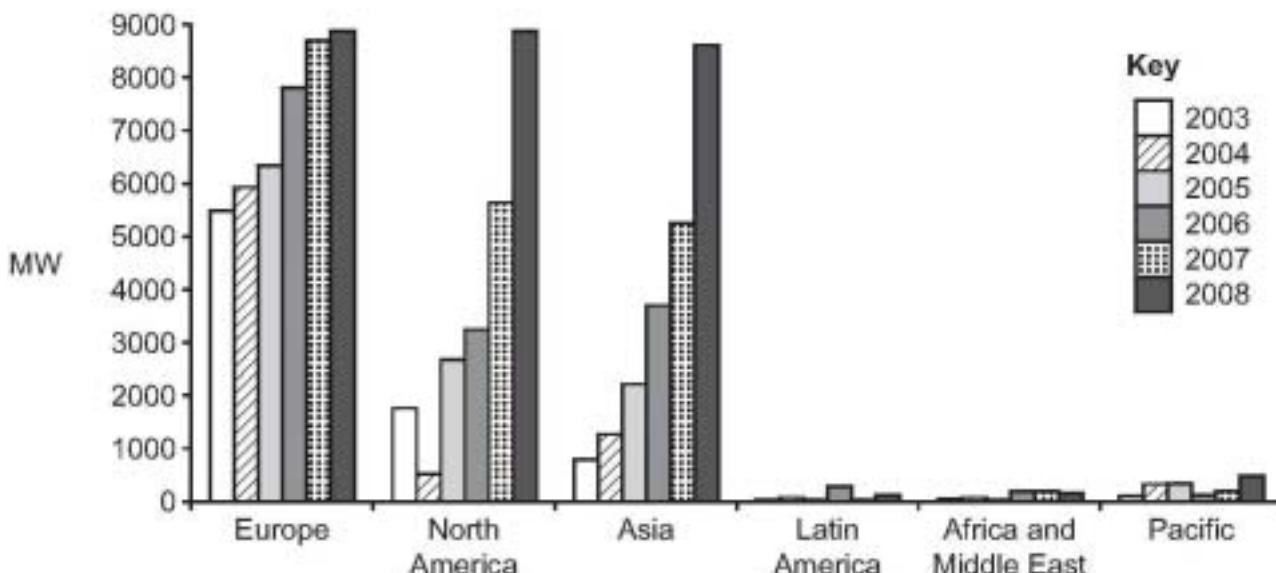
Only one question may be answered from this topic.

3 Fig. 2 shows the capacity of wind turbines installed each year by world region, 2003 to 2008.

- (a) Describe and suggest reasons for the trends shown in Fig. 2. [10]
- (b) For a named country, assess the extent to which renewable energy sources can meet its energy needs. [15]

Fig. 2 for Question 3

Capacity of wind turbines installed each year by world region, 2003–2008



Mark scheme

- (a) **Describe and suggest reasons for the trends shown in Fig. 2.** [10]

General increases in Europe, North America and Asia: particularly rapid for the latter two. In Latin America, Africa and Middle East and Pacific, much lower installation levels and no discernable trends. Trends need data support from Fig. 2.

Suggested reasons will probably be economy or development based to explain the differences in the trends, but can equally be population based, especially in the case of the Pacific region. Some areas, notably Middle East are rich in oil so see little need to develop renewables. Technology transfer is needed in many regions and other priorities may exist, etc.

Mark on overall quality, not seeking comprehensive answers, bearing in mind the three bands of marks and levels of response: 0–4, 5–7 and 8–10. Descriptive responses remain in the lowest band, whilst only reasons may be awarded up to 7.

- (b) **For a named country, assess the extent to which renewable energy sources can meet its energy needs.** [15]

Candidates may well focus on electricity generation, but there are many other energy needs, particularly transport, but also cooking and heating, etc. The balance of the argument will depend on the country chosen, MEDC or LEDC. Few countries can depend on renewables for even their electricity generation.

Candidates will probably:

L3 Develop a high quality assessment of the energy scene, supported by detailed examples from the chosen country. Demonstrate high order conceptual understanding. Structure the response effectively and make an assessment based on the evidence provided. [12–15]

L2 Provide an assessment of sound quality, which may be good in parts, but which remains partial or limited overall. It may be broad and lack detail, possibly concentrating on electrical generation with limited consideration of the relative roles of renewables and non-renewables. [7–11]

L1 Make one or more basic points about renewable and non-renewable energy sources. Have little specific knowledge of the chosen example and offer little or no true assessment. Notes and fragments remain in this level. [0–6]

[Total: 25]

Example candidate response – grade A

Environmental management

③

a)

Figure 2 shows that in every world region, the capacity of wind turbines installed was greater in 2008 than in ~~2003~~ 2003. However the capacity of wind turbines installed was greater in ~~the~~ Europe, North America and Asia every year compared to Latin America, the Pacific, and Africa and the Middle East, ~~except for North~~.

For Europe, North America and Asia, their largest increase in capacity of wind turbines was in 2008, and was much, much higher than any increase in wind turbine capacity in the other 3 regions. In Europe, N. America and Asia their largest increase ^{in one year} in wind turbine capacity was between 8500 MW (megawatts) and 8800 MW, compared to the wind turbine capacity increase in a single year in the other regions. The largest increase in each of these 3 regions was still some 7000 to 8000 MW less than the increases in Europe, North America and Asia (the Pacific's largest increase was in 2008, at 500 MW; Latin America's largest increase was in 2006, at 300 MW; and Africa and the Middle East's largest increase was in 2006 and 2007, both increasing by only 200 MW).

Careful analysis

One possible reason for these trends is that there is much more wealth in Europe, North America and Asia (mainly from Japan, China, Korea (South) and India), so

these regions can therefore afford the expensive turbines (costing between £4 million and £7 million, depending on whether they're onshore or offshore). The less wealthy in the lesser developed countries of Africa, Latin America, and the Pacific might not be able to afford wind energy, preferring to remain with cheaper fossil fuels.

The good educational attainment in Europe, and North America, and partly in Asia, could also be behind why the turbines and their technology are being pioneered in these developed nations. The higher scientific knowledge of North America and Europe has been driving the ~~desire~~ to development of wind as a source of electricity, resulting in more turbines being erected. In Asia this could be possible, but is less likely to be a key factor.

Developing countries in Africa, the Pacific and Latin America are less worried about using renewable resources such as wind, so they don't see the desire to switch. The developed world does care, and is the driving force behind laws and regulations such as the Kyoto Protocol and the Renewables Obligation. Aside from the USA ~~and~~ and China, virtually every other nation signed these laws. As the developed nations proposed these changes, they have to be seen undertaking them and actually putting them into practice.

- b) A renewable energy source is one that is non-finite – it is sustainable. This is because using the energy source now will not reduce its availability for future generations.

The UK currently operates with a strong dependence on fossil fuels. These non-renewable (and therefore finite) energy sources (coal, oil and natural gas) currently supply the UK with 74% of its energy. However the UK has pledged to reduce its reliance on fossil fuels, under the Renewables Obligation promising that 40% of its energy will be generated by renewable sources by 2025. Currently the UK's energy proportion from renewable resources (excluding nuclear) is roughly 8% (made of mostly wind (4%) and hydroelectric power (2%)).

The UK is at the forefront of the drive to use wind power because of its prime location to maximize the use of wind. The UK has a large coastline, and the winds are mostly within a turbine's operating range (15 miles per hour, up to 60 miles per hour). Currently the recent construction of ~~Fleet~~ ~~Scroby~~ Scroby Sands wind farm off Kent has lifted the UK's wind capacity to ~~12000~~. However despite this obvious advantage, there is a reluctance to move to wind. The main reason is cost. Experts have predicted that if the UK unlocks its full wind potential then the UK could produce 30GW (Gigawatts) annually (half its peak demand). However this massive improvement to the sustainability of the UK's energy

strategy will come at a huge cost, costing the government over £30 billion in subsidies. This subsidy would be to encourage firms to switch to using wind to produce energy, and to discourage them from letting consumer energy prices up too far.

Whilst 30GW can be produced when the conditions are right, when conditions are not good for producing wind energy then there will be an electricity shortage. If wind ~~power~~ is used to generate energy then other energy sources need to operate as back-up to compensate when the wind isn't blowing. Other options for the UK are hydroelectric power and tidal power; solar isn't really a viable option at such a high latitude. However there are ~~some~~ ecological problems with h.e.p and tidal, whilst experts believe that the UK's hydroelectric potential is nearly fully unlocked (including the rejected proposals for the Severn Barrage).

The UK currently depends on nuclear for 18% of its energy. Whilst this is not a sustainable energy source in the long term, nor is it renewable, it might have to form part of the UK energy strategy whilst other renewable sources are identified and taken advantage. To summarise the extent to which renewable energy sources can meet the UK's energy needs is currently limited. Whilst there is huge potential for wind as a energy source, relying on it could lead to an energy gap. Other sources such as hydroelectric power and tidal play a minimal role in the current UK energy strategy, but ecological

damage (and similarly, costs - ~~cost~~ construction and maintenance) might have to be overlooked in order to shift towards a sustainable and renewable energy strategy. Although wind does have its problems, if there's anywhere in the world where it will most effective it's in the UK.

Examiner comment – grade A

This is a well-written and carefully structured response which demonstrates good knowledge and understanding of the global context in **(a)** and the chosen national context in **(b)**. The approach to Fig. 2 is well-organised and insightful, moving from an overview in the first paragraph, to more detailed analysis in the second. Whereas the question is about 'trends', i.e. changes over time, and the analysis is strong, the candidate falls into the limited practice of identifying the year of the greatest capacity installed in each world region. As such it is the description element of the response which is not full. The reasoning advanced is realistic, supported with some place-specific knowledge and demonstrates both a global perspective and a sense of geographical judgement. The approach to **(b)** is evaluative, well-informed and convincing in terms of country detail and contemporary reality and moves easily between different scales. Although possible approaches vary, one way that the assessment of extent could be further enhanced is by attention to the contribution of the non-renewable energy sources outlined in the second paragraph.

Mark awarded = 21 out of 25

Example candidate response – grade C

- 3a) As a general trend, there has been an increased installation of turbines since 2003 to 2008. With the MEDC's as a whole investing much more in wind turbines in comparison to LEDC's, with Europe the most due to EU policy of cutting emissions contributing 20% of power to be generated via renewably by 2020. This is why they had in 2003 5,500 MW to 2008 9,000 MW installed. However as a whole the MEDC's who account for 30% of the earth's population consume 70% of global energy and therefore due to high standards of living therefore consume more energy. Furthermore MEDC's are investing massively in renewable energy sources due to sustainable energy sources and in the case of turbines, their investment is around 10 years. Asia also investing a large amount from 1,000 MW to 9,000 MW due to being a "Tiger economies" pursuing rapid growth are in search of many energy sources due to population growth and industrialisation which is helping to supply their growth. However the LEDC's countries investing less than a 1,000 MW's a year due to their lack of funding, plus need for energy and governments often have more important schemes such as Agribusiness development which does not require energy. Another factor is that the Middle East are investing little in wind turbines due to its large availability of oil and in turn there is no need.

for this wind power investment.
A problem with Fig 2 is it is only 2003-2008
and therefore does not show previous investment
such as Norway and Denmark → 20% windpower
and the likes of the UK in the EU are more
suited to wind power than other countries like
Latin America & Africa where solar power and may be
more effective in producing energy.

