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Cambridge  
**Pre-U**

# Example Candidate Responses (Standards Booklet)

Cambridge Pre-U

Geography

**9768**

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## Introduction

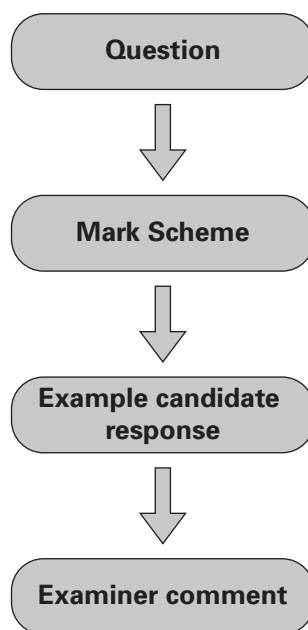
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The main aim of this booklet is to exemplify standards for those teaching Cambridge Pre-U, and to show how different levels of candidates' performance relate to the subject's curriculum and assessment objectives.

Cambridge Pre-U is reported in three bands (Distinction, Merit and Pass) each divided into three grades (D1, D2, D3; M1, M2, M3; P1, P2, P3).

In this booklet a selection of candidate responses has been chosen, to illustrate, as far as possible, each band (Distinction, Merit and Pass), as well as a few examples of the highest grade D1. 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 marks were awarded, why marks were lost, 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 at <http://teachers.cie.org.uk>

## Assessment at a glance

Component	Component title	Duration	Weighting %	Type of assessment
<b>Paper 1</b>	Geographical Issues	Two hours 30 minutes	40	Written paper, externally set and marked
<b>Paper 2</b>	Global Environments	One hour 30 minutes	20	Written paper, externally set and marked
<b>Paper 3</b>	Global Themes	One hour 30 minutes	20	Written paper, externally set and marked
<b>Paper 4</b>	Research Topic	One hour 30 minutes	20	Written paper, externally set and marked

Teachers are reminded that a full syllabus and other teacher support materials are available on [www.cie.org.uk](http://www.cie.org.uk)

# Paper 1 – Geographical Issues

## Generic Mark Scheme

### Guidance notes for marking 9768/01

In marking questions in Sections A and B of this paper, the indicative content and levels descriptors on the following pages should be used throughout. In marking questions in Section C, which are worth 25 marks and based upon extended writing, the Generic Mark Scheme (GMS), used for assessing all pieces of extended writing bearing 25 marks in the Cambridge Pre-U Geography, should be used in conjunction with the indicative content for each question.

Whilst the Generic Mark Scheme captures the essential generic qualities of responses in five mark bands, the indicative content is what it says: some indication of the probable content in responses, or possible approaches, to the questions and titles set. Candidates may develop their own approaches to questions. Examiners should not expect to find all the indicative content in any one response, such as to achieve a Level 5 award. The same mark may be awarded to different pieces of extended writing for different reasons.

Cambridge expects examiners to use their geographical judgement and professional experience, combined with guidance given by senior examiners at the Standardisation Meeting and during the standardisation process, in assessing responses appropriately.

### Use of the Generic Mark Scheme

The Generic Mark Scheme is used together with the indicative content for each essay question.

Responses may be placed in any level without fulfilling all the descriptors for that mark band, for example where the essay does not lend itself to the use of sketch maps and diagrams. Responses may exhibit characteristics of more than one Level and so examiners use the principle of best fit in determining response quality. The grid below gives an indication of the relative weightings of the Assessment Objectives (AO1, AO2, AO3) at each Level.

Level	Marks	AO1 Knowledge and Understanding	AO2 Skills	AO3 Analysis and Evaluation
5	22–25	15	3	7
4	18–21	14	2	5
3	14–17	12	2	3
2	10–13	10	1	2
1	0–9	8	0	1

## Generic Mark Scheme (GMS)

Level	Marks	Assessment criteria
5	22–25	<ul style="list-style-type: none"> <li>• Wide-ranging, detailed and accurate knowledge and clear, high order understanding of the subject content</li> <li>• Relevant, detailed and accurate exemplification used effectively</li> <li>• Logical and clear organisation; good English expression; full and accurate use of geographical terminology</li> <li>• Well annotated and executed sketch maps/diagrams integrated fully with the text</li> <li>• Fully focused on the specific demands of the question</li> <li>• Systematic analysis and a critical approach to evaluation; appropriate application of concepts and theories</li> <li>• Conclusion shows high level insight and is logical and well founded on evidence and argument</li> </ul>
4	18–21	<ul style="list-style-type: none"> <li>• Good knowledge and depth of understanding of the subject content</li> <li>• Appropriate and well developed exemplification</li> <li>• Logical organisation; sound English expression; appropriate use of geographical terminology</li> <li>• Clearly annotated sketch maps/diagrams well integrated with the text</li> <li>• Well focused on the demands of the question</li> <li>• Elements of systematic analysis and ability to evaluate; generally appropriate application of concepts and theories</li> <li>• Conclusion is sound and based on evidence and argument</li> </ul>
3	14–17	<ul style="list-style-type: none"> <li>• Sound knowledge and understanding of the subject content lacking depth in some areas</li> <li>• Appropriate but partial exemplification, may not be integrated with the text</li> <li>• Generally clear communication but lacking some organisation; English expression and use of geographical terminology are mostly accurate</li> <li>• Sketch maps/diagrams generally used effectively and appropriately</li> <li>• Specific demands of the question mostly met</li> <li>• Some ability to analyse and evaluate; limited application of concepts and theories</li> <li>• Conclusion is limited and has some links to the rest of the response</li> </ul>
2	10–13	<ul style="list-style-type: none"> <li>• Some knowledge and understanding of the subject content lacking depth and detail</li> <li>• Exemplification used may be limited or not fully appropriate</li> <li>• Limited organisation; English expression is basic with some accurate use of geographical terminology</li> <li>• Sketch maps/diagrams may have inaccuracies and limited relevance</li> <li>• Question is addressed broadly or partially</li> <li>• Analysis, evaluation and application of concepts and theories are limited and may be superficial</li> <li>• Conclusion is basic and may not be linked to the rest of the response</li> </ul>
1	0–9	<ul style="list-style-type: none"> <li>• A little knowledge and understanding of the subject content; response may also contain unconnected material</li> <li>• Exemplification, if used, is simple and poorly related to the text or may not be relevant</li> <li>• Lack of clarity and organisation; English expression is simple with inaccuracies; geographical terminology, if used, is basic or not understood</li> <li>• Sketch maps/diagrams are limited or poorly executed and may lack relevance</li> <li>• Question is understood weakly and may be addressed slightly</li> <li>• Superficial statements replace analysis and evaluation; application may be minimal or absent</li> <li>• Conclusion may be absent or simply asserted</li> </ul>

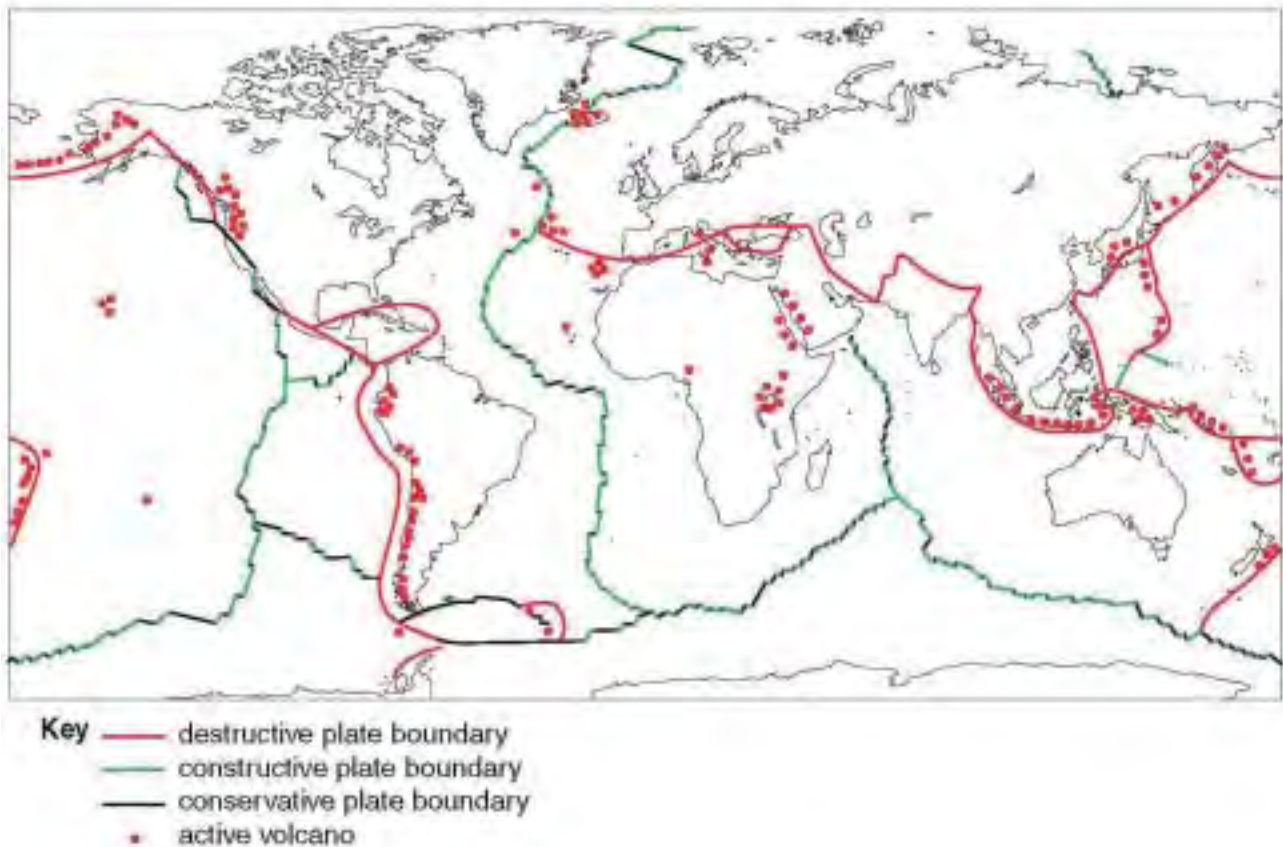
## Question 1

### Tectonic Hazards

- 1 (a) Identify **two** primary hazards resulting from volcanic eruptions. [2]
- (b) Fig. 1 shows the global distribution of active volcanoes and plate boundaries.  
Using Fig. 1, discuss the extent to which active volcanoes are concentrated along destructive plate boundaries. [4]
- (c) With the help of one or more diagrams, explain the formation of island arcs. [5]
- (d) Assess the relative risk posed by different primary hazards resulting from volcanic eruptions. [9]

Fig. 1 for Question 1

The global distribution of active volcanoes and plate boundaries





## Mark scheme

**(a)** Any **two** from pyroclastic flows (nuées ardentes), lava flows, tephra, ash falls, lahars, jökulhlaups, toxic gases, lava bombs, directed blasts. 1 mark per hazard. [2]

**(b)** Candidates might identify the link between the location of active volcanoes and destructive boundaries around the Pacific and the islands of SE Asia. Reference should also be made to active volcanoes on constructive boundaries, such as the Red Sea/East Africa and Iceland/mid-Atlantic, or away from boundaries, such as in the Pacific. 1 mark per valid descriptive point, with 1 mark reserved for some evaluative statement, based on the evidence. For a response related only to destructive boundaries, max. 2. [4]

**(c) Indicative content:**

The diagram(s) should be clearly labelled to help support the following key explanatory points:

- the destructive nature of the boundary at which island arcs are formed;
- subduction of the denser plate into the mantle/aesthenosphere;
- subsequent melting of the subducted plate and the rise of plumes of less dense magma;
- repeated eruptions of this magma as lava builds up into the volcano.

Credit reference to the mechanisms of plate movement (convection currents, slab pull, ridge push) and to explanations of the arc-shape of the island system which is formed. Arc shape needed for full marks.