- G) In the case of (China) a NIC, their Energy needs are ~~decreasing~~ increasing due to several factors. There is an increasing population in the short term due to a child policy act which will be predicted to reach max population around 2025. Plus according to Clark's Sector model the movement from Agriculture to urbanisation and therefore urbanisation leading to heavy industry requiring vast amounts of energy, plus the improvement of quality of life due to raised incomes leads to larger energy consumption per capita.
- For China their policies predominantly revolve around growth of GDP and strive to catch up with the MEDC's countries.
- However in the processes of this Renewable projects have been built & planned leading to less reliance upon coal, oil and gas, which they use in heavy industry. They have invested \$90 billion in the last 5 years into wind turbines as their coal reserves will run out as predicted ~~by 2025~~, in the next 30 years, therefore when these run out they do not want to be dependent upon the Middle East for oil or Russia for gas, and also not even Australia for coal due to previous events like the OPEC oil price hike in 1984 and want to have a predominance of self-sufficiency.
- One example of this, is the investment of \$25 billion dollars in the Three-gorges Dam, which stretches across the Yangtze river and 600 km back, and has helped China grow,

growth by providing 18% of China's power supply, 18 million kilowatts with the potential to install more generators. Not only has this led to a reduce dependence upon coal (equivalent of 20 coal-powered stations) it has provided the local region & Beijing with power and electricity it often lacked.

Furthermore it is a multi-purpose scheme & helps China's economic future, by increasing trading up stream, for 6 tonne vessels 6 months out of the year and 6 tonne vessel all year round as unimpeded shipping brings trading and knows as one town experiencing its rapid growth.

However Furthermore the project has employed 20,000 people installed 800 turbines and the Chinese Govt plan this and are leaders in hydro-turbine design, therefore can continue to build hydro-electric projects as they are because it has potential to provide electricity to the rest of China.

However the investment in all these projects is substantial and the Chinese government have lack of investment capital to continue to pump into renewable projects that are often controversial, such as the Three Gorges dam, where the World Bank pulled out of funding due to worry of impacts, such as weak limestone the scenery could collapse leading to a similar event of Vajont dam which the displacement of water toppled the dam and destroyed the settlement below killing 2,000+. plus other juries as Phillip Farnside

found that the flooding of the Balbina Dam (910 square miles) led to a 26% increase of greenhouse gases due to the organic matter being broken down, even though this is due to the environment of the Amazon rainforest.

However, China also has been known for its lack of consideration in displacing locals in Hydro-electric projects and have received global attention, especially when 300 off official were prosecuted for corruption in keeping money which was in fact for the too 1.2 million displaced.

As a whole China have many obstacles to overcome after the Three Gorges Dam due to Economic, political and social constraints which means more considered planning and approach is needed in the future. However long slow huge steps in Sustainability played and the Energy policy will lead to continued investment in this route, however it is of how fast and how big big, plus when. As they may want look for coal deposits further instead.

In the short term for their heavy Industrialisation they will use there vast supplies of coal, however in the long-term sustainable renewable projects look like the future of Chinas energy policy.

Examiner comment – grade C

In the response to (a) the necessary element of description of the trends in Fig. 2 is largely overlooked after reference in the first few lines. The reasoning advanced for the trends is, however, satisfactory and shows a good appreciation of the energy scene, combining some specific knowledge of the world regions with wider geographical understanding, to account for what is shown. It would be enhanced if some assumptions were developed, for example, the meaning of sustainable or the identity of the MEDCs and LEDCs to which it refers, in relation to Fig. 2. It would also be preferable to use the phrase 'installed capacity' from the figure and the question stem, rather than 'investment', as they are not the same. The response to (b) starts well establishing 'energy needs' and recent initiatives and concludes reasonably well, emphasising timescale. It loses direction in the middle, rather, in that it becomes an assessment of the success of a single scheme, the Three Gorges Dam. More skilled and disciplined selection, direction and application of the material to the question and a wider approach to renewables are needed for a better quality answer.

Mark awarded = 14 out of 25

Example candidate response – grade E

3. In the diagram there is a big difference between
5) the wind turbines installed in different regions, Europe,
North America and Asia are more economically developed
countries, those are regions that have a big demand of
energy, and are countries that concern ~~th~~ about the
pollution of other type of resources as oil, coal or nuclear.
So they are investing in renewable resources such as wind turbines,
those are ~~over~~ ^{regions} countries that because of their economicall resource
they can afford ~~th~~ this type of energy. But
Latin America, Africa and middle east and pacific in comparation
with the other regions, they have a much lower use of
wind power, those are LEOC's regions that can't afford
because of economicall resources the expensive wind turbines,
and the difference between regions like Europe and Africa
is very high, because Europe is concern about the pollution
and so expenses a lot of capital in a renewable energy but
Africa is a country that instead it have hasn't got enough
money for food supply, so who can that country afford for wind turbines?
In MEDC's we can see that in the last years especially
in 2003 it has been a increase on the wind turbines/
and that's triggered because of the concern of Global warming.
but in the LEOC regions the wind turbines hasn't yet a
great impact and ~~there~~ so there aren't any great change
or a rising of the installation of the wind turbines in the last year.

b) Renewable resources are energy that are not polluted to the environment, there are relatively new, and they never waste because they are renewable, they come from the nature power. There are - Solar power: solar panels transfer the sun energy on to electricity, so it is always producing energy, they are most commonly at deserts zones-Australia (USA). It wind power. The wind is a ~~rea~~ source of the nature that is always blowing so by ^{wind} turbines the energy of the moving wind can be transformed in electricity. biomass is the energy received from sewage of the animals, geothermal is the energy received from inside the earth, hydraulic - the water can be very strong so by building Dams, the water pass through a turbines and transforms the velocity of the water in to electricity (Three gorges dam China).

(Uk.) is a country that has a high population density, and the most part is urban, that means that a lot of energy is produced. So we concern about the polluted energies such as coal, oil, nuclear... and is starting to create renewable energy. We has start to built wind turbines on the last century. The renewable energy in the uk is increasing more and more, and is intended that by 2020 the 20% of the energy in uk will be from renewable.

Uk is a region that is very populated, so there is a lot of energy used for companies (light, computers...) houses (washing machine, light, heaters...), lights on roads. So because it needs to use a lot of energy we concern that using only non-renewable resources was more expensive, and the main idea is that polluted the environment, so it has started to produce renewable energy (specially wind power), in a few years the 20% will be from renewable but it will take a lot of years to get fully from renewable but it wont take to long until the most part is gone' of the energy is from renewable.

b) Three Georges Dam - In China before the dam was built, the river was a hazard for the population, because the river constantly flooded the rural areas around, and here because China is an overpopulated country, there is a lot of people using cars, the an amount of energy needed for light (on buses, houses) or new houses techniques (washing machine, TV, computer, refrigerator...) that means that there is one of the biggest energy production in the world, so the pollution was increasing once more, and there were also increase in the Global warming. Now there is a dam built on that large river, the dam is very big and it takes a lot and long extremes of land. The Three Georges Dam produces a lot of energy due to its giant hydroelectrical turbines and the huge lakes formed. After the Three Georges Dam the flooding hazard stopped, there where a big increase on renewable resources, and the area becomes less polluted.

disadvantages - Expensive construction to build the dam, the destroyed habitats for animals especially end fish and birds

Examiner comment – grade E

The response to (a) comprises both elements (description/suggesting reasons), but each remains limited. The description of trends consists of an introductory statement distinguishing the three world regions on the left from the three on the right in terms of level, and a comment near the end about one year. This is inadequate as an approach. Use is not made of data to support the observations. The reasons suggested are valid and show some awareness of energy demand and supply. They do, however, lack detail and evidence of specific knowledge. Whilst the geographical meaning is conveyed, there are errors of spelling, vocabulary, expression and structure. This candidate makes the classic mistake of referring to Africa as a country. Whilst examiners do not penalise such errors or use of language they do diminish the overall quality of the response. There is a key failing in the approach to (b) in that although asked for 'a named country', the candidate writes about two – and so is credited for the better one. The introductory paragraph shows a modest grasp of renewables, which are defined weakly. The content about the UK is thin and could apply to many MEDCs. The appropriate use of one learned case would do better.

Mark awarded = 10 out of 25

Question 4

4 (a) With the help of examples, describe and explain the main sources of air pollution. [10]

(b) Assess the effectiveness of the measures taken to protect one or more environments at risk. [15]

Mark scheme

4 (a) With the help of examples, describe and explain the main sources of air pollution. [10]

A number of approaches are possible, e.g. sectors, activities, locations. The two greatest are manufacturing industry and transport (smoke, greenhouse gases, particulates, etc.). Candidates may include fuelwood burning in LEDCs and forest clearance by burning. The use of the word **main** should restrict inclusion of sources such as cigarettes. Allow, but do not expect, the inclusion of noise as a form of air pollution. Indicators of quality include exemplar detail and the use of data in support of the response.

Mark on overall quality, bearing in mind the three bands of marks and levels of response: **0–4**, **5–7** and **8–10**. For a response without examples, **max. 6**.

(b) Assess the effectiveness of the measures taken to protect one or more environments at risk. [15]

Any environments are acceptable at any scale, from a local nature reserve to the world's oceans. Candidates will need to make clear the nature of the environment, the nature of the risk and the nature of the measures in order to assess their effectiveness. This may be considered in terms of environmental degradation, improvement in quality and reduction or removal of risks. Responses which identify different outcomes in different locations, over time or in relation to different groups of people are especially creditable.

Candidates will probably:

L3 Produce a high quality assessment, well-founded in detailed knowledge of the chosen context(s). Impress by overall perspective and clear identification of the measures and their varying effectiveness. [12–15]

L2 Develop a response of sound quality which is good in parts, but which remains limited in perspective, detail and/or the assessment offered. At the lower end may consider effectiveness quite broadly. [7–11]

L1 Make one or more basic observations about environmental protection. Respond quite generally or descriptively, offering little or no assessment. Fragmentary and note-form responses remain in this level. [0–6]

[Total: 25]

Example candidate response – grade A

4. a) Air pollution is largely caused by industrial manufacturing and electricity producing processes. Factories such as the ones lining Rayong Province of Thailand degrade the quality of the air by expelling byproduct gases from their manufacturing activities into the air. Electricity production in Thailand also relies heavily in coal and fossil fuel burning which creates excessive carbon dioxide release into the atmosphere.

To an extent, gases released from the exhaust pipes of vehicles also contributes greatly to city air pollution, especially in cities such as Bangkok, where public transportation is not effective and there is a lot of private vehicle use. Vehicle maintenance laws in Thailand is also not very strict and old vehicles with faulty internal catalysts release excessive amounts of carbon dioxide and toxic gases to contribute to air pollution in the city.

The toxic gases released from volcanic eruptions is one of the world's greatest air pollution effects. Ash clouds can travel across through wind, block the sun, and cause changes in global temperature, as well as affecting weather patterns.

4. b)

^{That}
The marine environments, particularly on the South of Thailand in the Sattahip Province is currently at risk due to excessive tourism and irresponsible waste management from manufacturing factories.

Poorly managed tourism causes the beaches of Sattahip to be full of litter and garbage. The sea is also dirty from this and the dumping of industrial waste, often illegally. From all these chemicals, as well as change in temperature of sea water, corals in the area have all suffered from excessive bleaching and is at great threat. ~~sea turtles~~ Tropical fish in the area are also starting to disappear, with ^{some} ~~more~~ species sometimes only present in captivity and ~~not~~ no longer present in the wild. Sea turtle breeding grounds have also been disturbed and destroyed by the use of beaches in tourism such as setting up restaurants and parking speed boats.

To protect and preserve the area, the Royal Thai Navy, with a base ~~at~~ navy base in the area, employs trained experts to study the areas, especially to investigate the excessive coral bleaching. Most of the Sattahip Islands are currently closed off from tourists by the navy, and the areas are slowly rejuvenating from the tourism impact.

4. b) continued Breeding facilities are also set up on the mainland for sea turtle conservation. This is set up by the navy as an educational site where locals and students can learn about ways to protect and preserve marine species. Turtles are also reintroduced to the wild in batches once grown, and lots of youth volunteers are involved in this project.

Scientists initially attribute the coral bleaching to global warming causing increased water temperature. To this day these studies have yielded no real solution to solving the coral bleaching problem. Sea turtle conservation has proved successful, but the marine environment on the whole, which is dependent on the coral reef, is still at risk. A large part of the problem is the political corruption going on in the area with politicians, businessmen and navy officers. This is quite common in a NIC/LINC such as Thailand and is causing great degradation of the Sattahip coral reefs.

So far the measures taken to preserve the corals and turtles of Sattahip have been sound in theory but not very effective in implementation. Coral bleaching continues to occur and corals are dying everyday. Turtles are released into the sea with no coral reef habitats to depend on. Locals in the area also lose income from the closed off tourist areas. The environmental future of the Sattahip sea is currently uncertain.

Examiner comment – grade A

The response to (a) is careful to identify 'the main sources' of air pollution and introduces a number of them in a judging and weighing manner. Three human and one natural source are given. The human sources are exemplified from Thailand, but the examples remain quite basic and greater detail or specificity is needed in order to lift this piece into the highest mark band. For (b) the response is high quality and shows the use of an environment from the home country to very good effect. It combines local knowledge and understanding with conceptual insight into the functioning of the ecosystem and environmental management and with effective assessment. What could be a bland judgement by way of a conclusion is clearly appropriate in the circumstances. To move higher up the Level 3 mark band, greater detail (e.g. named locations, events, dates, leaders, attempts, statistics) is needed.

Mark awarded = 20 out of 25

Example candidate response – grade C

4a) Air pollution is the term given to the human or natural emission of impure substances into the environment. When the air becomes so impure that it hinders or harms normal human activity, it is said to be polluted. Air pollution occurs due to mainly human factors. Industrial development, vehicle activity and garbage disposal can be causes of air pollution.

One example is that of Electricity generation using fossil fuels. The burning of coal to produce electricity in China leads to high levels of Sulphur dioxide and carbon dioxide. The smog often moves towards cities too, reducing visibility and leading to breathing problems. Another source of air pollution is that of Combustion engines in motor vehicles. The burning of petrol emits high levels of carbon which pollute the air. Smog levels in New York, USA reached new highs due to (high ~~pollution~~ number of vehicles in the city.)

A third source could be that of incineration of garbage. As most waste is burnt, it emits toxic gases into the environment. Sometimes plastic bags and batteries are also burnt which emit highly toxic gas.

The burning of cow dung or bio-fuel for energy emits high levels of methane in the villages of Pakistan and India. (Fuelwood may also be used as energy which emits sulphur). Industrial factories, ~~manufacturing~~ also produce pollutants that are ~~are~~ released into the air. Specifically, steel industries produce many gases that are released untreated, as catalytic converters are ~~not~~ in use. Chlorofluorocarbons or CFC's are also released due to aerosol sprays and even fridges and air conditioners.

There are ~~number~~ causes of air pollution too such as the eruption of volcanoes that emit high levels of smoke and ash. For example, last year's eruption of the volcano in Iceland emitted such large amounts of ash that air travel was dangerous. (Wild fires and forest fires in Russia and Australia also produce ~~dangerous~~ toxic waste as they burn wood.)

Air travel is also a large source of air pollution as fuel is used in large amounts. ~~but~~ a range of pollution sources. Some examples:

b) In cases where air pollution reaches unbearable limits, measures ~~have~~ have to be taken to save the environment in danger. An example of such measures is the case of the Taj Mahal in India which was severely ~~damaged~~ damaged due to high carbon levels around the area.

When the Taj Mahal's white marble started

In discolour, more effective measures were put in place to protect the national treasure.

The area around the tomb was closed to thoroughfare. High tolls were placed to discourage vehicular movement around the tomb. Cycle-driven rickshaws were provided for tourist movement in the vicinity. All these measures reduced carbon emissions around the tomb. Protection was ordered and the tomb's heritage was protected. However, the effectiveness was limited due to certain failures. Firstly, vehicles outside the forbidden area still moved ~~abundantly~~ freely and were ^{many} ~~abundant~~ in number. The emissions from these cars could not be stopped from reaching the structures which may harm the marble. Corruption and lack of political will also caused the rules to be relaxed at times and strict enforcement is overlooked.

Another case is the control of smog level in Hong Kong. At times the smog levels had reached so high that visibility was reduced significantly. The level of carbon dioxide was many times more than the permitted levels. Congestion charges were enforced. These charges placed an extra cost on people commutes travelling through the city centre at peak times. This was done to encourage private car movement. Another method adopted was that at high taxes on car ownership as well as subsidised charges on public transport to encourage public transport. Coal-fired power stations were shut down near the city and industrial firms were required to install catalytic converter.

These steps reduced smog levels significantly.

Another example is that of the Cuyahoga river. Industrial waste entering rivers as well as extensive fertiliser use polluted the river to such an extent that all species of fish were wiped out. Eutrophication was severe and all marine life vanished. At this point environmentalist groups and agencies stepped in and cleaned up the river. One factor industrial waste being disposed in this manner. This led to too few fish again inhabiting the river and within 200 years, 75 species of fish were found in the river.

In 2010's Gulf of Mexico oil spill also put marine life at risk. The cleanup operation was a relative success as oil spill was contained, separated from the water and then collected by separate tankers. The cleanup was completed a mere month after the spill was stopped.

Level 2

Examiner comment – grade C

The response to part (a) is similar in character to that of the previous candidate, combining human and natural sources suitably. The exemplar content for the human sources is inadequate. That for the natural sources has some detail and is of better quality. The response to (b) would have been improved by an identification of the environments chosen at the outset as there are at least three, of varying levels of development and detail. Overall the work is strong on 'the measures taken' which are covered at some length. The quality of the assessment offered is variable and there is insufficient attention given to what 'effectiveness' might mean in these contexts. The last example of the Gulf of Mexico ends abruptly and may be unfinished. Answer quality could be improved by a less ambitious attempt (taking fewer environments); by paying more attention to some of the key ideas in the question, such as 'at risk'; and by focusing on assessment, as in the Taj Mahal example, rather than taking a more narrative approach.

Mark awarded = 14 out of 25

Example candidate response – grade E

4(b) The main sources of air pollution include industrialisation, vehicles, and urbanisation, CFC and high population density.

Increase in industrialisation¹ responsible for the most causes of air pollution. They release pollutant gases such as SO_2 , CO and CO_2 . Industry release the pollutant gases in their course of functioning¹ of their manufacturing process.

Burning¹ of vehicles' petroleum can release the harmful gases from the exhaust. If there is an increase of the use of vehicles air pollution will also increase. Urbanisation is the increase in development, raise in development will encourage the necessity of using vehicles as it is part of the demand at increasing standard of living. Thus the number of vehicles use will rise¹ also the air pollution.

Refrigerators, air coolers and other electrical equipment may contain a group of chlorinated chemicals called chlorofluorocarbon (CFC). This chemicals is¹ a potential pollutant. If large amount of such equipment use in a small scale geographical area (urban area) it will produce air pollution which endangers environmental and ecological system.

High population density also can cause air pollution. This is happen when their constant intake of oxygen and release of carbon dioxide will cause a change in the composition of air.

(b) Some of the measures that can be used to protect environments is by the enforcement of law. By doing this, environment can be protected by encouraging people the behaviour of 'take nothing but photographs, leave nothing but a foot prints'. This quote should be displayed on a sign board such as at recreational park or archaeological sites. Imposing some amount of fines also can be useful for those that cause a destruction on environments. ~~These~~ Thus, rules and regulation need to be needed so that people may know what have to do and what should not to do. Accessing permits' can be helpful so that it can limit the number of people visiting the area and make the place hard to access. ~~This~~ less number of ~~the~~ people entering the area might unpollut (~~the~~ natural environments.)

- ✓ Advertisement to through posters, media and distribution of ~~brochures~~ or leaflet to mention to people of the importance of protecting environment also require, so people will be more aware and understand the motive of protecting environments. To make people more aware, the awareness program and campaign can be include as a measure to protect environments.

Measures (Idea, without assessment)

However, there are some limitations to some of measures of protection. This is because, the enforcement of law is not standardised internationally. Another thing is, different countries have different government priority. Some government will put high priority on military defences, foods or education. Level of education also included as part of the limitations. If the literacy rate of one country is low, it would be difficult for them to understand the importance of protecting environment and they might not able to read what have been mention on the posters.

Examiner comment – grade E

Overall, the candidate shows a general grasp of some basic ideas about the environment; it is the lack of exemplar content in both parts which is the principal limitation on performance. The response to **(a)** is broad, general and makes a clear attempt to identify 'main sources', as required by the question. The inclusion of "high population density" and the effects of breathing were not credited. The candidate may have overlooked the beginning of the question 'With the help of examples', or lack such content, for no examples are to be found. In **(b)**, clear attention is paid to 'measures' but the approach is inadequate as no environment is identified and there is just the use of the phrase "the natural environments". Credit is given within Level 1 for the broad understanding of some kinds of measures, such as laws or fines, but the assessment that can be done in the abstract is very limited and not really what the question is about. The answer needs one or more examples of named, located environments as a basis in order to become concrete and real.

Mark awarded = 10 out of 25

Question 5

Global interdependence

Only one question may be answered from this topic.

5 Fig. 3 is a cartoon showing one view of global interdependence.

(a) Describe and explain the relationships between MEDCs and LEDCs in relation to giving and receiving different types of aid. [10]

(b) Consider the view that the costs of receiving aid are far greater than the benefits. [15]

Fig. 3 for Question 5

Global interdependence as seen by one cartoonist



Mark scheme

Global interdependence

5 Fig. 3 is a cartoon showing one view of global interdependence. [10]

- (a) **Describe and explain the relationships between MEDCs and LEDCs in relation to giving and receiving different types of aid.**

An open question allowing candidates to use the material that they have; any forms of aid are acceptable, e.g. relief aid, development aid, tied aid, etc. The **relationships** are complex and various. Much depends on the examples chosen. Look for specific detail as part of the description and a measure of analysis for the explanation. Aspects of power and influence, history, neo-colonialism, etc. may be pertinent. The cartoon, if referred to, shows South America and Africa pinned to ?an institution in an MEDC, presumably, by dollars.

Please mark on overall quality, bearing in mind three levels of response and the mark bands **0–4, 5–7 and 8–10**. For a general response without examples **max. 6**.

- (b) **Consider the view that the costs of receiving aid are far greater than the benefits.** [15]

An opportunity to undertake some basic cost/benefit analysis (CBA) and to use the example(s) a candidate has. Costs and benefits may be economic, social, environmental and political; short, medium and long term. The scale may be national, regional, local, communities and individuals. A consideration of dependency is likely.

Candidates will probably:

L3 Develop a high quality response, offering a consideration which is distinguished by its conceptual basis, contemporary knowledge and overall perspective. [12–15]

L2 Provide a response of sound to good quality, which is satisfactory as far as it goes, but which remains underdeveloped in detail, scope or in the consideration given. [7–11]

L1 Make a response which is more a description than a consideration, or which may simply agree with the question. Write broadly or generally about outcomes, rather than CBA. Offer fragments or notes. [0–6]

[Total: 25]

Example candidate response – grade A

5 a) The most notorious relationship of giving of aid is that it would be of MEDCs to LEDCs in order to redistribute wealth or offer some sort of help. However aid can take many forms. Multi-lateral aid is independent world organisation such as the WTO giving large sums directly to LEDCs as a genuine gift. Domestic governments decide individually how much to give to this. Bi-lateral aid also known as aid aid is i) the view that the giving of aid is to be repaid, for example if one country gives another many things this has to be spent on those goods or ii) if one country is paying for this scheme it has to contract builders from the donor country. The last type of aid is emergency aid given by both governments and multinational charities. Finally aid can occur from charities where donations are made and given away from political impact. These types of aid will be looked at the relationships of MEDC's and LEDC's

In relation to these types of aid.