**Candidates show:**

L3 accurate and detailed explanation of the stages in the formation of island arcs, with some reference to plate movement, subduction and rising magma, supported by a clearly labelled diagram or diagrams. A fully labelled diagram or diagrams with detailed notes. [4–5]

L2 partial explanation of the stages in the formation of island arcs, with one or more stages missing. The response may also contain some inaccuracies and other omissions. Diagram(s) may not be present, may lack clear labelling and/or contain inaccuracies. [2–3]

L1 little or no relevant explanation of the formation of island arcs. May identify one relevant stage, but may identify the plate boundary incorrectly. Diagram(s) absent or highly inaccurate. [0–1]

[5]

**(d) Indicative content:**

Knowledge of a range of different primary hazards resulting from volcanic eruptions: pyroclastic flows (nuées ardentes), lava flows, tephra, ash falls, lahars, jökulhlaups, toxic gases. Understanding of how these hazards pose risks to people, property and environment. Assessment of the relative importance of these hazards in terms of the risk they pose, which might be considered in a variety of ways, such as death toll, economic costs, speed of onset, areal extent.

**Candidates show:**

L3 convincing knowledge of a range of primary hazards and understanding of the risks they pose, supported by reference to specific examples; assessment of the relative risk the identified hazards pose, supported by evidence.  
[8–9]

L2 knowledge of different primary hazards and understanding of the risks they pose, supported by some reference to examples; assessment is assertive, rather than supported by evidence, and exemplification is present but lacks detail.  
[5–7]

L1 **either** knowledge of some primary hazards and a limited understanding of the risks they pose, lacking supporting examples; assessment is likely to be absent or simply to take the form the assertion, with no supporting evidence.

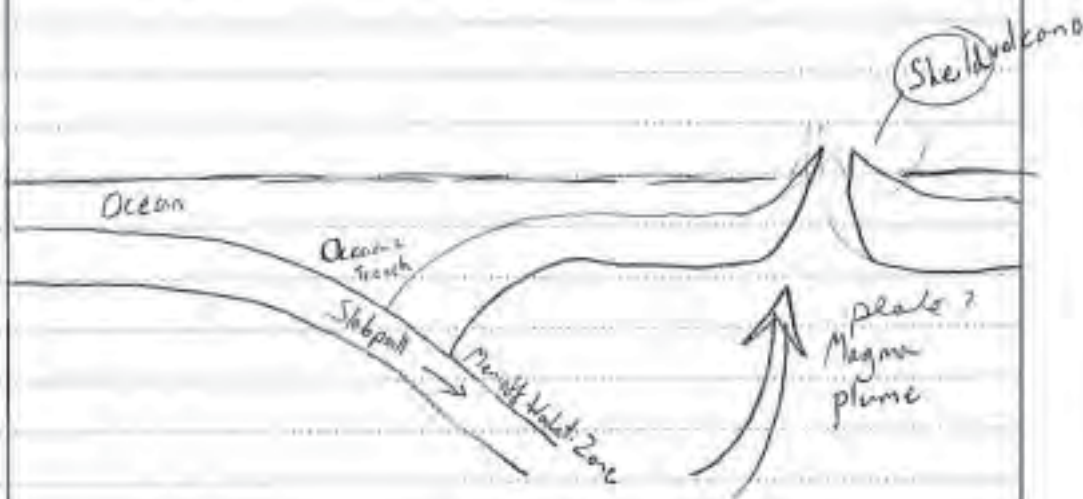
**or** knowledge of a range of primary hazards, but limited or no understanding of the risks they pose, and lacking supporting examples; assessment is likely to be absent or simply to take the form of assertion, with no supporting evidence.  
[0–4]

[9]

**[Total: 20]**

## Example candidate response – Distinction

1. a) Lava flows, especially basaltic lava, can reach up to 60mph and engulf local structures.  
 Sandpapers, ~~potatoes~~ released from Ashes. Ash columns contain cooled, airtight lava known as pumice which can fall back to earth dangerously.
- b) Most volcanoes are clustered along destructive boundaries (2 in South America) and along associated features like the Ring of Fire in the Pacific. However, there are anomalies. There are volcanoes in Iceland on a constructive boundary and 3 volcanoes in Hawaii (as well as 6 in USA) to say the Africa Rift Valley) not near any boundaries at all.
- c) Island arcs form due to the excess magma being forced up, out of the asthenosphere, at areas of subduction.



The destructive boundary drawn above shows an oceanic tectonic plate (dense and thin) being (subducted). When the rock is pulled deep enough it reaches pressure melting point and the tectonic plate disintegrates. The subsequent magma formed most go somewhere and, being both hot and plastic, rises in a plume to the lithosphere. Here, the (basaltic) magma reaches the ocean floor and, after many eruptions and discharges, form volcanic rock cones large enough to reach the surface and become islands. This happens all (along the boundary), creating a line of these islands: an island arc.

- d) Volcanoes cause relatively few deaths (280,000 from 1600 to 1980, whereas over 300,000 die from earthquakes in 2010 alone) <sup>and</sup> most primary, though deadly, are avoidable and this can have their risk reduced.

Lava flows, such as commonly found in Hawaii, can be fast and cause total destruction upon contact with structures. However, on (Mt Etna,) successful efforts were made to drill ear channels into the rock to direct lava flow and thus reduce damage. Lava lakes, such as is found in Mt Nyiragongo, present no (danger to anyone not working in close proximity.

Mt Nyiragongo does present another danger: fissure cracks under the adjacent lake could cause large scale (CO<sub>2</sub>) gas and methane releases that might poison the nearby town Goma. While the USGS does monitor the situation, the relative inaccessibility of the lakebed means little is understood about the actual danger.

The settling of ash, which ~~it~~ may cause drought as a secondary effect, (increases) the risk of mudflows. Unconsolidated, particulate material ~~gather~~ can obscure roads and break infrastructure like power cables due to its weight. Ash-derived roof collapse was

The single greatest factor in primary effect related deaths after Mt Pinatubo erupted in 1991.

Hazards posed by volcanoes are, in general, predictable using morphological and seismic measurements. This, coupled with accurate knowledge of the volcanoes, periodicity, means evacuations can often take place. However, (lava) and (ash flows) found in plinian eruptions, remain almost 100% deadly upon contact and move too quickly to escape as some hazards are risky since they are unavoidable.

### Examiner comment – Distinction

This is a thoroughly competent answer across all the four parts of the question. In part (a) two accurate primary volcanic hazards with added descriptions are provided. The global description of active volcanoes covers most of the main types of volcanoes including Hawaii and those along the East African Rift Valley. The only main group that is ignored are the volcanoes associated with spreading centres in the middle of oceans such as the Mid-Atlantic Rift and Ridge. The analysis of island arcs is the weakest of the answers omitting one plate type and with some confusion over the type of volcano. The answer to part (d) demonstrates good knowledge and depth of understanding of primary volcanic hazards. Assessment of relative risk is illustrated with a range of hazards including good exemplification. A more thorough understanding of island arcs and more detail in the assessment of hazards would have pushed the overall mark towards a D1.

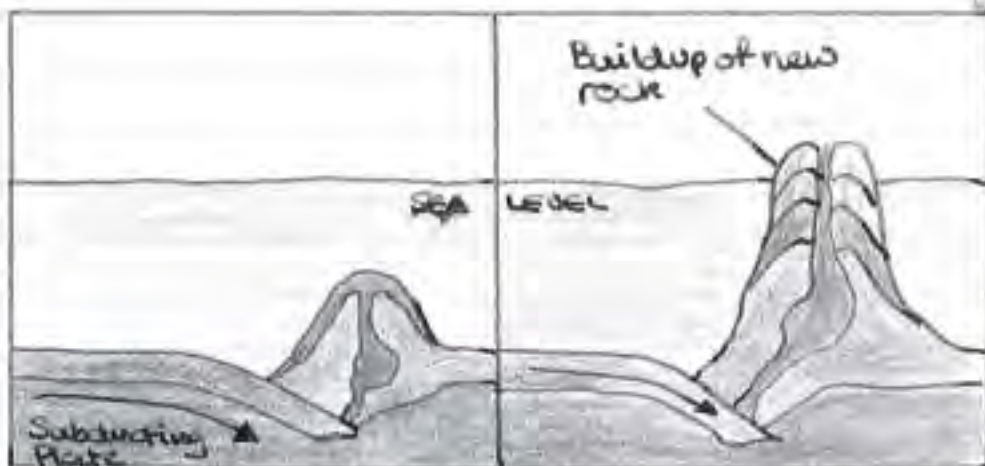
Example candidate response – Merit

1a. Pyroclastic flow and lahars.

b. Active volcanoes are in the most part concentrated along destructive plate boundaries. There are however at least 28 volcanoes sited away from destructive boundaries: some are found in the middle of plates (in the Pacific and in Central Africa), and others are found at constructive boundaries, such as in the Iceland area.

*Lacks geographical detail*

c. Island arcs form at destructive boundaries between two oceanic plates. The buildup of solidified lava around submarine volcanoes increases the height of the vent and the island arc is revealed when the cone penetrates the ~~the~~ rises above sea level. A notable example is the "Pacific Ring of Fire" *Not all -*



The arc is formed as multiple volcanoes

rise above sea level along the (length of the boundary.)

Not entirely accurate

6.2

1d. The main primary hazards associated with volcanic eruptions are pyroclastic flows and lahars ~~and the eruption of toxic gases~~ ~~and ash~~. With examples, I shall illustrate how it is not the hazard itself which poses the risk, but the effectiveness of mitigation procedures which will determine the outcome.

Pyroclastic flows) are the movement of ash, gases and airborne debris down the slope of a cone in the immediate aftermath of an eruption. This hazard is only a threat if the slopes of cones are inhabited and not evacuated, or if economic infrastructure (mainly farmland) is located in the vicinity.

The eruption of (Mt. Pinatubo) in 1991 was followed by a substantial pyroclastic flow. The three evacuation zones (15, 30 and 50 km radii) ensured most local people were out of harm's way, and the death toll from primary hazards only numbered 350.

Lahars are fast flowing mudslides. These arise in wet climates where the soil structure is loose allowing easy movement after a seismic shock (such as that triggered by an eruption). The Nevado del Ruiz

eruption of 1985 saw four glacial lakes. These followed the paths of densely populated river valleys and contributed to the high 23000 death toll. The implementation of building restrictions in river valleys would have reduced this risk, however these are some of the most fertile and economically virtuous areas and population displacement would be controversial given the subsequent value of the hazard.

The forward thinking and coordinated response of geographical agencies (such as the USGS), along with the advice and regulation regarding settlement siting would, and has, go a long way in mitigating against the potentially destructive volcanic primary hazards.

### Examiner comment – Merit

The calibre of answers to all four parts of the question is similar. Factual knowledge is generally sound but with occasional errors. However, although the knowledge base is adequate the answers fail to develop fully the themes being discussed. The answer to part (b) lacks geographical detail and range. The process of subduction leading to the development of island arcs is not described or explained and the geographical examples, e.g. along the Pacific 'Ring of Fire', are not specific enough. Not all volcanoes along the Pacific Ring of Fire are island arcs. The answer to part (d) demonstrates sound knowledge of volcanic hazards with relevant exemplification but lacks convincing discussion of their relative risk.



## Example candidate response – Pass

1 a) Lava flows (in close proximity to an eruption), and pyroclastic flows.

1 b) In Figure 1, certainly the majority of active volcanoes are situated along plate boundaries. The 'Ring of Fire' (the ring running around the Pacific Ocean on both destructive and constructive plate boundaries) has numerous active volcanoes, but only on the destructive boundaries (Mainly the west side of the Pacific). The destructive of south America plate boundary has numerous active volcanoes. There are of course outliers such as the volcanoes near Iceland on nearly constructive boundaries, in sub-Saharan Africa, lining the red sea, one near the Canary islands and a few that are not situated near a plate boundary over the Pacific plate. plates?