Multi-lateral aid is archetypal and usually direct giving money from many MEDCs to LEDCs. However as the cartoon shows this can create an MEDC dependency from LEDCs where the aid has no help coming and coming.

Tied aid again is usually MEDCs to LEDCs but creates a kind of in debt relationship kind of like terrorism where the LEDC is always trying to pay back. A recent example is Australia giving to Indonesia, partly still helping Banda Aceh from the Tsunami of 2004. ~~and to try and~~ However only 9% of the aid ever gets to Aceh and over 45% of the money gets spent on Australian goods. From 2005 to 2007 over \$2 billion was given and the trade relationship is worth ~~over~~ over \$7 bn. It builds trading partners but it is like debt with conditions attached.

Another example was the UK building a dam in T

However Emergency aid doesn't have to follow the MEDC & LEDC relation

ships and cars over there is a natural disaster as seen with Australia with the Queensland floods they received aid from much less economically developed countries. And LEDC's often donate.

More recently as seen in the aid budget the UK give large amounts to India and China and an objection is that why are we giving to country's both with space programmes and has not been seen as MEDC giving to another MEDC.

And aid from charities such as Oxfam go directly from MEDC's to LEDC's.

partial approach

b) (i)

Adv

- can provide big infrastructure
- really help ✓
- key after disasters ✓
- long term is very effective ✓
- promote incentives

Disadv

- dependent ✓
- tied ✓
- kill economy ✓
- corruption ✓
- places it needs. rarely
- don't know how to ...

PITs

5 b. The question asks whether the benefits that can be achieved from aid outweigh the possible disadvantages. The advantages from aid will be looked at followed by the disadvantages and then see whether the costs out weigh the benefits in the conclusion.

The first advantage of aid is that if it reaches the areas of need it can make a big difference to individuals, it can bring people out of absolute poverty, provide drinking water and medicine. An example is in Somalia a charity has been set up and thousands have lost their sight due to water borne diseases and with a £12 donation someone can have their sight back. Aid can give help to individuals in form of basic amenities to healthy care that undeniable help.

The second advantage of aid is that if given in the right way can be on a large scale benefits. The phrase from Oxfam: 'give a man a fish it will feed him for a day, teach a man how to fish it will feed him for a life time'. It can provide people with skills and technology that can make them

rely on themselves and is a long term solution.
 Aid can give people techniques and teaching
 that are free from dependence and
 help them produce for themselves for
 a long time.

Another advantage of aid is that it can
 really help after disasters and help
 provide basic amenities that wouldn't
 be present otherwise.

Lastly, it can improve the economy that
 so that in the long term the
 aid shouldn't have to be given. For
 example the UK have built up bases
 in Nigeria's infrastructure of roads +
 technology and schools and long term
 supply side policies. and in certain
 areas the economics productivity has
 increased per head. However aid
 has been seen to outweigh the
 benefits.

The first disadvantage is that it can
 encourage dependency on the source country.
 for example if every month a country
 receives a lot of food given then
 it provides no incentive to produce
 their own food and local production
 will cease and the receiver just ✓

becomes so reliant, this is a major problem. i) the donor takes their money out for example due to recession. Aid in some forms can make people and countries very dependent on it in the long term.

A second disadvantage is that the aid given can be used mainly the country that receives the aid has little to re-spend it to the donor. For example the aid that the Australian government gives to Indonesia under the Hhlc of help post 2004 tsunami. 45% is spent on Australian goods and only 9% reaches the area it is supposedly intended.

A third disadvantage is that it can really spoil an economy. And appear to be aid but instead be benefitting the MEDCs. An example of this is that in 2004 the WTO put a stop to the EU buying all domestically produced sugar for a much higher price, all the surplus. They put a 150% import tax on sugar. And then dumped it all in the form of 'aid' {w}

in LEDC countries. This is then sold for an extremely low price or given away. This to the MEDC seems great giving away as a gift but on a small scale the sugar farmers who are producing sugar in the LEDC are being forced out of business destroying their income.

A further disadvantage is that aid can offer corruption and the receiver government claims it is going somewhere when actually it is going to politicians, government officials and others not to the people in absolute poverty who really need it.

Moving on from this the places that really need it never get it. For example Burkina Faso in 176th out of 178 in the level of poverty but doesn't receive anywhere as much aid as some countries due to not having favourable political ties or nothing to offer back in the form of tied aid.

The last disadvantage of aid is that it is often given in the form of technology but there is real problems with this because the locals either can't afford to run the technology and/or

don't know has to and they have /
and it is effectively useless.

Harris assessed the costs vs the benefit
one would tend to agree with
the Hitler quotation that the costs
of aid are greater than receiving it.
But if aid is given in the right
way it can be effective and is
crucial for natural disasters —

Examiner comment – grade A

Although the question asks about 'relationships between MEDCs and LEDCs', the way in which the response is written suggests that the candidate has taken the last phrase, 'different types of aid', as the organising principle. It proceeds from one form of aid to another, showing understanding of each, but the relationships remain broad and general and are mainly about the direction of aid flows. It is good to see a reference to the cartoon in Fig. 3, but the attempt is unconvincing in the interpretation given. Although the work starts generally a number of recent examples of giving and receiving aid are included. The connections to debt and to trade are, in this context, acceptable. Response quality could be enhanced by some sort of overview, by close observation of, and reflection on, the cartoon and/or by some development of the nature of the relationships, for example in relation to colonial ties or strategic priorities in aid budgets. The high quality response to (b) is a true consideration and shows skills in cost/benefit analysis (CBA). It is simply and effectively structured and moves from the general point to exemplar support with ease in several places. Most of the response consists of developed advantages and disadvantages, one per paragraph, some of which are very good. The concluding paragraph offers an overall assessment which could be expanded on for further credit. Higher awards in Level 3 could be given for an integrated and weighing approach to assessment; fuller detail, perhaps developing example and counter-example; or by deconstructing the idea of a 'view', maybe considering other perspectives and whose they are.

Mark awarded = 19 out of 25

Example candidate response – grade E

5a The relationship between MEDC's and LEDC's in relation to giving and receiving different types of aid.

The more economically developed countries help the less economically developing countries by giving them two types of Aid:

Bilateral - Is when the richer nations provide loans to the poor nations in exchange that the poor nation would buy it's good manufactured goods and services e.g. Kenya is loaned money by the Chinese government in exchange of the cost of building the Kenyan roads

by the Chinese government would be cheaper than any other MEDC willing to give the roads in the country

The Multilateral aid - This when the richer nations give the money to NGOs or UN in order to help the poorer nations in order to fix up something in their countries. The EU donates money to the World Bank or the G8 summit provides the money to the World Bank and see which nations require the aid the most.

Voluntary Aid - Comes in when a country isn't able to sustain or recover from an event e.g. Haiti LEDC countries was voluntary aided by the most of the countries in the world because the country was capable of recovering by it's own. This was from the Haiti 2010 earthquake which also destroyed the city.

Also MEDCs e.g. Japan was hit by an earthquake 9.0 on March 11 2011 and also a tsunami the impact

Japan so hard that it needed voluntary aid for its people because it wasn't able to do it by itself. Voluntary aid would consist from medical, food, donating to the countries indeed and also services to benefit them e.g. trucks from the U.S.A had to come to Haiti and remove breakdown the huge numbers that the men wouldn't do and also clear the paths so emergency services transports would be easier.

see part of the topic 2020

- 5b. **Explain the cost of receiving aid are far greater than their benefits.** Receiving aid would help the countries that are in need to recover back to normal if a country has been hit with an earthquake or a natural hazard with them receiving the amount of aid it would lift them higher than before or in that case fit with the receiving aid it would creates more jobs in the service sectors and also improves infrastructures to help minimise the damages that wouldn't be implemented if another natural hazard was to occur. It would also increase the economy of that area. Receiving aid would be more supportive course in that the country that is being aided wouldn't payback all there is to do it's just able to recover and continue to trade their goods and services to the rest of the world. The receiving aid also makes it gain in for both countries e.g. Kenya roads are made at a lower prices than any other MEDC would offer in because we are buying goods and services from China in return. Also with the multilateral aid NGO being given money to support the poor nations in that the countries are receiving aid from NGOs and support through other connections that would benefit have positive impacts to the receiving countries.
- The benefits of aid is that to what extent are the countries going to be receiving the aid; its governments benefit in that they don't use their income to support

5b Or they use very little on supporting on what the receiving aid is trying to support. unclear.

Benefit would be there for a shorter term process this would mean that the growth of the economic because of the benefits of the aid wouldn't be enough.

But Benefits at the same time would have an advantage in that they would create multiplier effects which would benefit other sectors but with better shorter terms.

Examiner comment – grade E

The response to **(a)** is of the right intention, but remains partial. The candidate identifies that there are two types of aid, but then appears to write about three (bilateral, multilateral and voluntary). There is some awareness of recent events shown, such as in Haiti. Not all the ideas advanced about aid are firm. The relationships in the question are described mainly in terms of connections and direction of aid flows. The response to **(b)** is relatively brief. It is a similar length to that for **(a)** even though the mark allocation is substantially more. Rather than following the command word and offering a consideration of the view given, the candidate seems to accept the view – in the first sentence – and then try to explain it and support it. This is encapsulated in the Level 1 descriptors. The positive emphasis, on benefits, makes for an inadequate approach to a much broader issue and the writing is general except for the mention of China. The quality of the response would be enhanced by the inclusion of costs and so greater balance; an evaluative rather than an explanatory approach; and specific exemplar content.

Mark awarded = 10 out of 25

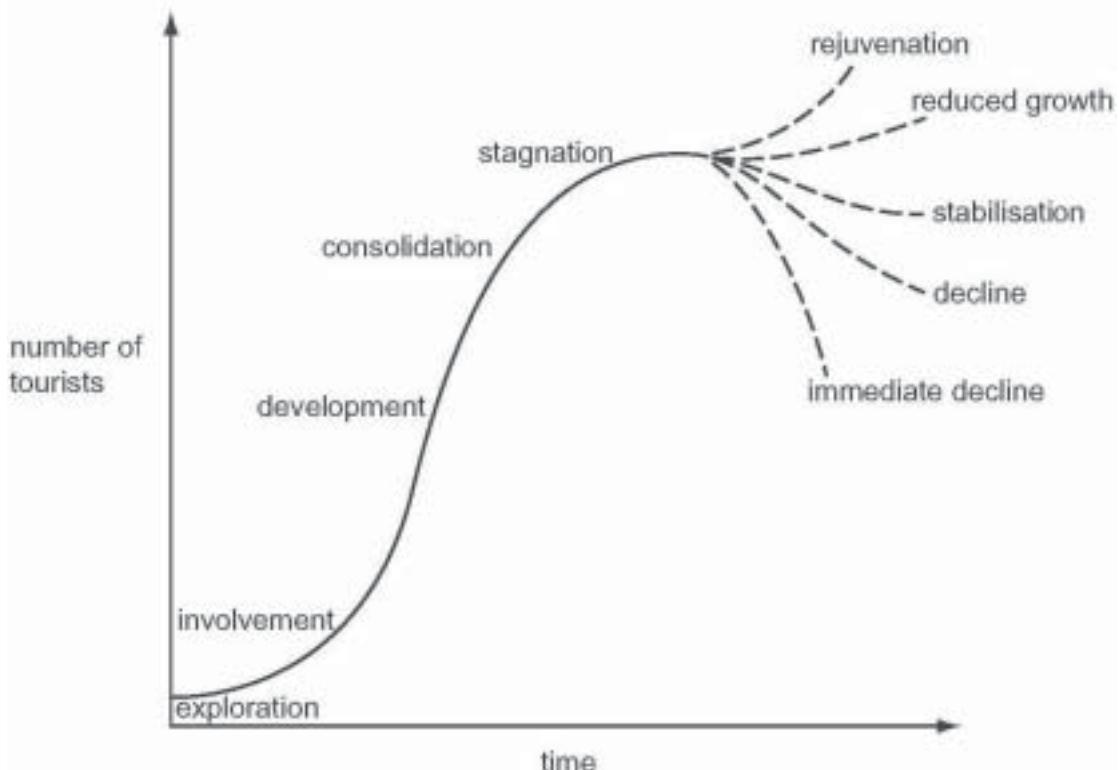
Question 6

6 Fig. 2 shows the tourism life cycle model.

- (a) (i) Describe how the character of a tourist area or resort may change between the stages of 'development' and 'stagnation'. [4]
- (ii) With reference to examples you have studied, outline the factors that may influence whether a tourist area or resort experiences 'rejuvenation' or 'decline'. [6]
- (b) To what extent is it inevitable that ecotourism will eventually lead to the same problems as conventional tourism? [15]

Fig. 2 for Question 6

A life cycle model of the development of resorts and tourist destinations



Mark scheme

6 Fig. 2 shows the tourism life cycle model.

- (a) (i) Describe how the character of a tourist area or resort may change between the stages of 'development' and 'stagnation'. [4]

Familiarity with Butler's model will allow description of the changes that are likely to occur between the named stages. 'Development' describes the point when mass tourism takes off, so the resort will be busy, successful businesses may encourage a 'spread effect', foreign travel companies/external organisations may dominate. There is conflict between locals and tourist, possibly, as traditional activities are threatened. New buildings continue to be built. Consolidation follows in the upward curve. By contrast, 'stagnation' sees the resort as no longer fashionable, the buildings/facilities become rundown as visitor numbers have peaked. Some buildings are not completed, businesses close, etc.

- (ii) With reference to examples you have studied, outline the factors that may influence whether a tourist area experiences 'rejuvenation' or 'decline'. [6]

Credit understanding of the two outcomes 'rejuvenation' and 'decline'. Sometimes an element of decline is reached before intervention takes place. For example in the case of some Mediterranean resorts, visitor numbers tailed off, infrastructure deteriorated, reputation fell and environmental image diminished. The factors that influence whether this is turned around would be government intervention – at either a national or regional level and local business climate/entrepreneurs. Credit the use of examples and conceptual understanding of the two stages.

For a theoretical response without examples, max. 4.

- (b) To what extent is it inevitable that ecotourism will eventually lead to the same problems as conventional tourism? [15]

An opportunity to consider the role that ecotourism may play in the future of a sustainable global tourist industry. Look for understanding of the meaning of ecotourism and recognition that there are problems associated with it (economic, social, environmental, political). The words 'inevitable' and 'eventually' are open to interpretation by the candidate.

Candidates will probably:

- L3 Offer a strong, overall assessment of the character of ecotourism, linked to conventional tourism in an evaluation of its outcomes real or potential. Example detail is used to enhance the evaluation in a response which impresses by its perspective. [12–15]
- L2 Make a sound attempt to evaluate the impact of ecotourism which may be good in parts. Discuss some of the problems of conventional tourism and relate them to ecotourism. Respond appropriately, but with limitations in exemplar detail, structure and/or understanding. [7–11]
- L1 Give a few basic points, maybe describing some aspects of ecotourism or conventional tourism. May write generally, lacking a focus on the question and offering little or no assessment. [0–6]

[Total: 25]

Example candidate response – grade A

(6a)

X

A tourist area may find itself increasing in size and capacity to cater for more tourists during the development stage of the butter model. This may be because the area is becoming more popular and vibrant and the 'want' to visit the area may be increasing. So the tourist area may become more upmarket, raise its prices, increase advertising and improve its facilities. However, the stagnation may occur as a result of a change in consumer choice factors, too high a price hike or just better competition somewhere else. The character of the area may become a little rundown as the area becomes harder to maintain due to lack of income. In order to save costs, certain facilities such as vending machines, pool tables may be closed down or sold. The overall area may begin to look old-fashioned, not up with the times, and a little boring.

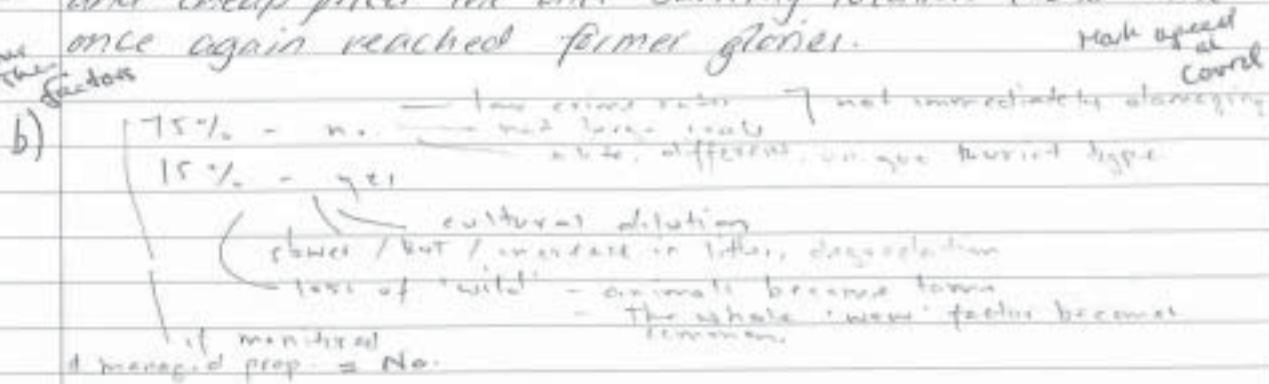
1/2

H

(ii)

The main reason depicting a tourist area's 'rejuvenation' or 'decline' comes mainly down to motivation. For example, Majorca in Spain is now entering the 'rejuvenation' stage because they've branched out and aimed at another form of tourism known as 'Agricultural Tourism'. Here people come to view majestic apple and orange orchards, go fruit picking or even on tours and family picnicks to see how the locals originally lived. The increase of tourists to the area once more (as to do with increased advertising, aiming at a different era and class of tourists). Furthermore, the will and ability to put large sums of money to good use to knock down old-run down buildings and create green, eco-friendly spaces.

makes the region more aesthetically pleasing to tourists too, making them want to return. However 'decline' can occur for a number of reasons too. For example, Lang Tengha Blue Coral Beach Resort on Lang Tengha Island, Malaysia declined dramatically and eventually shut in late 2005. Whilst it had been buzzing with tourists during the summers of 2001 - 2003 the resort's owners got complacent. The beach shacks became run-down, there was no variation in the food and the place was left untidy: no cut-grass, unclean pool etc. This, combined with the opening of a brand new 5-star hotel over the other side of the island was the deciding factor and the resort closed. However, if attempts to refurbish and heavily promote the resort once more, a long with initiatives such as package deals and cheap prices the once bustling location could have once again reached former glories.



Eco-tourism is a modern-day form of tourism appealing to a more contemporary type of tourist - with the aim of educating and reducing our impact on the land. By giving back to and working within the environment the damage is low impact.

This form of tourism has only recently been getting

extremely popular, within the last 10 years. Due to a growing conversion from contemporary consumer tastes to something beneficially and lower thrill, more tourists are visiting areas such as Sarawak, Malaysia with the intention of providing for our future.

I do not believe that the majority of eco-tourism will eventually end up like conventional tourism for several reasons. Firstly, the type of people that this form of tourism is aimed at are ~~not~~ conventional. They are ~~not~~ looking to get drunk and party over the weekends like much of the Western world's youth. These people are often older couples or families that want something more relaxing and that provides a greater benefit. This means that such an are won't experience ^{much} noise pollution, litter or even crime because the nature of the people embarking on eco-tourism are very different. You choose this form to ~~Grade~~ all that and reduce such impacts. For example, during forest tours in Sarawak you're constantly reminded to remain quiet and 'take nothing but photographs and leave nothing but footprints' because these companies pride themselves on aiding the eco-system, on benefitting it.

Furthermore, that conventional tourism is very large scale and eco-tourism will never become like this. It will become popular but there will never be 100s of people on one tour because it isn't aimed at catering for that. Its intention is low impact benefits. More people means more management and this alone is harder.

However, in the long-term some things may begin

to go the way of conventional tourism. Such as the wild-life. In Sarawak Orangutan sanctuary's there primates are becoming more and more tame, meaning that the projects are losing their sustainability. This alone is the complete opposite to the eco-tourism aims. Furthermore, Cultural dilution may begin to take shape. Much like the how the thousands of visits to Machu Picchu has led to Sherpa's drinking coke, wearing baseball caps and jeans. The same is happening to the inhabitants of the long-houses in Sarawak, Sabah and Borneo. Tourists to these 'houses' are encouraged to help the locals by buying food for them and bringing along resources that are everyday to us, such as stationary, board-games, clothes and even fishing rods. And although in the short-term this can be beneficially it can be damaging over a longer period of time. Especially as the locals will become reliant on the things given to them.

In conclusion though I believe that if all aspects of eco-tourism are carefully planned, executed and monitored then the damaging factor will be very limited. But overall, I feel that eco-tourism may become more popular than 'conventional' tourism but I don't ever think it'll experience the same problems. Although you can never completely eradicate littering or small amounts of pollution.

Examiner comment – grade A

In both sub-parts of (a) the candidate demonstrates good understanding of the tourism life cycle model. In (i) a little time and effort is wasted giving reasons for the changes, when the command word is 'Describe' and no mention is made of consolidation, but the focus on 'character' is firm. In (ii) there is an admirable attempt to identify 'factors', such as "motivation", but it could be made explicit who is involved in rejuvenation, such as national government, local planners or entrepreneurs in the tourism sector. The candidate uses good detailed contrasting examples. The response to (b) is well-written and presents and develops a personal perspective, addressing both timescale and spatial scale. There is good varied exemplar content about ecotourism and a management perspective is apparent, but overall the writing lacks the detailed content about conventional tourism to move higher in Level 3. More could be made of the content about its problems which is embedded in the coverage of ecotourism.

Mark awarded = 20 out of 25

Example candidate response – grade C

6aii)	<p>In the stage of development, there has been already increasing number of tourists to the tourist destination forming the major part of the local economy. There is little investments in the economy & and the tourists destinations are known to tourists. Next stage will be consolidation, where the ^{rate of increasing} number of tourist will start to level off and second class infrastructure is seen. At the stagnation stage, the tourist destination has reached its peak and it is about to rejuvenate or decline. If steps are taken to improve the destination from the stagnation stage, it will lead to a rejuvenation while if nothing is done from this stage, otherwise happens, leading to decline.</p> <p style="text-align: right;">1/0 Doesn't describe the next</p> <p>Kenya can be one tourist area that has gone through all the stages of the life cycle - exploration, involvement, development, consolidation, stagnation and finally decline. Kenya sells itself as a wildlife and safari type of tourism. This tourism largely depends on the wildlife animals which needs to be carefully preserved and conserved. Increasing number of tourists has brought about the decline in Kenya. Footpath erosion has occurred and animals ^{experience} fear the from constant large groups of tourists. This has caused them to not mate and neglects their young. This leads to extinction of or endangered species in the wildlife ecosystem which does not attract tourists anymore. Also, the but ^{seep} drivers are expecting tips from the tourists by driving really close to the animals. Exploitation of such towards tourists has caused tourists to turn away from Kenya.</p>
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Malaysia on the other hand experiences rejuvenation in the tourist industry after the ^{economic} crisis in 1997 and 1998 due to its diversified culture and heritage sites. For instance, Penang is one of the world heritage sites under the UNESCO World Heritage. Achieving this status has brought influx of tourists. With its diversified culture as a result of multi-racial community, tourists are able to experience celebrations of different races in certain time of the year. Penang also sell itself as a food junction where it serves gastronomical delights. With ^{efficient} transport system and network, international flights coming in has brought a lot of tourists to land themselves there. The tagline 'Malaysia Truly Asia' hence stands and proud pride itself as a country with various culture, heritage and traditions.