1 c) Island arcs are



h1

d) Volcanic eruptions, unlike other tectonic hazards such as earthquakes, are relatively easy to predict. With advancements in modern technology such as seismographs, gaseous substance detectors, tiltmeters, the only real problem faced in terms of the risks posed by primary hazards is evacuation time, & willingness to evacuate. This is however assuming the area surrounding the volcano has these detection methods pre-installed. For example take the eruption of Mount Merapi in 2006; these monitoring stations were able to detect early signs of an eruption, many lives were saved. In total only 20 people died, and the majority of this was due to refusal to heed evacuation orders. Primary hazards caused by this eruption devastated the island, making 50% of the land uninhabitable afterwards due to lava and pyroclastic flows destroying the land. Because of early warning systems,  $\frac{2}{3}$  of the population (7000 people) fled the island, thereby the risks posed by primary hazards were minimal to human life. However to property the risks were high. Over 5000 homes were destroyed, as well as the international airport. Another example of risks posed by primary hazards resulting from volcanoes is the eruption of Mount Pinatubo. The Aeta Tribe refused to heed evacuation warnings and therefore became engulfed in the proceeding ash and lava flows resulting in their unfortunate demise. Overall primary hazards such as lava flows, ash clouds & pyroclastic flows can be devastating to land and property, but the risk to human life is ever decreasing due to mitigation methods.

## Examiner comment – Pass

The answer, as a whole, demonstrates variable knowledge and understanding. Two relevant hazards are identified for part (a) but the analysis of the distribution of active volcanoes, provided for part (b), is partial with minimal detail. Knowledge of island arcs is completely missing. In part (d) some knowledge of primary hazards is demonstrated using two relevant examples, Montserrat and Mt Pinatubo, but there is a limited understanding of the relative risks associated with them. The key phrase in this question is 'relative risk' and it is this element that is lacking. The knowledge base is not used to its full potential. As with many answers, the quality over four parts varies and not all the answer is at the P2 level. Answers at this level are usually lacking in some respect. In this answer it is an understanding of island arcs and the answer demonstrates the point that all aspects of the syllabus are equally important and need to be addressed.

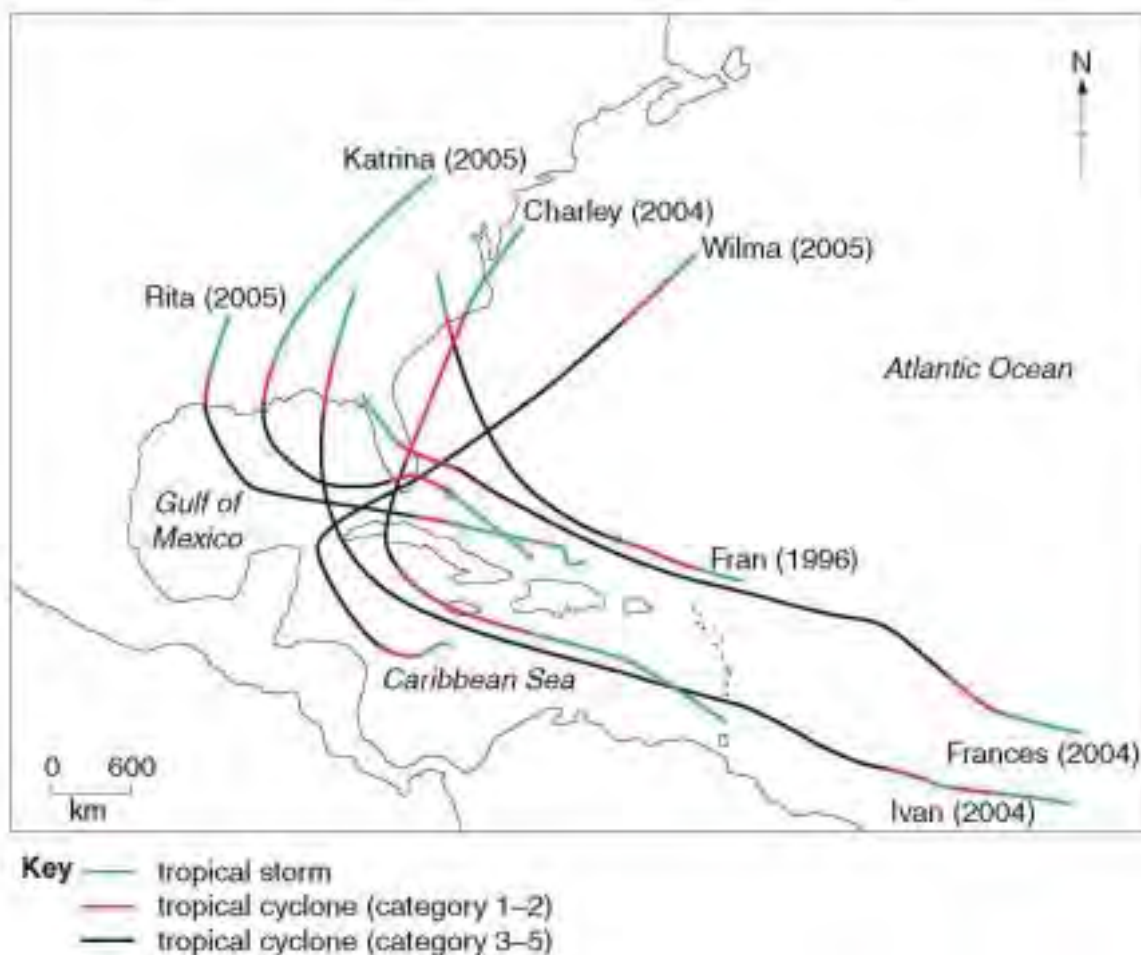
## Question 2

### Hazardous Weather

- 2 Fig. 2 shows the track and strength of selected tropical storms and tropical cyclones (hurricanes) between 1996 and 2005.
- (a) State **two** changes that occur when a tropical storm develops into a tropical cyclone (hurricane). [2]
- (b) To what extent do the tracks shown in Fig. 2 follow a similar pattern? [4]
- (c) Using Fig. 2, explain what happens to the strength of tropical cyclones (hurricanes) when they move over land. [5]
- (d) Assess the importance of level of development in determining the consequences and impacts of tropical cyclones (hurricanes). [9]

**Fig. 2 for Question 2**

**Track and strength of selected tropical storms and tropical cyclones (hurricanes), 1996–2005**



## Mark scheme

**(a)** Any **two** from: pressure drops, wind speed increases, wind speed exceeds 74mph (119kph); eye becomes more clearly defined. 1 mark per change. [2]

**(b)** Candidates might identify the initial westerly movement of all tracks shown as evidence of similarity, followed by a movement polewards/northwards. Exceptions to the similar basic pattern, such as Frances and Fran, which tail off before turning polewards, should be expected. One mark per descriptive point, with one mark reserved for some evaluative statement, based on the evidence provided. [4]

**(c) Indicative content:**

Explanations should address the lowering of the strength of tropical cyclones over land, relating to the cutting off of the source of energy in the absence of the warm water that provides water vapour through evaporation and the subsequent release of latent heat as the air rises. Evidence to be taken from Fig. 2 may include the downgrading in terms of category and status.

**Candidates show:**

L3 detailed description of the change in strength of tropical cyclones as they move over land, with some evidence from the map; explanation recognises the reduced energy input and explains this clearly. [4–5]

L2 **either** detailed description of the change in strength of tropical cyclones as they move over land, with some evidence from the map; explanation is limited to recognising that the land reduces energy supply, without further development.

**or** simple description of the change in strength of tropical cyclones as they move over land, without evidence from the map; explanation recognises that the land reduces energy supply, with some development of the explanation. [2–3]

L1 simple description of the change in strength of tropical cyclones as they move over land, without evidence from the map; explanation absent or incorrect. [0–1]

[5]

**(d) Indicative content:**

Knowledge of a range of consequences and impacts of tropical cyclones linking impacts to hazardous weather in areas at different levels of development. (These may be taken from anywhere in the world, not just the area in Fig. 2).

Understanding of how level of development helps determine consequences and impacts and of the role of other factors affecting risk, hazard and loss. Assessment of the overall importance of level of development in terms of the outcomes, this might be considered in a variety of ways, e.g. prediction, preparation, rescue, recovery and dimensions, e.g. economic, political.

**Candidates show:**

- L3 convincing knowledge of a range of consequences and impacts and understanding of how these are linked to development, supported by reference to specific examples from two or more levels of development; assessment of its importance relative to one or more other factors, supported by evidence. [8–9]
- L2 knowledge of a range of consequences and impacts and some understanding of how these are linked to level of development, supported by some reference to examples; assessment may be limited, or assertive rather than supported by any evidence, exemplification is present but lacks detail. [5–7]
- L1 knowledge of some consequences and impacts, but limited or no understanding of how they are linked to level of development, lacking supporting examples; assessment is likely to be absent or simply asserted, with no supporting evidence. [0–4]
- [9]

**[Total: 20]**

## Example candidate response – Distinction (D1)

The Coriolis effect causes rotation of wind generating the hurricane. There is an increase in wind speed as the winds join - <sup>all?</sup> spinning in circular motion.

A point of similarity amongst all of these tropical storms and cyclones, is that in all instances their path shifts from east to west with a curve, as a result of ~~strongly~~ trade winds and the Coriolis effect, equally with the exception of Frances whose path is ~~rather~~ comparatively straight.

A point of difference between the different paths is that, although they all begin at sea, they do not all die out at sea. Hurricanes: (Rita, Katrina, Fran and Frances) die out over land, whereas the remaining hurricanes die at sea, ie follow a different path.

With the exception of Hurricane Ivan, all of the storms/cyclones follow the same development pattern, going from a tropical storm to a category 1-2 hurricane and then a 3-5 level hurricane. On this point most of them are similar however Ivan doesn't follow this going from a tropical storm to a hurricane and back to a storm.

What also differs is the duration that they are at each state, with hurricane Wilma for example being a level 3-5 hurricane for a long duration and Charley's path would indicate it was only at this level for a very short ~~amount of~~ time, the distance to around 600km.

So although there are some similarities they are also ~~also~~ differences in their patterns.

c) When tropical cyclones move over land ~~it~~ is usually when they ~~inflict~~ <sup>inflict</sup> their most damage as initially they are high strength having been powered by the latent heat energy of evaporating water, so the damage they can inflict to coastal areas is great, with hurricanes averaging 200 km/h. However the ~~the~~ larger the hurricane is over ~~the~~ land the weaker it will become, because although conditions may still be desirable for a hurricane, (it has lost its source of power.) hurricanes can only occur when there are sea surface temperatures in excess of 27°C ~~and~~ because this is where evaporating water produces enough latent heat energy to fuel the hurricane. Therefore when the hurricane is over land there is no longer a source of latent heat energy and so the hurricane will eventually weaken and die out. This is why there are not hurricanes over land, because they cannot form and continue to function without a water source. L3

d) Level of development of a country arguably is of great significance when attempting to control the loss of life due to a hurricane event. What is normally considered to be the case is that the higher the level of development the (greater the ability) to prevent loss of life, because the country has the finances necessary to prepare defences for the event. It also has the capabilities to accurately predict the event better



for instance through better technology. Developed countries  
 often have hurricane monitoring systems (if 'hot spots')  
 to predict them & measures can be taken. An  
 effective example where this has proved useful was  
 the 2003 hurricane (Isabel) which was accurately  
 predicted at every stage minimising damage.

(LEDCs) do not have the same capabilities to prevent  
 damage from these hazards and so typically you  
 see a higher loss of life. An example of this is  
 the 1998 hurricane (Mitch) which killed 17,000 people  
 in Honduras, displacing 800,000 of the Honduran  
 population. However what is also considered to be  
 the case is that generally LEDCs will suffer somewhat  
 lower damages because they have not developed  
 as much and so proportionately do not have  
 such high value assets to be destroyed within the  
 country, whereas an MEDC does, and this is reflected  
 in an average estimate of around \$30 billion ~~damages~~  
 damage sustained as a result of hurricane Katrina (2005)  
 with a loss of life of 1,836 compared with the loss  
 of life of 17,000 in Honduras via hurricane Mitch, with  
 \$1.5 billion of damage sustained.