How does it and d 2 stages - factors implant

- (b) Ecotourism a form of sustainable tourism are in search of balance between the ecological system, biodiversity and the economic system of the country.

Ecotourism first of all limits and sets certain rule to the tourist destination. For example, in Ban Don Bay Thailand, they have come up with zonation for tourists to visit. The sanctuary zone is strictly prohibited, conservation zone is allowed but without plastic bottles being carried and the general use zone where ~~is~~ it is permitted for all. Regardless of those strict rules, the coral reefs in Ban Don Bay has still manage to attract tourist to Thailand causing further footpath erosion on the coral reefs. ~~This rather cause~~ it creates the same

problem to conventional tourism, only that it slows down the process of footpath erosion from occurring.

~~Interpreted~~ Ecotourism also limit the number of ~~which~~ tourist that can visit the place. This nevertheless still encourages tourism. Once there has been an activity for tourism, accommodation and infrastructure need to be provided for the tourists. Still, lands are being cleared for the construction of hotels, pools and entertainment centre. The construction of these buildings inevitably increases the erosion of soil if ecotourism were to be closed to a flora ecosystem such as in the Sarawak, orangutan jungle. Water table under the soil also being affected with construction of pools. This can be seen in Gta, where tourism has gone wrong. There have been no clean water for the people, and they are only subjected to two hours of usage of water each day.

Ecotourism and conventional tourism both causes negative economic impact to the country. There will still be leakages, regardless of whether import or export leakages. Most of the ecotourism destinations are in the developing countries, where they are not able to provide sufficient capital to cater for ecotourism, internationally. Transnational or multinational cooperations are the ones investing in the economy of the country, whether it is ecotourism or conventional tourism. In Thailand, there has been a 70% leakage in the economy, from

the activity of tourism.

Hence, both ecotourism and conventional tourism will eventually lead to the same problems. However, ecotourism will provide better environment for the country and allow long term growth which balances the biodiversity/biodiversity of the ecosystem.

Examiner comment – grade C

The description in (a)(i) appears to be derived largely from Fig. 2 with the exception of a few ideas such as "second class infrastructure". As such 'character' is insufficiently developed. The response is also broader than the question in that it continues beyond stagnation, so the last five lines are irrelevant. In (ii) the candidate takes Kenya for decline, but the selection of material is not disciplined and the 'factors' for which the question asks are rather limited. The example of Malaysia is taken for rejuvenation and is rather better done, although, again, the factors could be pointed up to good effect. For (b), the candidate shows knowledge of both ecotourism and conventional tourism and develops some useful ideas. The quality would be enhanced by an attempt to get at the idea of inevitability in the question; and/or by further specific examples. What is found about Ban Don Bay in Thailand is exactly what is needed; more could be made of the content about Sarawak and Goa. The conclusion is personal, rather bleak and, perhaps, not fully justifiable.

Mark awarded = 14 out of 25

Example candidate response – grade E

i (i) During development, the area is greatly reconstruct to build more facility and roads for easy access however reaching the consolidation, the area is now full of tourist with good attraction and services however due to this there is an increased in crime and old building stagnation meaning there is many old building in an area giving image of uglyness which made tourist to not want to come to the area and not only that there is a huge crime rate.

3/4

ii Example of country which experiences the rejuvenation stages is Costa Del Sol in Spain. The factors which enables Spain to rejuvenation is that they promote to rebuilding the building, employing new policy to reduce crime and protect the environment. However for declination stages would be Victoria Beach in United Kingdom where since there is many people still going there, with building worn out and building make building there is an urbanisation in economic terms however with crime rate high.

decline less clear

2/4

(b) Ecotourism will eventually lead to the same problems as conventional tourism depending on certain factor. One factor would be resources. When more people coming in meaning more resources is used up to keep with the growing of population which include local and tourists. When the carrying capacity exceed then ecotourism may end to conventional tourism.

Unstable economies can also be said as to when more people are coming, more building have been built causing disruption in forest which may eventually turned into conventional tourism. Another factor is when the disruption or disturbance of ecosystem when many people comes in roads have been built, more building which cause ~~cause~~ ^{the} the forest to be cut down and destroying the term ecotourism. Pollution rises due to traffic congestion and other factors which results in pollution problems. As more tourist kept coming in, crime rate increased. To be more precise when tourist comes into a country, there is a small changes some local doesn't have job ~~rest area~~ ^{the main} resulting in using crime to aid himself. These are the factors which may lead ecotourism to conventional tourism.

However there may be other factor which may lead to ecotourism to conventional tourism, one ~~part~~ of it may be because there is no strict policy in restricting the number of tourist. Because of ~~weak~~ policy, many tourist come in on ecotourism nation and cause problems. Another factor ~~sapping~~ would be in term of government when a government ~~financing~~ more tourists coming in more capital and by that meaning more building and attraction can cause unstable economies. Unclear

Examiner comment – grade E

This is a brief attempt at the question, especially in part (b) given the mark allocation and time available. Some grasp of the model is shown in (a). For (i) stagnation is the strongest element, but character is little explored. In (ii), poor expression and an uncertain example obscure the response and the examiner is left to identify the factors within what is written. The approach to (b) is brief and general, based around the concept of carrying capacity and the balance between resources and population. There is some understanding shown of environmental disturbance and of tourism-related crime, but unless the context is taken to be implicitly that of the candidate's home country, it reads as being unlocated and broad. In order to gain more marks, attention needs to be given to examples of what the problems of conventional tourism are and whether these are found already now or will ever be found in relation to examples of ecotourism. This would need developing at rather great length than is offered here.

Mark awarded = 10 out of 25

Question 7

Economic transition

Only one question may be answered from this topic.

- 7 (a) (i) Give the meaning of the term *foreign direct investment* and explain how it occurs. [5]
- (ii) With the help of an example, explain the meaning of the term *new international division of labour (NIDL)*. [5]
- (b) To what extent do you agree that globalisation creates more winners than losers? [15]

Mark scheme

Economic transition

- 7 (a) (i) Give the meaning of the term *foreign direct investment* and explain how it occurs. [5]

Foreign direct investment (FDI) is investment made to serve the business interests of the investor in a company in a different country from the investor's country. Classically, it involves a business and its foreign affiliate within a TNC and some element of interest and/or control.

FDI may be inward (received) or outward (given/made). Different types may be identified, such as greenfield FDI (investment in new plant or facilities when starting up), or mergers, which accounts for most FDI, enabling a TNC to expand. Mark holistically (definition/explanation), for one, max. 4.

- (ii) With the help of an example, explain the meaning of the term *new international division of labour (NIDL)*. [5]

A good explanation encompasses all the words and ideas here:
new it emerged recently associated with globalisation
international across countries in the global production network
division of labour work is split up into tasks/functions for efficiency.
 The example is preferably named and located, but may be generic.
 Mark holistically on quality (example/meaning of the term).

- (b) To what extent do you agree that globalisation creates more winners than losers? [15]

The key to the question is uneven development within the world economy. Candidates are free to develop their own approach and to interpret "winners and losers" at any scale. It is possible to argue that MEDCs (home to the majority of TNCs) win; that NICs also win (some more than others); that people who gain jobs and income win, etc. Those who may be seen as losing include workers in MEDCs where factories close; workers in LEDCs where hours are long, wages low, health and safety poor, etc; and those who suffer collaterally from environmental pollution, family breakdown, or from TNCs' relocation in search of the next low-cost location. Answer quality may be judged on overall argument, use of evidence and contemporary perspective.

Candidates will probably:

- L3 Offer a convincing assessment, addressing the question directly and providing an effective argument supported by detailed evidence from different locations. [12–15]
- L2 Provide a response which has a "satisfactory so far" quality to it, and which may contain good elements. The response may be unbalanced (focussed on either winners or losers), or top and tail a narrative about globalisation with evaluative comments. [7–11]
- L1 Make one or more simple statements about globalisation, but lack the material, conceptual framework to make more than a basic response. Notes and fragments remain in this level. [0–6]

[Total: 25]

Example candidate response – grade A

7ai Foreign direct investment is the money that is invested by foreign firms into the country. These investments may be physical things, for example factories, buildings, roads and infrastructure. They occur because of a variety of reasons. First of all, it may be because of the large and good potential market, such as Brazil and China, and the foreign firms are looking to make more revenues and expand their market. Secondly, the local governments may offer the foreign firm tax breaks, and so the firms invest there. Finally foreign firms may also be attracted the cheap costs of production there and so reallocate their factory plants in order to benefit from the economies of scale.

Good

7aii New international division of labour (NIDL) is the reallocation of factories, industrial plants from traditional MEDCs to LEDCs. It is a shift of the production line where the manufacturing process that requires less skill and training is now located to LEDCs, where the costs of the factors of production is relatively cheap. The MEDCs is now transformed into a more service based (tertiary sector) or where IT, research & development (quaternary sector) is now focused. An example of this is the company that produces 'bag-less' vacuum cleaners - Dyson. In 2002, it

has shifted its major manufacturing plant from the United Kingdom to Malaysia. The average salary in the UK is £9 an hour whereas in Malaysia, it is only £3 an hour. The yearly office rent is up to £114 per square metre and in Malaysia, it's only £38 per square metre.

and develop division of labour / other factors

- 7b. Globalisation is the process where economies are more integrated, so that there isn't really a set of boundaries. Some people call it 'the death of distance'. There are more capital flows in and out of different markets, and this could be in terms social and cultural exchange too.

One of the winners are multinational companies (MNCs). Because of the new international division of labour (NIDL), these foreign firms are now allowed to reallocate their factories and manufacturing plants into less economically developed countries. Globalisation has allowed this because of the cheaper communication and transportation costs. The low costs of production has allowed the firms to reduce their overall costs. The large potential markets such as Brazil and China has allowed them to expand their market rapidly and hence increase their profits. These two reasons enabled the MNCs to achieve economies of scale which have benefitted them mainly. One of the other winners are the workers in the LEDCs. Initially they weren't paid much through their subsistence farming and seasonal jobs. But now the

MNCs have provided them with a job that has a stable income. MNCs also provide training courses to enhance their productivity and skills. However, it may be argued that MNCs are exploiting on these cheap workers and that ~~as~~ they will only be able to do the low skilled jobs because the managers and brought in and so they don't have a chance to promote.

Secondly, one of the other major winners are the consumers. Because of globalisation, they are now available to a wider choice of products that are potentially cheaper. They could choose between products which encourages competition from firms wanting to win more market share. This sparks off innovation, R&D so that better products and improved services are available.

One of the losers, however are the semi-skilled workers in the MEDCs, they are now unemployed, because their original manufacturing job has now gone to LEDCs because of the NIDL. It may ~~be~~ difficult for them to find other jobs because they are low skilled and have little education.

In addition, one of the other losers may be the environment. It is possible that LEDCs have less strict legislation on the pollution levels, therefore MNCs are able to exploit on that and release as much carbon dioxide, sulphur dioxide as they want, thus contributing to global warming. (In conclusion,) I believe that globalisation has created more winners than losers. We are all benefiting from the low cost of communication,

transportation, instant updated news and huge advances in technology. We are also now more aware of the culture in different countries and their traditional values.

Examiner comment – grade A

The response to **(a)** is of high quality. The good definition in **(a)(i)** is especially clear in the explanation of how FDI occurs. This is both concise and strong conceptually. The explanation in **(ii)** is similarly accomplished and uses the chosen example skilfully with well-selected detail on comparative costs. The response could be enhanced by a little more content about other functions within the division of labour or by a little elucidation in relation to the 'new' of the term. The assessment offered in **(b)** is of Level 3 quality in terms of argument, the balance of the approach taken and conceptual understanding displayed. It is a rare and perceptive observation, for example, to cite the environment as one of the losers. The quality of the response would be improved by pertinent exemplar content to support and advance the general points made; the lack of place-specific or named content (such as particular TNCs) being its major limitation.