However what is also the case is that despite  
 this great correlation, proportionately the damage sustained  
 in LEDCs is far more severe, because they are not in  
 the (same economical position) to deal with the  
 damages. Many Honduras was reliant on aid

To cope with this disaster, and it triggered political instability and lowered its economic output by around 70%.

Therefore ~~the~~ ~~level~~ the level of development in a country does influence the impacts of a hazards event such as a hurricane. For an MEDC they are better equipped to deal with the economic losses, even if hurricane Katrina proves that even MEDCs can experience heavy loss of life. /3

### Examiner comment – Distinction (D1)

This is an extremely competent, well-written, succinct and well-focused answer throughout. Part (a) is good and the answer to part (b) is extremely comprehensive, discussing the tracks, strength changes and length of time at each strength category. This is probably more than can be expected for full marks. The answer to part (c) shows good knowledge and understanding, including the significance of latent heat transfer. The answer to part (d) starts with a good introduction and the discussion is amplified with useful data. It makes some very good assessments of the significance of levels of development in coping with the impacts of tropical storms. The conclusion is relevant and relates to the earlier discussion. Overall, the question is well argued with useful facts.

## Example candidate response – Distinction

2. a) Wind speed increases and a rotation effect begins to occur due to the Coriolis effect.
- b) Evidently each of these seven tracks originate ~~also~~ as tropical storms. They start in the Caribbean and ~~with~~ move North-West before curving towards the US in a North Easterly direction. Ivan and Frances develop into Category 5 storms shortly after their conception and the other storms follow a pattern of going from a storm to a category 3-5 cyclone over the Caribbean Sea, ~~with~~ ~~the~~ they all reach this category, and with the exception of Charley, which remains category 5 for a short distance through Florida, the intensity of these cyclones decreases as they hit land ~~in~~ in the USA. All 7 of these cyclones hit the US at some point, and they all die out ~~at~~ ~~the~~ ~~same~~ at around the same latitude.

c) All of these cyclones shown in figure 2 hit land ~~lets~~ during their track, and 6 out of the 7, with the exception of Wilma, decreases in intensity over land. This is due to the lack of energy, which is provided to the cyclones by moisture rising off the sea, which is the reason for ~~all the~~ all the cyclones being conceived over the sea. The cyclones that hit the US, Rita, Katrina, Ivan, Frances, Fran and Charley, lose energy, <sup>and</sup> by the time they are about 40 miles inland, their intensity has decreased to that of a tropical storm. Intensity also decreases ~~as~~ because of latitude, as there is not enough heat energy to sustain a cyclone further north of the Caribbean Sea. There is still damage caused by these storms over land, but all of these cyclones do not have the ingredients required such as the warm, moist air that rises off the sea, to ~~off~~ maintain a very high intensity over land, but they can remain active for a considerable period of time, as Katrina shows. h2.

Correctly identified change with some explanation

d) Level of development is very important in determining the level of damage and impact of cyclones, and this is shown by 2 examples, Hurricane Katrina, and ~~Hurricane Mitch~~. ~~Hurricane Mitch, a category 5 cyclone in 1998, had large effects on low 20s LICs, Honduras and Nicaragua~~ Cyclone Nargis. Cyclone Nargis killed 146,000 people in 2008, and many of these were due to low levels of development in Burma, an LIC. Experts predicted that the

cyclone would hit land in Bangladesh, not Burma, so the 146,000 who died, and the 3 million affected had no time to prepare for the impact of the cyclone. Education about cyclones was poor, and many houses were built on flimsy stilts, which only exacerbated the destruction. Fishing fleets, plantations and other industries were ruined, and poor levels of development resulted in a huge death toll, which some government officials believe could have been up to 1,000,000.

New Orleans only lost 1,005 <sup>in 2005</sup> during Hurricane Katrina, and was certainly helped by its higher level of preparedness due to the USA being an HIC. There was \$75 bn in damage but loss of life was hugely lower than that of Nagis, which was also a Category 3 storm when it hit land. The levees in New Orleans, although they could not withstand the 28 foot storm surge, provided some protection for the city. The mayor had ordered an evacuation of the city and areas such as the Louisiana Superdome, which housed 28,000 refugees during the crisis, were ~~also~~ were part of an ~~evacuation~~ emergency plan that just could not be coordinated in an LIC. Level of development has a bigger effect on loss of life than damage, as ~~off~~ ~~was~~ there was huge damage during Katrina, but loss of life is the most important part of natural disasters to prevent.

## Examiner comment – Distinction

The answers demonstrate sound to good knowledge and understanding throughout. A little more elaboration in the answers and development of the ideas would have easily pushed the mark towards D1. Two relevant changes in tropical storms (hurricanes) are identified in part (a) and the only element lacking in the answer to part (b) is a full analysis of the 'to what extent' part of the question. The exceptions to the general pattern of hurricane tracks, especially Hurricane Wilma, are not recognised. A relatively detailed description of the change in strength of tropical cyclones as they move overland is provided, with some evidence from the map, but explanation is limited to a loss of heat energy. The reason for the loss of energy, such as loss of water vapour and subsequent release of latent heat, as stressed in the mark scheme, is not discussed. Two relevant tropical cyclones are analysed with sound knowledge but the analysis of the impact of level of development is more implicit than explicit. This illustrates the point made earlier that the answer could quite easily have been raised to level D1 with a little more development of the themes. However, the answer, as a whole, demonstrates good knowledge and depth of understanding with a logical organisation.

## Example candidate response – Merit

2. (a) Two changes that occur when a tropical storm develops into a tropical cyclone are that the wind speeds reach 120 km/h, and only!
- (b) All the tracks shown in Figure 2 begin as tropical storms, then mature into tropical cyclones (category 1-2), then into tropical cyclones (category 3-5), then return to the smaller category of tropical cyclones and finally return to a tropical storm.
- There is a general trend in the tracks of these storms which is that they are all approximately at their greatest strength - tropical cyclone (category 3-5) at a similar latitude running across the north of the Gulf of Mexico and through Florida, U.S.A. Equally, their general movement goes from south-east to north-west, with the exception of Wilma and Katrina (both 2005).

(c) As Figure 2 clearly shows, as a tropical cyclone moves over land, it begins to lose strength, resulting in a lesser tropical cyclone and then a tropical storm before dissipating completely.

This is because tropical cyclones rely on a source of water to provide them with a source of energy. Tropical cyclones only form in the Atlantic Ocean during when the water in the tropics is at its warmest. Warm water provides a tropical cyclone its energy through latent heat. Latent heat is the energy released by water as it converts from water into water vapour.

Without a supply of warm water for its energy, a tropical cyclone does not have the energy which fuels its development, so it thus ~~dissipates~~ begins to dissipate once it moves over land.

Beats good understanding  
of the mechanism

(d) The level of development is very important in determining the consequences and impacts of tropical cyclones. LICs affected by hurricanes are more likely to suffer in terms of loss of life and homelessness, whilst HICs affected by hurricanes are more likely to suffer economically. However both countries at all levels of development will suffer from similar consequences and impacts, but it is the scale of these impacts which is normally explained by the development of the country or region affected.

e.g. Hurricane Katrina (23<sup>rd</sup> → 31<sup>st</sup> August 2005) devastated low  
an HIC with relatively economically and less so socially than a LIC.

There were 1,500 fatalities and 50,000 made homeless. The hurricane caused approximately \$75 billion of damage. Hurricane Nargis (27<sup>th</sup> April – 5<sup>th</sup> May 2008) affected India, Sri Lanka, Bangladesh and most significantly Burma. There were 150,000 fatalities, the majority of which occurred in Burma. Damage estimates



range between the US\$ 4-10 billion dollars. Both Katrina and Nargis caused the majority of their damage whilst the latter had 5 hurricanes on the Saffir-Simpson scale.

The differences in consequences and impacts were caused by contrasting levels of development. Large proportions of Greater New Orleans were evacuated ~~before~~ following prediction of Katrina in the National Hurricane Centre in Miami, Florida. Those who remained in the city and surrounding area were, for the most part, sheltering in properly built homes. Conversely, the prediction of Hurricane Nargis for the population of Burma arrived too late so nobody was evacuated to save their lives. The homes which were destroyed by the hurricane, in some cases causing the deaths of those inside it were poorly built, made of a variety of materials in a makeshift way with no foundations. Whilst Hurricane Nargis did affect Burma economically (the livelihood of farmers was disrupted as 1 million acres of crops were destroyed), the economic damage from Katrina was substantial. The rebuilding process is much more expensive and in developed countries and industries affected by natural disasters will make greater losses (the Katrina damaged 30 offshore oil rigs in the Gulf of Mexico, contributing massively to the economic cost of the hurricane).

The level of development is extremely important in determining the impacts and consequences of hurricanes as justified by the differences in social and economic impacts of Hurricane Katrina and Hurricane Nargis.

### Examiner comment – Merit

This is a highly variable answer as is often the case at this level. It demonstrates some sound knowledge and understanding but with gaps in both. Thus, only one change associated with the transition of a tropical storm into a tropical cyclone is provided in part (a) and little description and analysis is provided for part (b). Where the question asks for a description and analysis of information provided in a resource, it is important that the information be thoroughly used. In this case, there is only a very partial use of the resource. However, the answer to part (c) shows good understanding of the mechanics involved in hurricane formation. The role of latent heat is well explained. The answer to part (d) is detailed with good use of examples and sensible assessment of the importance of level of development in affecting the impacts of tropical cyclones.

## Example candidate response – Pass

- 2a) The flow of air becomes more organized, into a spinning vortex with warm updrafts and cool downdrafts. The wind speed also accelerates.
- 2b) The tracks all run in a clockwise direction and travel from south to North. They all start out at sea, and with the two exceptions of Wilma and Charley, finish on land. They all start out and finish as tropical storms, developing into category 1-2 tropical cyclones, and with the exception of Ivan (creating to a storm, and then a category 1-2 cyclone again) then immediately afterwards develop into category 3-5 cyclones, and then back to category 1-2 again. Major areas of land loss cause a decrease in the level of strength as well (i.e. for Rita, Katrina, Frances and Fran).
- 2c) Hurricanes Rita, Katrina and Ivan are all category 3-5 near the coastline, however quickly develop into category 1-2 cyclones. It seems as though when they hit land, this decreases their strength significantly. As their wind speed decelerates the further inland they continue, the weaker they get, with no hurricane gaining becoming a category 3-5 cyclone level again. With the exception of Katrina, they all stop within roughly 800km of their coastline entry point. However when some hurricanes (i.e. Charley, Wilma and Katrina) cross small sections of land (i.e. Florida, and two Caribbean islands), this does not affect their strength as much, if at all in the instance of Wilma moving over Florida.

2 d) 'Level of development' is ambiguously defined in the question, it could mean the level of development of the tropical cyclone, or of the area that the cyclone comes into contact with. I will take it to mean the level of development of the area affected.

Hurricane Katrina in 2005 caused ~~105 billion~~ US\$105B worth of damage to the United States of America, an MEDC. Although the levels of secondary damage effect damage (disease, lack of clean water etc.) were handled more effectively than in LADC due to vast efforts in emergency response and from FEMA, ~~very~~ much initial damage was caused; the levees were not of high enough specification to withstand the storm surge. The consequences and impacts were vast, with approximately 3 million people left homeless. The poor mitigation and inaccurate path prediction caused catastrophic losses in terms of resources, livelihoods and also reputation for the USA. However Katrina does not demonstrate that all MEDCs would be so badly affected by hurricanes. Although on the whole, LADCs would be worse off, due to less superior architecture, emergency response, evacuation methods and overall mitigation.

## Examiner comment – Pass

The answer to part (a) is complete and accurate. Answers to other parts of the question did demonstrate some knowledge and understanding but there are significant gaps in knowledge and the answers generally lack depth. The analysis of tracks of hurricanes for part (b) is partial with no account of the path of the tracks. The answer concentrates on the change in strength and not the pattern of the tracks. The answer to part (c) is very descriptive with little explanation of the reasons for the drop in strength. In part (d), although the candidate clearly understood the needs of the question, only one example of a hurricane (Katrina) was provided. This made it very difficult to assess the level of development as there is no comparison on which to base an assessment. There is a brief mention of LEDCs but there is no specific exemplification. Thus, the answer is severely hindered by this lack and the conclusion is not justified by the discussion provided in the main answer.