Mark awarded = 20 out of 25

Example candidate response – grade D

7. a) Foreign direct investment is the process of a ~~new~~ firm investing into another country to ~~make~~ expand itself. For example ST Microelectronics invested into Singapore to create a new factory there. This is FDI because a firm not present or started up ~~from~~ in Singapore invested in it i.e. they invested in a foreign country. They will have bought a site and paid local firms to build a factory there thus expanding themselves through FDI. So FDI is when a firm based in 1 country ~~invested~~ invests and moves part of itself into another.
- ii) The international division of labour is ^{the} idea that the world's labour is divided up and different areas perform different things. The new IDOL is the current make up of the world's labour. Therefore countries like Africa who are mainly into primary activities e.g. Farming, consist mainly of labour working in the primary industry. Countries such as Taiwan are mainly manufacturing and countries like the UK's division of labour is generally in the service sector e.g. banking, lawyers etc.

b) Globalisation is the idea of a greater integration of trade and dependence between countries. Over the last 100 years it has evolved and really taken hold in society & mainly due to transport and communications. However the real benefits only really come to those who trade and so far those who don't it is easy to leave out.

Through the advent of containerisation it is now 30% of the cost in 1930 to transport goods around the world. The result is countries like China and India, who manufacture large amounts of goods are being able to reap the rewards by trading with other countries. TNC's (trans-national corporations) are also able to exist since communications and cheap transport allow different stages of production to be outsourced to those countries with a comparative advantage, lowering unit costs. ST Microelectronics went to Singapore for example to take advantage of cheap labour to produce its goods. It employed 50,000 people there thus helping the local economy as well through the multiplier effect. The increase in trade doesn't help everyone though. The EU for example acknowledges that cheap foreign imports can undercut its domestic producers so cost while having free trade within it those who want to export to it have to incur tariffs and quotas making them less competitive. The reality then is that countries out of it will suffer relative to those in it. The WTO tries to encourage free trade and has helped those suffering because of trade blocks. Economically then, globalisation does help those who trade but means that domestic producers can get undercut if protectionist measures aren't implemented.

Socially there are also implications. Because of globalisation, TNC's have got bigger and bigger and thus more powerful meaning weak countries can be exploited. De Beers for example is the

World's largest diamond producer. It went into ~~Botswana~~ Botswana to mine their diamond reserves. Because of the cost of capital to mine them, Botswana couldn't afford to do it. De Beers came into the country, used their own labour, didn't implement any infrastructure and then left. There had been no improvement to the country and very little paid to the govt. In this instance then, socially Botswana lost out. And it is the same around the world. Globalisation has made companies 'footloose'. The idea is they have no incentive to stay in a country so if wages go up or another country offers them better conditions. This can be detrimental for a country or an area. Samsung for example came to the UK in the early 1990s. They employed several thousand but soon decided they wanted to go somewhere else, making these people redundant and leaving a bad looking factory behind. It has also led to the demise of industries like the UK clothing and coal industries. Other countries can do it more cheaply and so firms move there to do it. So although in most circumstances it provides more increased employment opportunities, it can have negative social implications.

There are also environmental problems. As firms try to maximise production they may cause damaging effects on the environment such as over intensive farming or increased pollution from factories. Although perhaps not an obvious issue of globalisation it is certainly present.

And finally politically there can be issues. There can be political disagreements present as a side effect of globalisation. For example there is pressure on the western world to provide aid to developing countries. Because of the ease of transport and large amounts of produce often made, surpluses of goods will be sent to the developing world. Therefore grain may go there on the intention of supplying food but actually it floods the market, driving down the price and hindering local businesses.

from succeeding.

So clearly the globalisation has served as a massive step forward and without it the world simply wouldn't be anywhere near as developed as it is. However it would be ignorant to suggest it was all good with some places having lost out considerably. However certainly as it has created more winners than losers.

Examiner comment – grade D

This uneven response is thin and brief in **(a)**. The approach to **(b)** is direct, more fully developed and of a more suitable length at this level and for the mark allocation. This response is slightly better quality than a typical grade E, but is included for what it demonstrates. For **(a)(i)** FDI is understood although the explanation is narrow. One reason it may be restricted is that it takes an example when actually it is in **(ii)** that this is asked for. By contrast, understanding in **(ii)** is less firm and the explanation advanced is simplistic and inadequate, being at the scale of sectors and countries within the global economy rather than the global production network of TNCs. The candidate uses their own term (IDOL), loosely, rather than the one given (NIDL). The response to **(b)** begins about trade but then broadens to cover other aspects of globalisation. It shows some appreciation of different dimensions (social, economic, environmental, political) yet the environmental content is about 'problems', which diverges from the question, and is brief and general. There is a sense in which the candidate seems to be struggling to use the question's categories 'winners' and 'losers' and to apply knowledge and understanding of globalisation in the manner it demands.

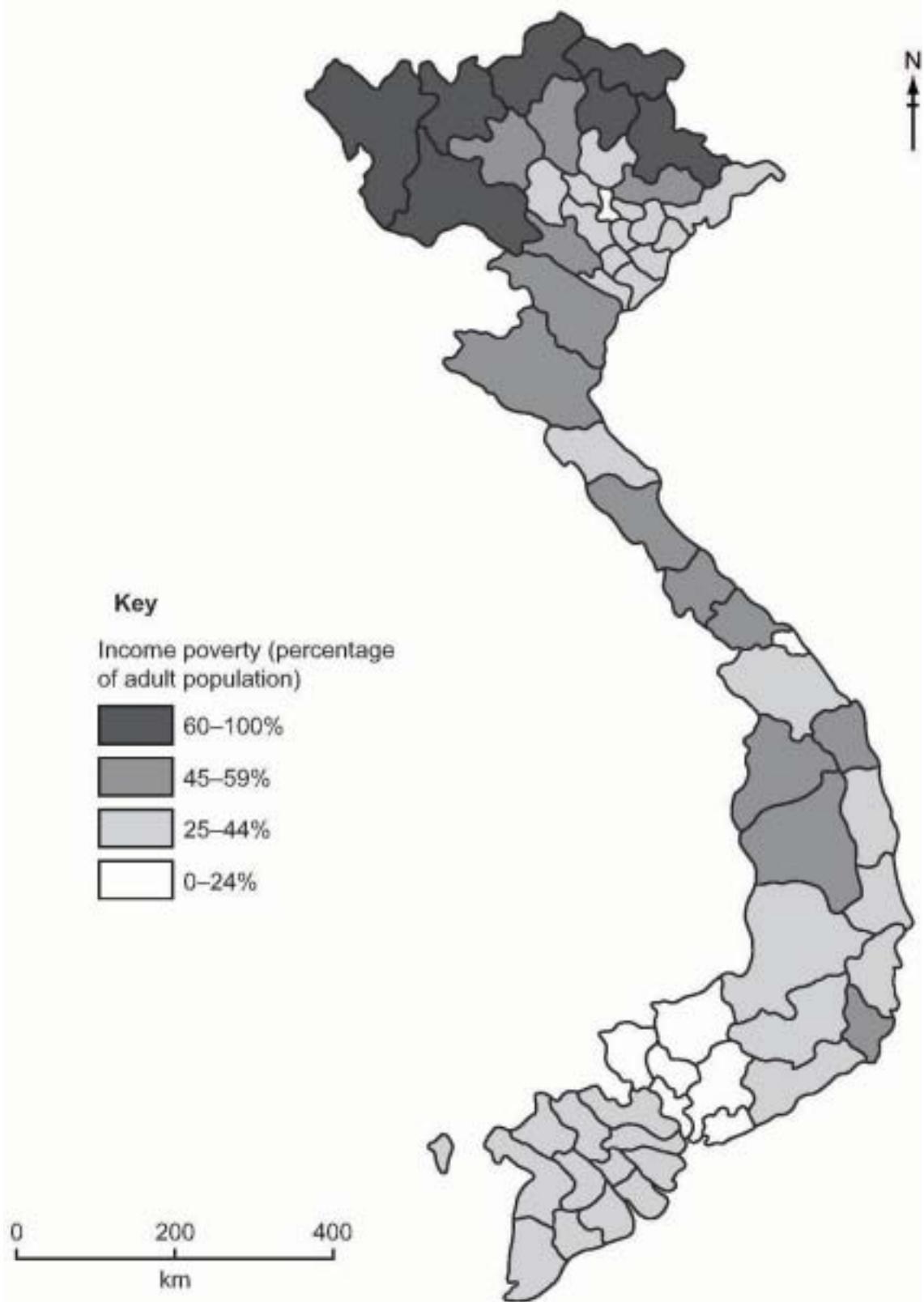
Mark awarded = 11 out of 25

Question 8

- 8 (a) Fig. 3 shows income poverty in Vietnam, an LEDC in Asia, by province, in 2008.
- (i) Describe the spatial inequalities in income poverty in Vietnam shown in Fig. 3. [5]
 - (ii) Explain the limitations of the index and the mapping in Fig. 3 for studying spatial inequalities. [5]
- (b) Assess why regional disparities within a country or countries are difficult to overcome. [15]

Fig. 3 for Question 8

Income poverty* in Vietnam, by province, 2008



* Income poverty means the percentage of adults who cannot afford the recommended minimum daily amount of food.

Mark scheme

8 (a) Fig. 3 shows income poverty in Vietnam, an LEDC in Asia, by province, in 2008.

(i) Describe the spatial inequalities in income poverty in Vietnam shown in Fig. 3. [5]

Clearest that income poverty is lowest (0–24%) in the south/SE provinces, a value found only in two isolated provinces elsewhere in Vietnam. There is no simple south–north pattern, as low levels (25–44%) occur in the NE and elsewhere. The highest levels (>60%) are found only in provinces in the north. High incidence of high values (45–59%) but no simple pattern, with clusters seen, e.g. in NW and centrally. Mark on overall quality and data support.

(ii) Explain the limitations of the index and the mapping in Fig. 3 for studying spatial inequalities. [5]

Index: ideas might include, the lack of \$ values, % data, the difficulty in subsistence economies or where the informal sector is important in determining poverty. No gender-specific data. Credit any valid ideas 3/2.

Mapping: areal units (provinces) hide local variations, e.g. rural/urban. Map is dated (2008). Much background information not shown, e.g. relief or economic activity. Classes are very broad (e.g. 60–100%), etc. Credit 2/3.

(b) Assess why regional disparities within a country or countries are difficult to overcome.

Regional disparities are the differences in levels of development between regions. Many governments intervene attempting to reduce these gaps, by enhancing the development of peripheral regions and/or by limiting development of the core. There are many reasons why disparities are difficult to overcome including cost, scale, the attraction and dominance of the core, harsh environments, regional economies, remoteness, political interests, inertia, etc.

Candidates will probably:

L3 Develop an effective assessment of the difficulty of reducing disparities in the chosen country/countries. Found the response on detailed evidence and show strong conceptual understanding of development. [12–15]

L2 Produce a sound response which lacks full development, but which may contain good elements. May approach the topic broadly, or 'top and tail' a narrative piece with some assessment. [7–11]

L1 Make a descriptive response and offer little or no effective assessment. Write loosely or quite generally about regional development. Show faulty understanding of regional disparities. Offer notes or fragments. [0–6]

[Total: 25]

Example candidate response – grade A

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- a) i) 60% to 100% ^{adult} people in northwestern and north can't afford minimum daily amount of food.
 45% - 59% ^{adult} people in middle between south and north and 3 provinces in north live under minimum daily amount of food.
 25% - 44% adult in northeastern, middle north, south and south eastern, can't afford minimum daily amount of food.
 only 10-24% adult in all provinces in north, one in middle and 6 in south western of Vietnam can't afford the recommended minimum daily amount of food.
- Overall, North Vietnam is poorer than South Vietnam according to income poverty index
Miner + Uso, Cambridge IGCSE
- ii) Spatial inequalities is not only depend on economic activity but also on resources own, education, social factors.
Income poverty is only one index in economic activity. More kinds of index need to be showed for example, GDP for different provinces, PPP for different provinces.
 For resource parts, Map should indicate areas which have different kinds of resources (e.g. coal, natural gas etc.)
 Social factors should also be showed like HDI, literacy rate and male/female ratio.
- If combine all index above, the studying of spatial inequalities will be more accurate.

b) China development face huge regional disparities in east China and west of China.

The main cause of the regional disparities is because of physical factor. In the west of China Tibetan Plateau with average altitude 3500m + sea level, lack of resources due to climatic condition and population is small too. However, in eastern of China, landscape is flat, many rivers across coast line is long. As a result 70% of industry activity, 80% of port transportation and 90% of foreign investment happen in east China.

In order to solve this inequalities, Chinese government set different policy to solve it. The major one is called 'develop west'. In order to develop transport, roads and services between east and west, Chinese government build Qing-Zang Railway which is the highest railway in the world. Every year over 3 million people go to west China through the railway. West China has many natural gases and oil so gas pipes build from west to east, this provide job opportunities for local people. The geothermal energy is also full their and Chinese government has a project called "west electricity send to east". Despite economic and resource factors, government try to help the western people through more social factors. For example, ^{children in} rural areas don't need to pay tuition fee after 2008. This can encourage children to go to school. More schools or technical schools are built in west region to develop education here. Free health care in isolated mountain regions are also included in the project. Chinese government also encourage companies in developed region set branches in west of China or hire more local workers to urban area. These people commonly work in toy, cloth factories. Their standard of living increase as they made more money.

Although these policies seem to be good enough to overcome

regional disparities. However, east China has been developed over 30 years. West areas are only 7.8 years. The time gap is huge so that west is still not develop as good as east. Furthermore, though ~~there~~ there are more air plane, buses, train can go to west. Compare to east the transportation fee is much higher. So companies in order to gain maximum benefit, owner still want to do business in east. The education level in west is lower than east so they don't have enough skills or knowledge to do a job. People live in west of China are mainly ethnic minority. They have different language and culture. Compare to eastern people (mainly Han). So when they come to east to find job will face language barriers. Because of culture difference and foreign terrorist activity. ~~For~~ political instabilities occur recent years so it reduce the speed of development.

As the above factors, regional disparities is still a big problem for Chinese development but the development gap reduces ~~now~~ than before.

Examiner comment – grade A

The approach taken in (a)(i) to describing the spatial inequalities in Fig. 3 is only partly successful in that, by taking each class of the key in turn, the sense of spatial variation is limited and the final sentence only identifies one element of an overview. In (ii) expression is moderate and some low level reference is made to both the index and the mapping. Greater coherence and fuller explanation of these ideas and others would be needed for higher reward. By contrast, the response to (b) using the familiar example of China, is good quality. It takes the broad east/west disparity as the context and first looks at policy and initiatives. However, rather than ending there, it pursues the assessment in a long paragraph of evaluation, taking a number of reasons why the stated disparity is indeed 'difficult to overcome'. At a number of points some specific exemplar support for the good quality observations made would drive the achievement still higher in Level 3. The aggregate quality of the answer is at the grade A border.

Mark awarded = 17 out of 25

Example candidate response – grade C

ai) Income ~~poor~~ poverty is much serious in ~~Northern~~ Northern provinces, which is near to the boundary of China. More~~*~~ (Half or more than half) of adult population suffer income poverty. On the contrary, income poverty in Southern provinces are much less serious, (less than half) or even less than a quarter of adult population suffer income poverty.

In fact, Income poverty is much ~~severe~~ serious in interior province, compared with coastal province. Usually coastal province suffer less income poverty.

Outward differential, lower income rate to Fig 2016

aii) First of all, we don't know the exact amount of people who are suffering income poverty. In fig 3, it only shows the percentage rate of people who suffer income poverty. The real number may be more in southern provinces, since population in southern provinces are larger than northern provinces.

In fact, Income poverty only count adults who cannot afford a certain amount of food. It doesn't count other essential element of living such

as housing, medical care, education, and so on. It cannot fully reveal the situation in Vietnam.

Furthermore, Fig 3 is using province base, it can only roughly show the spatial inequalities in Vietnam.

However, we don't know the income poverty in a ~~or village~~ village or a resident. The scale of Fig 3 is too large to reveal the situation in each province.

Moreover, the map cannot show the standard of living, that means the quality of living in Vietnam. Fig 3 only shows the people who earn lower than the recommended minimum daily amount of food. It cannot show the overall standard of living in Vietnam.

Regional disparities are difficult to overcome, especially in less developed countries. There are physical reasons, but the most important reasons are the human reasons.

First of all, basic infrastructure is one of the major reasons why regional disparities are difficult to overcome. Due to different accessibility, there will be differences while these regions develop their own economy.

Take Vietnam as an example,

Vietnam is a former French colony.

In the past, French first occupied Southern part of Vietnam and develop the major basic infrastructure.

In the South, the CBI or financial centre is in the South. When there is better basic infrastructure, there ~~exists~~, will be rapid growth of economic development, hence the income poverty is lower than North. In contrast,

Northern provinces, especially near to the boundary are remote area. It is relatively difficult to develop.

acceptable - but unexpected - link to (a)

In fact, education level in different regions will also affect regional disparities. If the education level in a certain area increase, the income poverty will usually

decrease. Due to the fact that high level of education will ~~not~~ increase income level.

Take China as an example, ~~most~~ income poverty in China is less serious in east coastal province, compared with interior province in China. As the general education level in East Coastal province is much higher than people on the west. It is still hard to overcome Education takes time to change.

Moreover, government policy is another reason that regional disparities may exist.

~~Some countries In 1960's, government~~ Hong Kong government need to propose a new town development scheme in order to release population pressure in city centre. Government build various industrial estate like Tai Po Industrial Estate to attract ~~poor~~ low-income class to move to new territories. As a result, Income level also, government provide public housing for them to improve their living environment. As a result, general income level in

New Territories is lower than general Income Level In Central or ~~high~~ people Mid-level. Nowadays, it is still a trend in Hong Kong.

If you were rich, you will leave the New Territories. It is hard to overcome a culture!

Furthermore, historical reason is also another factors affecting regional disparities. In ~~that~~ Sydney, Australia. Due to historical reason, the richest usually live at the east and the poor usually live in the west. In the past, when Australia is a colony to accept prisoners, most prisoners will live in the west in order to build the city and guard the site. However, most officials ~~and~~ will live in the east in order to monitor these prisoners. The trend remains until now. ~~falling~~ is one of the major reason. Historical reason is one of the reasons why regional disparities are difficult to overcome.

These four factors illustrate why regional disparities are difficult to overcome.

Examiner comment – grade C

The interpretation of Fig. 3 in (a)(i) is rather loose, in that it overstates the variation and omits data. By contrast, (ii) is done well and considers both the nature of the index and the nature of the mapping with some insight into both spatial inequality and the techniques. A little further attention to one or the other could bring it to full marks as the candidate evidently understands what is required. The response to (b) is lengthy but of moderate quality. Its tone is more that of an explanation than that of an assessment in that it tends to state why. The link made to (a), income poverty and Vietnam is acceptable but unexpected, given that for most candidates Vietnam is likely to be an unfamiliar context. The inclusion of material internal to Hong Kong needs care but the New Territories are acceptable as an example of regional development, whereas the content within the city of Sydney is not. The candidate identifies four factors which relate to difficulties, but the writing is incoherent and the continued emphasis on income poverty restrictive.

Mark awarded = 13 out of 25

Example candidate response – grade E

Q. i. The income poverty of 60-100% is mainly in the peripheral areas of Vietnam while in the north the least income poverty of ~~0-24%~~ is 25-41%. Only 0-21% are in the south of Vietnam; that is in the core regions.

Loss of detail

ii. This gives an explanation that in the core area, there is development. The people here have therefore, businesses, industries are evolving. Hence, jobs are higher. So, the people are now stable income and they can afford to buy water and food, and provide better living conditions for their families or themselves. They now have better services such as communication. They may also have better necessities.

Whereas, in the areas where income poverty is high, this may be due to have lack of employment in the area; less development. The people have no stable income. Industries and businesses close down or locate away from the area.

Implementation of a demand

E-10. An example of regional inequalities in the Northeast and the Southeast of Brazil are São Paulo and São Paulo.

The regional inequalities are difficult to overcome because all the investments and the government's focus are on the core region; São Paulo. The areas and cities in São Paulo are very accessible and the soils are ~~not~~ rich in nutrients; very poor. Therefore, development in São Paulo are much easier than in Sertão.

Sertão has ~~poor~~ soil which causes the agricultural productivities to fall. The accessibilities are lacking. There is no road is very isolated.

Through these comparisons, São Paulo's standard of living are much better than Sertão's. Due to its increasing development, the economy of the region is increasing. The people's GDP have increased; their purchasing power parity have also increased. They can afford due to their stable income, they have better living conditions. They have clean water supply, food, electricity, better sewage connections and sanitation. They also have better health care and medical facilities. The education of the people and migrating better, therefore, the people are highly skilled. The job opportunities are higher due to industries. Businesses locations moved in São Paulo.

As a result of this, many of the people especially young males migrate to São Paulo looking for better lives. And the urban-male migration has left behind old people and are unable to move and earn an income. Therefore, younger birth rates to replace the old-male migrants. Due to the area i.e. Sertão is isolated, the government only spends for the core region i.e. São Paulo. They have ~~poor~~ social services such as poor education provided, lack of health care and medical facilities, ~~and~~ poor communications. As a result,

The area is filled the area is Sertão is filled with non-skilled people and due to their ~~low~~ of agriculture productivities which they depend on, the jobs are less. Many businesses close down. The people's purchasing power parity is lowered. They do not spend much as they could not afford due to unstable income.

Sertão also has no clean water supply and food, and no proper sewerage connection and sanitation. Therefore, diseases may spread easily, hence death rates increasing. Also, crime rates are higher due to the unstable income for lack of employment or no jobs.

Even the government tries to use spreading effects by spreading all the power and investments to the peripheral areas i.e. Sertão. It cannot be helped as the problems ~~are~~ are too much too bear. The development of ~~that~~ in Sertão ~~is~~ may be impossible as there are no proper communications, no highly skilled labour which means the production level may ~~tends~~ lower, no accessibilities; it is difficult for industries to import and export, this may lead to a higher transport cost.

And so, all the power, developments and investment are look to the core area ~~ie~~ i.e. São Paulo. This is known as the backwash effect.

Examiner comment – grade E

This performance is uneven with almost all the marks derived from **(b)** and learned material. The candidate seems to lack the skills to interpret Fig. 3 effectively. Three lines of writing for **(a)(i)** are insufficient for a mark allocation of five and the detail of the map, its overall pattern and complexities and anomalies are not apparent. In **(ii)**, the question appears to have been misread or misinterpreted as the explanation given is of the actual pattern in Fig. 3, rather than of the index and the map representation. As such the rare award of zero is justified. The response to **(b)** is of different character and a satisfactory standard. Taking two regions in Brazil, it develops the context broadly, showing greater knowledge and understanding than skills in selecting, directing and applying the material to the actual question. The sense of difficulty it conveys is clear, however the assessment offered seems overstated. This may, in part, be an issue of expression for a candidate whose first language is not English.

Mark awarded = 10 out of 25

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