### Question 3

- 3 Fig. 3 shows the main components in a drainage basin hydrological cycle and Fig. 4 shows the annual water budget for selected river basins.
- (a) Identify the flows (transfers) labelled X and Y on Fig. 3. [2]
  - (b) Using Fig. 4, assess the importance of evapotranspiration as an output of river basins. [4]
  - (c) What factors might help to explain the relative importance of runoff and evapotranspiration as outputs of river basins? [5]
  - (d) With reference to examples, examine the extent to which river flooding is more the result of human than of natural causes. [9]

Fig. 3 for Question 3

The main components of a drainage basin hydrological cycle

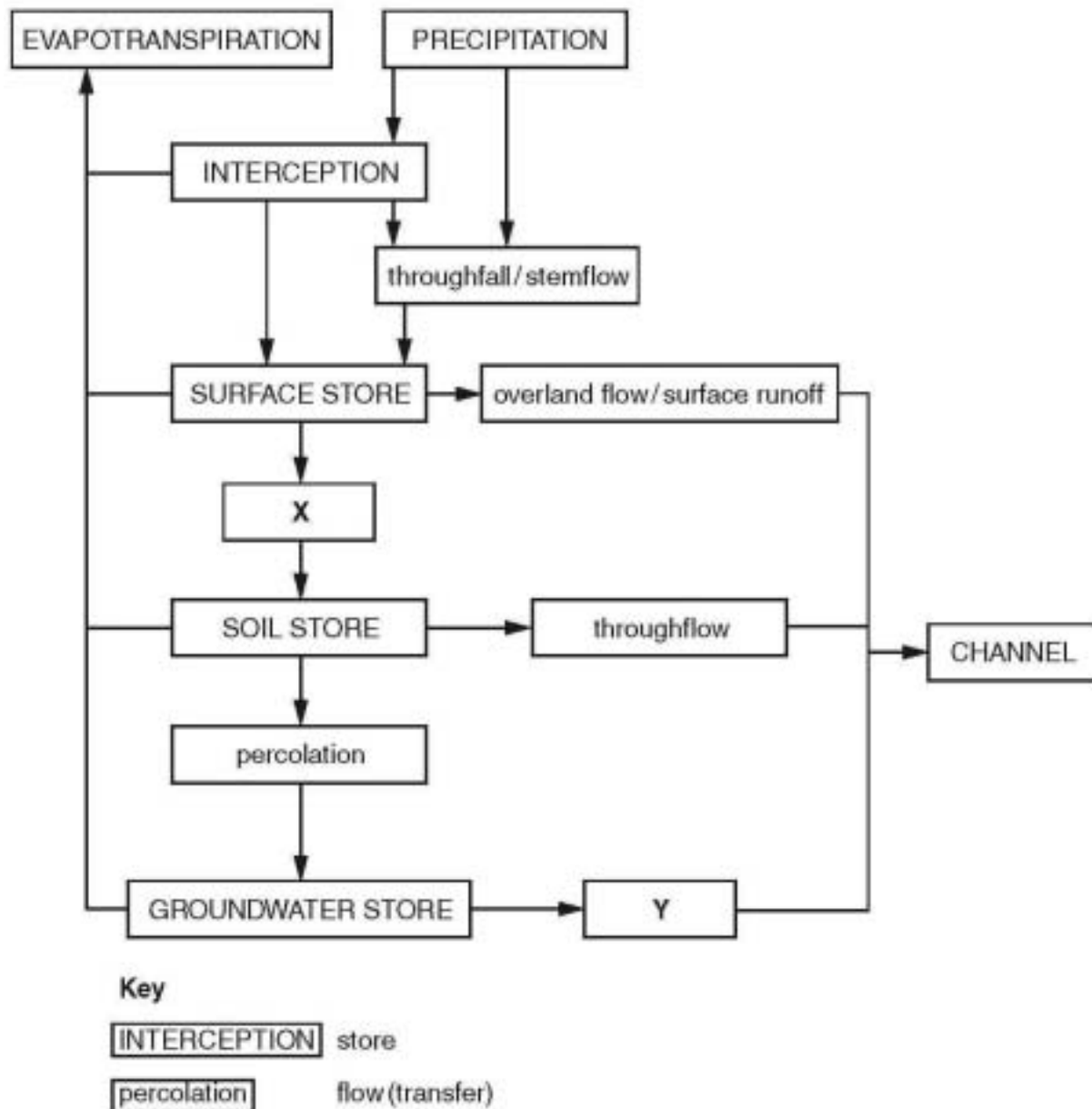
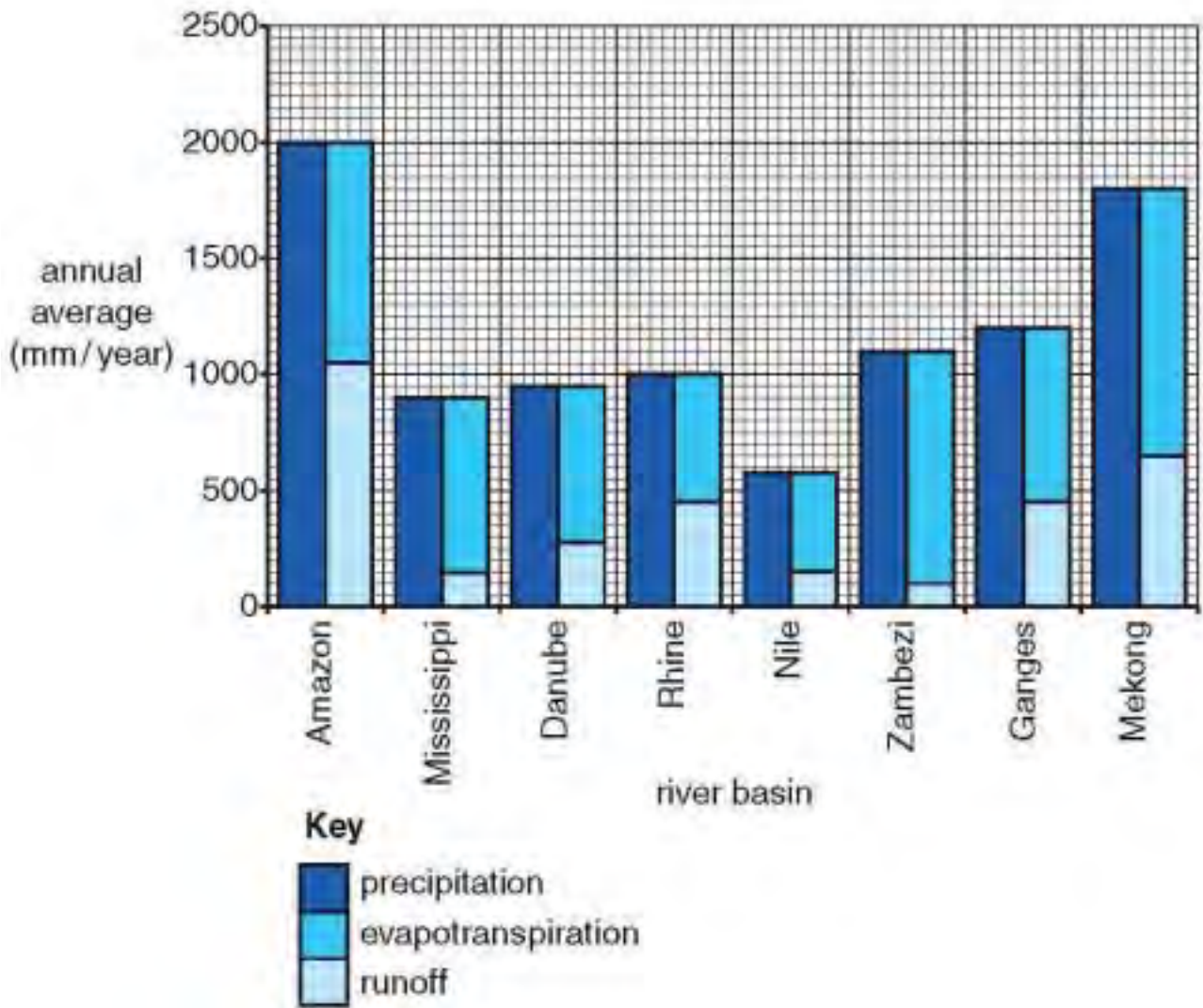


Fig. 4 for Question 3

Annual water budget for selected river basins



## Mark scheme

**(a)** **X** is infiltration, **Y** is baseflow or groundwater flow. 1 mark per identification. [2]

**(b)** Candidates might observe that in most of the river basins in Fig. 4 evapotranspiration is more important than runoff, but that for both the Rhine and the Amazon, runoff and evapotranspiration are approximately the same. 1 mark per descriptive point, with 1 mark reserved for evidence from Fig. 4 and 1 mark reserved for some evaluative statement based on the evidence. A river basin by river basin description would be worth 3/4. [4]

**(c) Indicative content:**

This may be answered with or without reference to Fig. 4 in terms of the relative importance of runoff and evapotranspiration. Candidates may also introduce their own examples. Explanations may involve the following factors:

- temperature: evaporation and transpiration increase with temperature;
- vegetation cover: increased interception reduces water reaching the surface, transpiration increases with vegetation cover;
- nature of precipitation input: snow in high altitude areas is a store in winter which is released in spring, leading to a reduction in losses from evapotranspiration; and any other factors the candidate identifies.

**Candidates show:**

L3 effective explanation of two or more factors, making clear links to variations in both outputs (runoff, evapotranspiration), with some reference to examples. [4–5]

L2 explanation of one factor in detail, linked to varying outputs, or to more factors with limited explanation, but some links to variation in outputs; reference to examples is limited or basic. [2–3]

L1 description of outputs (runoff, evapotranspiration) rather than explanatory; or identifies a relevant factor without explanation or links. [0–1]  
[5]



- (d)** Knowledge of a range of different human and natural causes of flooding. In the syllabus, human causes include changing land-use and river mismanagement, while natural causes include prolonged or intense rainfall and snowmelt. These meteorological causes are fully acceptable, however candidates who provide other natural causes related to the nature of river channels and catchments, may be credited. Understanding of how human and natural causes lead to river flooding. Assessment of the relative importance of human and natural causes.

**Candidates show:**

- L3 convincing knowledge of a range of human and natural causes of river flooding and an understanding of how these causes lead to flooding, supported by reference to specific examples; assessment of the relative importance of the two types of causes, supported by evidence. Responses are likely to show understanding of the interaction of the factors involved.  
[8–9]
- L2 knowledge of a range of human and natural causes of river flooding and an understanding of how these causes lead to flooding, supported by some reference to examples; assessment is assertive, rather than supported by any evidence, and exemplification is present, but lacks detail.  
[5–7]
- L1 knowledge of some human and natural causes of river flooding and a limited understanding of their likely influence on flooding, lacking supporting examples; assessment is likely to be absent or simply to take the form of assertion, with no supporting evidence.  
[0–4]

[9]

**[Total: 20]**

## Example candidate response – Distinction (D1)

3a) X = throughflow ~~X~~  
 X = infiltration ✓

b) Figure 4 would indicate that in most cases evapotranspiration is ~~less~~ less important as an output of river basins. As in all river basins with the (exception of the Amazon), evapotranspiration is by far the greater component of output from the basin over runoff, with in River ~~the~~ basins such as the Zambezi 100 mm/year is down to runoff and 1000 mm/year is attributed to evapotranspiration, making it (10 times the greater) output. However what the figure would demonstrate is that it is of differing importance at each river basin, for at the Rhine 450 ~~mm~~ mm/year is due to runoff against 550 mm/year due to evapotranspiration, which clearly indicates that it is of differing levels of importance respective to each individual river basin.

It also cannot be said from the figure that it is an absolute truth that it is more important as an output either, as at the Amazon (1050 ~~mm~~ mm/year is attributed to runoff out of a total of (2000 mm/year, making runoff in this instance more important.

Good

c) A number of factors can be taken into account when explaining the relative importance of runoff and evapotranspiration from both human and environmental perspectives. River management schemes could aim to limit the levels of surface runoff through means such as (afforestation), which would then lead to greater evapotranspiration. Naturally as well, creating higher levels of vegetation could also have

higher levels of evapotranspiration, because higher quantities of water are being (intercepted) by vegetation. ~~At the same time~~ Gradient can also be an influencing factor, i.e. the greater the gradient, the less likely water is to filter into the soil as opposed to run off it.

Areas of greater (humidity) may result in decreased evapotranspiration as with 100% humidity the air would already be holding as much as it could therefore you would expect to see greater run off, such as at the Amazon.

Increased (Urban areas) <sup>levels of</sup> with a drainage basin would contribute to greater ~~run off~~ runoff, which would account for why there are higher levels of run off at the Rhine.

However arguably it is ~~not~~ human measures such as river management that would for the most part account for the relative importance of evapotranspiration and runoff. For with rivers such as the Mississippi, it is in the interests of people to increase levels of evapotranspiration, to prevent as much runoff per acre as the Mississippi. Very thorough L3

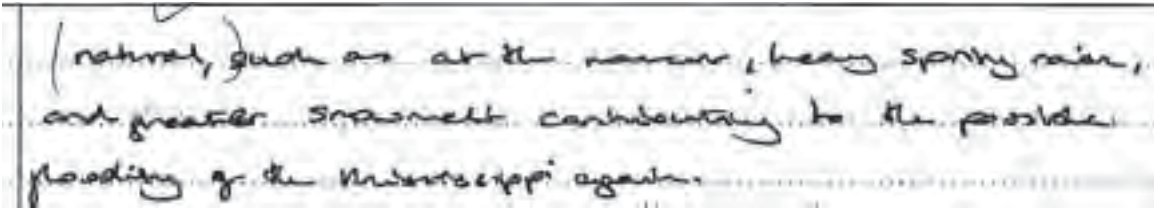
- d) Flooding as a result of human as opposed to natural causes would be as a direct result of the inefficient land use, or inappropriate measures undertaken to attempt to control rivers.

Flooding can even occur as a result of human density, it necessary in order to delineate greater

rise down the river. An example of this is that currently US operators are opening the main gates of river defences on the ~~Mississippi~~ tributaries of the Mississippi river and flooding rural areas so as to lessen the likelihood of a larger flood.

Human intervention can certainly be said to exacerbate flooding, for instance poor land use would involve constructing urban areas ~~on~~ on floodplains, or areas close to a river which would directly increase (surface runoff) and reduce the time between rainfall and peak discharge because water gets to the river faster. The 1993 flood along the Mississippi river which resulted in \$15 billion of damage and 15 million acres of farmland being inundated (some put down) to extreme human interference with the river system, i.e. \$7 billion had been spent over 100 years to fix and control the river, including many hard engineering processes such as levees and channelisation which have the river far from its original course. This combined with excessive ~~construction~~ construction on land adjacent to the river has resulted in an increased flood event. A further example would be some ~~of~~ (degradation) in (Haiti) dramatically exacerbating flood events during the tropical storm of 2008, and causing increased damage.

Therefore it can certainly be said to be the case that human interference and poor land use interferes with the hydrological system and creates a greater likelihood of flooding and can exacerbate the flood event, even if the processes that led to the flood were



(natural), such as at the moment, heavy spring rain, and greater snowmelt contributing to the possible flooding of the Mississippi again.

### Examiner comment – Distinction (D1)

The only slight blemish is in part (a) where groundwater flow has been misinterpreted. Part (b) is a very thorough analysis of the drainage basins, backed up with data extracted from the resource. Part (c) is comprehensive yet succinct with few wasted words. A variety of factors have been discussed for both evapotranspiration and runoff. These factors are both accurate and relevant. Part (d) commences with an excellent introduction and the main discussion uses a variety of examples to good effect. There is a sensible argument with a clear conclusion. It is well balanced and thoroughly justified by the discussion offered. This is a very good example of a D1 answer.

## Example candidate response – Distinction

3

- a. Transfer X → infiltration ✓  
 Transfer Y → groundwater flow ✓

b. Evapotranspiration is seen in figure 4 as one of the outputs for a water budget for a number of rivers (along with runoff) and is stated alongside the input, in the form of precipitation. As a general trend, the evapotranspiration accounts for (at least 50%) of the other output in the annual budget. The only river which is an exception to this is the Amazon (950mm/year) are accounted for by evapotranspiration, rather than 1080 mm/year by runoff. For the other rivers the extent to which evapotranspiration accounts for more than 50% is variable. In the Amazon evapotranspiration accounts for around 90% compared to the Rhine's 55%.

c. One factor which will affect the relative importance of evapotranspiration, over run-off, is air (temperature). This will affect the rate of evapotranspiration as it will dictate how much water evaporates into the air. For instance, in the Amazon, where air temperatures are high, the rates of evapotranspiration are much (higher than any) the Rhine, for instance. However, another important factor is also the (humidity) of the air as this regulates the capacity to carry water in the atmosphere. This explains why in figure 2 the Amazon does not experience, relatively, as much evapotranspiration.

The importance of run off will be affected by the nature of the ground around the river basin. For instance, high levels of (urbanisation) can lead to greater run off as a result of the artificial surfaces having less friction as than natural ones and less absorption. Similarly, the amount of vegetation will again affect run off as it will intercept precipitation + evapotranspiration and consequently reduce the rate of run off.

River flooding can be seen as occurring through human causes as a result of mismanagement and factors such as urbanisation. However, the extent to which this outweighs the impact of <sup>natural</sup> factors and causes such as heavy precipitation in quarters.

One example of poor management is the (Variant Dam) in 1964. It was designed to regulate the flow and provide a reservoir along the river. However, poor management led to an ~~excess~~ overflowed reservoir which allowing most water into the lake over-topped the dam creating a 250m high wave which eradicated the town of Variant (which was never re-constructed) and killed ~~1440~~ <sup>1440</sup> people. This is an example of a (flood with human causes) as it would not have occurred through natural means as the existence of the dam greatly exacerbated and worsened the outcome. Similarly, flood events such as the ('Great Flood') of the River Mississippi in 1993 demonstrates the failure of a system which included 1,700km of channels along the Mississippi ~~designed~~ by the Army Corps and led to damage of over \$81m ~~for~~ <sup>in</sup> and flooding which was so severe that it overtopped the levees in St Louis by 6ft. This demonstrates how human



Attempts to manage these rivers can lead to  
 (worsened situation) due to high levels of  
 discharge and non-rapid run-off  
 resulting from (increased urbanisation) along  
 the river, become responsible for the  
 floods.

As a result of events such as this, schemes have been developed to reduce the impacts of human causes of flooding. For instance, along the River Kissimmee in Florida \$700 million has been spent to dechannelise 90 km of the river and return it to its natural course. This highlights how human causes of flooding are recognised as being heavily accountable through factors such as management.

However, certain flood events, which are significant but common, are the result of (natural causes) to a large extent. For instance, in (Boscastle) in 2004 the arrival of a depression on the UK coast which was heavily laden with moisture and ~~fast~~ <sup>drove</sup> the rain over the shore (known as a storm surge effect) led to over 7 inches worth of rain falling, instantly flooding the local river. The natural causes were worsened by a lack of wind to move the rainfall on. The result was huge damage to the town.

costing in excess of £2 million →  
 destroying many homes  
 ✓ (To conclude) although human  
 causes are responsible to a large  
 extent for some floods this is not  
 always the case but because of the greater  
 costs associated with human caused they are  
 often more exposed than more frequent  
 but less severe flooding with natural  
 causes.

### Examiner comment – Distinction

There is good knowledge and depth of understanding throughout this answer, with appropriate and well developed exemplification. The two elements in part (a) are correctly identified and the analysis of the drainage basins for part (b) is thorough and accurate. Rather than simply providing a basin by basin account, the answer provides a general synthesis including identifying the basins that are exceptions to the general rule. Part (c) is quite a broad question and it is up to the candidate to decide which factors to focus on and the approach to take. The key to a good answer is to provide good links between the factors and variations in both runoff and evapotranspiration. In this answer, both runoff and evapotranspiration are covered although the level of explanation for runoff is somewhat limited. Vegetation, as a factor, is discussed but at a fairly basic level. A little more attention to detail would have pushed the final mark closer to level D1. The answer to part (d) is comprehensive with a good range of examples. It is reasonably successful in providing a balanced account of human and natural causes for flooding, although the emphasis tends to be on human causes. This is especially true of the Mississippi example where 'most blame' is placed on the river engineering. The role of intense and prolonged precipitation in the upper headwaters of the river is downplayed. However, the level of exemplification is well balanced and well integrated in the text. The conclusion is sound and based on evidence and argument.

## Example candidate response – Merit

- 3a) X = infiltration  
Y = groundwater flow ✓✓
- b) Fig 4 indicates that evapotranspiration, rather than run-off, tends to be the more dominant contributor to the total output of river basins, for example of the 800 mm/year output of the Mississippi, 650 mm/year of this output comes from evapotranspiration. The Amazon is the only exception to this rule, where the run-off (1050 mm/year) is greater than the amount of evapotranspiration (950 mm/year).
- c) In the case of the Amazon river, where the run-off (1050 mm/year) is greater than the rate of evapotranspiration (950 mm/year), humidity may be the biggest factor which leads to this anomaly. Because, the Amazon rainforest is so humid, the rates of evapotranspiration are slowed because of how saturated with moisture the air is already. In comparison, evapotranspiration occurs readily in hot, dry climates, such as the Nile, because plants are forced moisture intercepted on the leaves of plants is quickly "burnt-off" "burnt-off".

Also, the height of the water table and the level of ground (saturation may) affect the levels of run-off because water will tend to run-off land which is already saturated because it cannot infiltrate, due to the fact the saturation point has been reached.

L2

Couple of quite basic points.

- d) In 1993, the Mississippi flooded with catastrophic consequences for the surrounding area. 45 people died, 75,000 were evacuated, 45,000 were

left homeless and \$8bn of damage was caused. This flood had perhaps been made worse by the precautions which had been put in place, by man, after the great flood of 1927. Levees, stretching along the Mississippi, some as high as 15m had been put in place along with dykes. Also, some meandering parts of the river had been straightened to speed up the flow of water and hopefully transport it to the sea more quickly. 250km of the river was lost, which meant that a large amount of water was now travelling in a smaller area of river. Also, the levees, despite being very large, caused flash flooding because when they were eventually breached, let a huge amount of water travel onto 700 ha of agricultural land.

However, despite the failures of the levees and the river straightening it was arguably the natural factors which had the biggest part to play. The torrential rain (250mm over 2 days) along with unusually high snowmelts meant the volume of water in the Mississippi was much greater than could have been expected. However, arguably had the land around the Mississippi been allowed

to flood naturally, as occurs around the flood plains of the Ganges, where people live in raised houses, then the damage from the flooding would have been far less socially and economically significant. 62

### Examiner comment – Merit

The answers demonstrate some valid knowledge and understanding but lack depth and detail in places. This is especially true of answers to Parts (c) and (d), which, necessarily, are the more demanding answers. The more descriptive elements of the question are answered quite successfully, thus both components of part (a) were correct and there is a good general analysis of the drainage basins for part (b). For part (c) only a couple of quite basic points are provided. Humidity is the factor chosen to explain variations in evapotranspiration and height of water table is chosen to explain runoff. These are valid factors but the subsequent discussion lacks detail. It is clear that it is soil moisture status that is being discussed but not very convincingly. Precipitation and infiltration capacity are not mentioned. Part (d) is assessed using the River Mississippi as an example. The account did recognise the interaction of physical and human factors, but with only one example the validity of the points raised is somewhat limited. However, the knowledge and understanding of the Mississippi floods is quite substantial and received due credit. Overall, three of the components are clearly at M2 level; it is only the answer to part (c) that falls slightly short of this level.

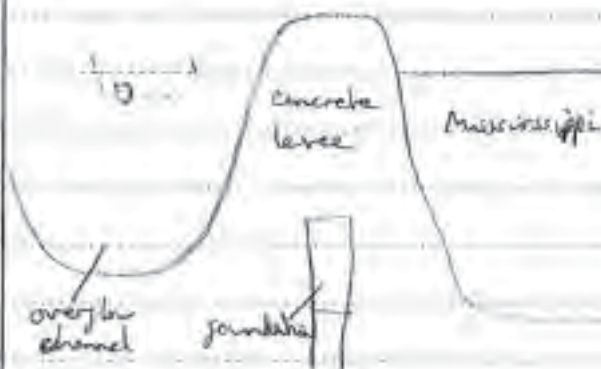
## Example candidate response – Pass

- 3a) X - infiltration ✓  
Y - groundwater ✓
- b) The complex barclat shows evapotranspiration being a key factor in the output of river basins. The barclat shows evapotranspiration to be either half a quarter or more of the overall output. The Amazon has a total annual average of evapotranspiration of 1050m which is a (quarter) of all its outputs. Whereas, the Zambesi has 1000mm output which is just less than (half) of its total output. Therefore evapotranspiration is a relatively important output of river basins.
- c) Vegetation cover ~~is~~ on (river banks) and (throughout) in the basin is important in explaining (flooding and drought). The more vegetation present, the lower the runoff rate is going to be because the <sup>under</sup> roots of vegetation absorb water from the soil surface and (get in the way) of the water flow. Also with vegetation, a better quality soil is maintained which can absorb water reducing run off. ~~Also~~ Furthermore, the more plants present, the

larger the evapotranspiration rate due to the ~~large~~ leaves releasing water from their stomata. (Aparistia) however, does the opposite effect and can lead to flooding due to the lack of roots ~~to~~ and ~~the~~ leaves to maintain the water cycle.

Very simplistic

- d) The 1993 Mississippi river flood caused miles of agricultural land to be covered in water. This was to a large extent, man's fault. The river had previously been straightened for navigational purposes ~~and~~ which increase the <sup>water's</sup> speed and (river discharge) increasing the ~~likely~~ <sup>chance</sup> likelihood of flooding. Also, high levees had been built to attempt to contain the river.



However, the water level got so high that it overtopped the levees thus flooding the land. Due to the higher levees, a larger <sup>volume</sup> volume of water <sup>was</sup> ~~lower~~ spilled from the river; man's poor judgement <sup>volume</sup>.

Good preparation though, saved ~~the~~ St. Louis from flooding. Here, ~~the~~ although there was a large volume of rainfall, to a large extent, humans were to blame.

- e.g. The Pakistan floods of 2010 (November) killed the Indus River basin - saturating it causing  $\frac{1}{3}$  of the country to be covered in ~~the~~ <sup>a</sup> zone of

water. The causes ~~were~~ due to a 'jogged'  
 jet stream that meant the monsoon rains remained  
 for longer than average. This is clearly a  
 natural cause, but it is thought that the monsoon  
 anomaly was due to El Niño's effect which  
 could have been exacerbated by global warming &  
 man's pollution. Also, some Pakistani organisations  
 were (cutting down trees) on a large scale in  
 the Pakistan forests. Some of the logs were stored  
 in reservoirs which then filled with water thus having  
 a higher level than normal - being filled with logs -  
 thus flooding the land.

In conclusion, man's impact has caused  
 flooding and to a large extent, all events  
 are altered by human decisions and how  
 we act when the disaster hits.

Pakistan example better but still  
 not convincing.

### Examiner comment – Pass

Apart from a few exceptions, the answer demonstrates limited knowledge and a clear lack of understanding even of quite basic concepts. However, it is not without some credit. There is clearly some knowledge of the drainage basin hydrological system as the components X and Y are correctly identified in part (a). However, the resource showing evaporation and runoff of drainage basins and total precipitation is misread. Precipitation is taken as an output rather than as an input. Also, only the Amazon and Zambezi are mentioned; a very partial analysis and with no general synthesis. The answer to part (c) is confused. It commences with statements concerning flooding and drought which are only marginally relevant. Explanation of the affect of vegetation on runoff is muddled and simplistic. Interception is not mentioned. Also, afforestation is described when it should have been deforestation. In part (d) the Mississippi and Indus River floods are used as examples. These are appropriate examples but knowledge of the floods is only partial and explanation of the factors involved is far from accurate. The conclusion is basic and only partially linked to the rest of the response.



## Question 4

Only one candidate answered this question and the response is not appropriate for analysis.

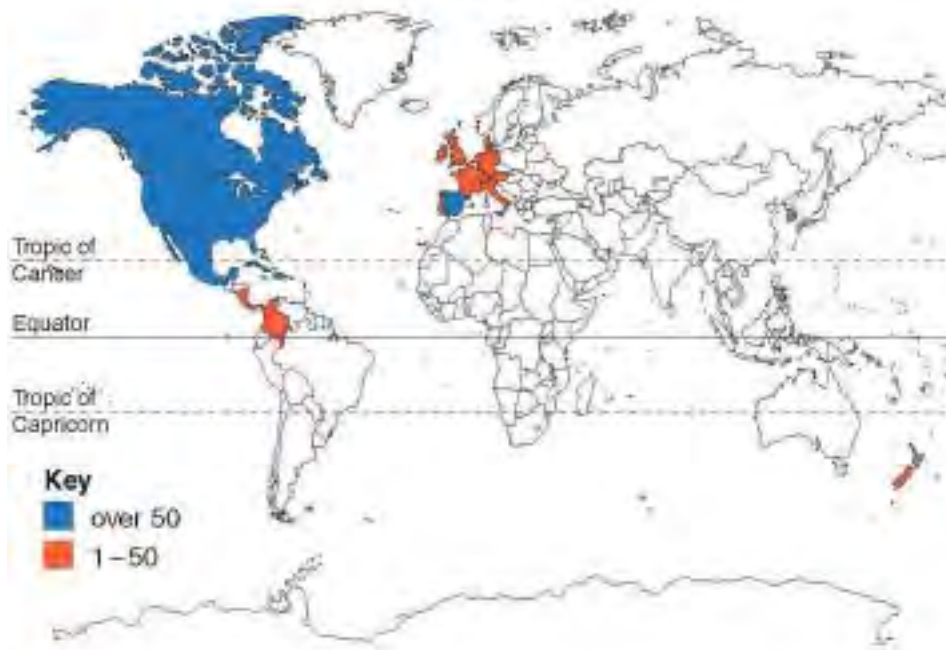
## Question 5

- 5 (a) What is meant by the term *pandemic*? [2]
- (b) Figs 5A and 5B show the distribution of confirmed cases of H1N1 (swine flu), by country, on 3 May and 4 June 2009.
- Describe the changes in the number of confirmed cases of H1N1 (swine flu) shown in Figs 5A and 5B. [4]
- (c) Using Fig. 5B, identify **one** country with more than 50 confirmed cases on 4 June 2009 and suggest reasons for the relatively high number of confirmed cases there. [5]
- (d) 'The economic impact of widespread disease and illness is greater than the social impact.' Using examples, assess the validity of this statement. [9]

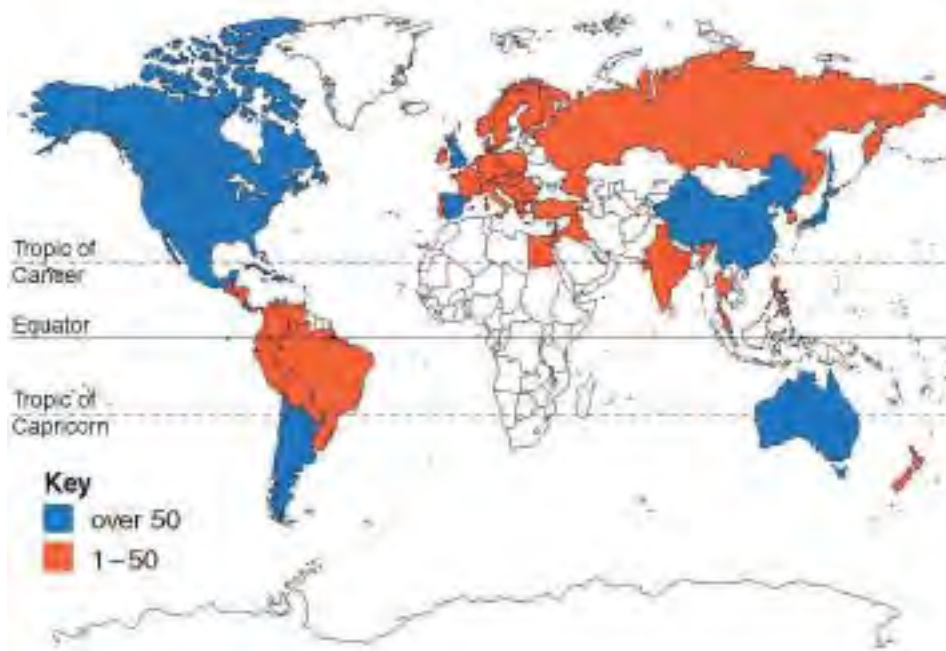
**Figs 5A and Fig. 5B for Question 5**

**Confirmed cases of H1N1 (swine flu), by country, 2009**

**Fig. 5A**  
3 May



**Fig. 5B**  
4 June



## Mark scheme

**(a)** An epidemic of an infectious disease (1) spreading through human populations across a large region / continent / the world (1). [2]

**(b)** Candidates may observe the concentration of cases in North and Central America and Europe in May and the more widespread distribution in June. Candidates might also describe the distribution of countries with over 50 cases in May and June. 1 mark per valid change, with 1 mark reserved for a clear reference to wider spread of the disease in June. For two separate descriptions, one for May and one for June, max. 2. [4]

**(c) Indicative content:**

1 mark reserved for the correct identification of a country. Possible reasons include:

- proximity to the source of the outbreak (e.g. Mexico, USA);
- population size (e.g. USA, China);
- population movements / air travel / tourism (e.g. UK, Spain).

**Candidates show:**

L3 correct identification of a country with over 50 confirmed cases; two valid reasons identified and their relevance clearly explained. [4–5]

L2 **either** correct identification of a country with over 50 confirmed cases, one reason identified and its relevance explained, or two reasons identified with little or no explanation of their relevance

**or** correct country not identified (omission or error), but two valid reasons suggested with one explained. [2–3]

L1 identification of a country or of one reason without explanation. [0–1]  
[5]

**(d)** Knowledge and understanding of how disease and illness can have both economic and social impacts. Economic impacts might include costs of treatment, loss of working hours, reduced income, lower productivity. Social impacts may affect population structure, family breakdown and migration patterns. Candidates might consider impacts at different scales from individual to national. Assessment of the relative importance of the impact of disease and illness in economic and social terms, based on the evidence presented.

**Candidates show:**

L3 convincing knowledge of a range of economic and social impacts resulting from widespread disease and illness and an understanding of how disease and illness lead to such impacts, supported by reference to specific examples; assessment of the relative importance of economic, compared to social, impacts, supported by evidence. [8–9]

L2 knowledge of a range of economic and social impacts resulting from widespread disease and illness and some understanding of how disease and illness lead to such impacts, supported by some reference to specific examples; assessment is assertive, rather than supported by evidence. [5–7]

L1 knowledge of some economic and social impacts resulting from widespread disease; limited or no understanding of how disease and illness lead to such impacts, lacking supporting examples; assessment is likely to be absent or take the form of assertion, with no supporting evidence. [0–4]

[9]

**[Total: 20]**

## Example candidate response – Distinction (D1)

- 5a) A pandemic is the presence of a disease on a <sup>very</sup> wide scale that spreads quickly, and is noticeable at high levels of <sup>infectious</sup> infections.
- b) Figure 4A shows that the majority of the disease is focused with high intensity in North America with numerous countries such as Mexico, USA, and Canada having over 50 cases, along with Spain, being the (only) higher intensity country in Europe, although numerous countries in Europe have it at very low levels as does a small number of countries in South America.
- There is a (large change) in 4b as the number of countries who have cases of the disease goes up dramatically, with the (largest expansion) being in Africa where there was previously cases in only one country.
- England and Scotland which previously had under 50 cases change to have over 50, and far more countries in Europe have it at low levels.
- Some countries jump from no cases to over 50 cases such as Australia and China, and Argentina.
- There is also a spread of the disease into South America so nearly all the continent's countries has incidences of it.

Q. There are very high numbers (over 50 cases) of the H1N1 virus in (China) just 4<sup>th</sup> of June and this could be for a number of the following reasons:

China is a (tourist location) for people (tourists) from countries such as the USA and Britain, who had high numbers of the disease previously. Therefore it is possible that contaminated people flew to the country.

A contributing factor for why it has so many cases is due to its (massive population size), with over 1.2 billion people it is more likely to have over 50 cases than a very small country.

(High population density) would increase the faster transmission of the disease, meaning that once it entered the country it could be passed to a number of people quickly.

Generally poorer standards of living would mean that there is poor access to either vaccines or preventative means of ~~the~~ stopping the spread of the disease.

Poorer education system would mean that ~~the~~ the population would be generally less aware of the disease or how to prevent catching it.

As a huge importer of food there is also a higher likelihood that contaminated foodstuffs was imported, increasing the likelihood of more people ~~catching~~ acquiring the disease.

5A) There certainly is a huge (economic impact) concerned with the widespread incidence of disease and illness, and examples of this can be noted from numerous diseases in numerous parts of the world.

✓ A (United Nations report) estimated that countries suffering from high prevalence of HIV/AIDS <sup>economic</sup> stunt their growth by approximately 2% each year. One of the impacts it has on people, though being most common amongst younger people it takes these workers out of the workplace and so constrains their ability to contribute to the economy. It can also have very damaging long term implications for the (next generation as children born) into families where members have HIV or AIDS often have to work early on order to support their family. This means that they are not receiving a high level of education and so are limiting the extent to which they can contribute to the economy. South Africa despite being an orphan as having 1 or both biological parents ~~to be~~ dead. In 2007 it was estimated that there were (1.6 million orphans) in South Africa as a result of HIV/AIDS, which obviously has negative social implications however arguably greater economic ones for the reason mentioned above.

It is widely judged to be the case that Botswana would be a wealthy country were it not for the virus.

high presence of ~~the~~ HIV/AIDS which spreads its workforce, for it already has all the natural resources.

One could argue it is a downward spiral as a country spends more loans money for its economy through disease and so has to make cuts, often cutting from the health sector, making the issue worse.

(Malawi) to the same effect has obvious economic implications. A highly regarded report by Gallup and Sachs in 2000 estimated that for countries where there was high prevalence of malaria there was a 1.3% deduction in the growth. In the same manner as HIV it targets the younger and the children of parents with malaria have proven neurological disabilities which can hinder learning.

The fact that 70% of HIV/AIDS is found in Sub-Saharan Africa and for malaria it's 90% would indicate there is a (correlation) in terms of negative economic consequence and these diseases, as they are predominantly found in ~~the~~ the poorest regions in the world, undoubtably they hold greater significance (than social consequences).

### Examiner comment – Distinction (D1)

This is an answer that operates at level D1 throughout. Part (a) is answered accurately and in part (b) there is a very thorough use of the data provided in the resource. In part (c) a valid country is chosen and the explanation for the disease spread is comprehensive with a good insight into the reasons for rapid spread of disease. The discussion of the role of education in allowing disease to spread is perceptive. In part (d) HIV/AIDS and malaria are the chosen diseases. Both short and long-term impacts are discussed with ample data justification. In the discussion on malaria, good use is made of quoted studies. Overall, the answer is excellent on economic impacts with social impacts not given quite so much attention. However, this is an impressive answer.



## Example candidate response – Distinction

- 5) a.) **Pandemic** A pandemic, requires three measures, a disease new to a given population, it spreads easily and sustainably amongst humans, and causes serious illness to those who contract the disease.
- b.) Immediately from looking at the two graphs you are able to see an increase in the number of confirmed cases of H1N1 worldwide.

In figure A, North America, ~~that is~~ and Spain had over 50 cases, whilst in Fig B, so did the UK, China, Australia and Southern South America, whereas before they had no cases, except the UK which had between 1-50 cases. So overall the main changes, is the increase in numbers worldwide, with a much larger number of countries gone to the virus, between the 3<sup>rd</sup> May and 4<sup>th</sup> June. ✓

- c.) The (UK) has over 50 confirmed cases on the 4<sup>th</sup> June 2009. One of the main reasons for this is that it (contains Heathrow) which is the world's busiest airport, so a large number of people will be passing through the UK, on route to other countries. The UK also has a ~~very~~ high population, so the chances of someone becoming infected, by someone else infected, is greatly increased.

d) One example to look at is (HIV/AIDS), which has 33 million infected worldwide, with 2 million dying each year. AIDS has generated huge (social impacts) within all countries where it is found, especially in Africa. In Africa it is associated with truck drivers, ~~miners~~ mines and the military, who travel from town to town sleeping with prostitutes, spreading the disease. Socially, AIDS used to be attributed to the 4 H's, Haemophiles, homosexuals, heroin users and hantians which lead to ~~an~~ discrimination amongst these groups. However recently it is now known that the spread of HIV/AIDS is mainly resulted due to prostitution, heterosexual activity and the use of dirty needles (mainly through drug use). The social stigma has now been removed from the 4 H's and it is widely known that they weren't the main cause. (Economically) AIDS ~~has~~ requires vast amounts of money to be spent to help prevent the spread, and help with treatment.

Another example is (malaria) which has had a huge impact on the economy of Africa. Sources suggest that 430 million people worldwide are infected with malaria, with 90% of deaths occurring within Africa. Malaria causes those infected, and ~~the~~ experiencing symptoms to take leave off work and seek <sup>long term</sup> medical care. This leaves a (huge gap) in the African economy and leads to an overall reduction in the ~~more~~ wealth generated for the country.

Overall whilst the economic impact associated with widespread disease and illness is huge and has lead to ~~an~~ negative impacts, so ~~have~~ the social

impacts of widespread disease. So I believe that you are not able to tell) which has had greater impacts, and therefore whilst this statement is partially true, social impacts have had huge impacts on societies as well.

### Examiner comment – Distinction

The answer is sound to good throughout with only slight variations in quality. As with many answers explaining the term 'pandemic', the geographical extent (ie continent/large region) is omitted. The description of the changes in confirmed cases of H1N1 flu, in part (b), is thorough with a good geographical range. In part (c) there is a correct identification of a country with over 50 confirmed cases with two valid reasons identified and their relevance clearly explained. Thus, the answer merits a L3 mark according to the mark scheme. The answer to part (d) is thorough and knowledgeable. The key to a good answer is to provide a balanced discussion of both the economic and social impact of widespread disease and illness, ideally with more than one example. This answer does that but with a slight bias towards the social impacts. The examples chosen are HIV/AIDS and malaria and the level of knowledge is good. The level of thought that has gone into this answer is illustrated in the general conclusion where the candidate argues that it is often difficult to separate economic from social impacts, which is a very fair point.

## Example candidate response – Merit

- 5 a) Pandemic - a widespread (usually global) disease or other illness that affects numerous locations through external and to lesser extent (international inputs).
- 5 b) In the USA, Canada, Spain, and most Caribbean islands the number of confirmed H1N1 cases has stayed at over 50 between the 21<sup>st</sup> May and 4<sup>th</sup> June. Western Europe has only seen an increase in the UK, starting from a base of 1-50 (to over 50 for UK). South Korea and New Zealand have stayed at 1-50. Australia, China, Japan, North Korea, Argentina and Chile have seen an increase from 0 to over 50. The rest of South America (bar Bolivia and a few other small island countries) have increased from 0 to 1-50. Eastern Europe, Russia, India and parts of South East Asia and some Middle Eastern countries & Egypt have also increased from 0 to 1-50 confirmed cases.
- 5 c) (China) has over 50 confirmed cases on June 4<sup>th</sup>. Reasons for this could include the recent globalization China is undergoing. As one of the BRIC countries and a NIC; China has seen increasing numbers of not only tourists, but general air traffic - this air traffic could have carried passengers with the H1N1 virus. Increases in personal mobility and development and new jobs created in the aftermath of the 2008 Beijing Olympics (could also spread) the virus. However the most prominent reason is probably the fact the UN pinpointed the origin of the outbreak of H1N1 to Western rural China. So with the virus originating there, as well as its

(largest population size), it is unsurprising China had over 50 confirmed cases on June 4th.

5d)  
eg

The (SARS) outbreak in 2003 had more of a social impact than economic one. Although many flights were cancelled and quarantines imposed (eg. in Canada on a group of ~~16~~ 16 Canadian tourists returning from China for 7 days), this is not a large economic impact. The social impacts were far worse: widespread fear and panic, especially among the uneducated who were unaware of how the disease spread). Urban ~~dweller~~ dwellers in China seemed to have the most fear of the disease, with the production of ~~face~~ and sales of medical face masks increasing (by 173%) as the vast amounts of people became paranoid. This was also evident by the numerous newspaper cartoons and articles written about the fear of SARS. Swine flu also had far larger social effects. With relatively few cases around the world, there was a huge increase in public fear, paranoia, and also awareness.

Due to the slight overreaction however, many medical supplies were ordered in, totalling 60 Million US \$ worldwide. These many of these have not gone to use. It is however hard to measure the economic impact (as ~~the~~ factual figure) to social impact (which has no key defining measurement). *Off*

## Examiner comment – Merit

This is a very variable answer but does demonstrate the characteristics that are often present in answers at level M2. The answer demonstrates an ability to describe data that has been provided but lacks the analytical ability to produce an argument and assessment where required. The definition of a pandemic is incomplete but the description of the geographical spread of swine flu is detailed and comprehensive. In part (c) a correct country is identified and two reasons for the spread are offered. However, the level of explanation is not completely convincing and the place of origin of the virus is confused. The explanation is not sufficient to raise the answer to a Level 2 according to the mark scheme. The SARS outbreak is chosen as the example for part (d). It is a relevant example but one where it is not so easy to assess economic and social impacts. This being so, the answer, although knowledgeable about SARS, is unbalanced with little discussion about the economic impact. The emphasis on the social impact is on paranoia and fear. A different example would have given greater scope for discussion and assessment.

## Example candidate response – Pass

5a) The term pandemic means ~~that~~ an infectious disease which is being spread globally, for example the bird flu outbreak of 1919!

6) The changes that have taken place from figure 5A to fig 5B is that firstly many countries and people south of the equator are now confined cases. Secondly in Britain excluding Ireland, had changed from '1-50' to 'over 50'

7) On the ~~fourth~~ 6<sup>th</sup> of June (Britain) excluding Ireland had more than fifty confirmed cases. This is due to the amount of ~~people~~ (social mobility) as well as good international systems, bringing people from seriously infected countries such as North America. We also have a very diverse culture of people and many people visiting family and friends and on returning to Britain and realising they are infected. The reason for the spread is good transport connection internally across the country but also on an international scale.

(d) The economic impact of a wide spread disease can have a devastating impact on the economic climate of a country. Firstly ~~with~~ with a pandemic such as ~~bird flu~~ Swine flu, business men and bankers (can not travel) to different locations of the world to carry out deals. Many people in big business were ill with Swine flu, this gave the excuse also to many fake ill workers. It affects the ~~global~~ ~~economy~~ economy hugely, with business going on stand by and not getting as much work done as possible, also swine flu lasts for a number of days if not weeks. The (cost of making the trays to prevent swine flu can be extremely expensive for a country especially ~~developed~~ an L.E.I.C.

HIV and Aids is a pandemic and is worse effected in sub-Saharan Africa. Antiretroviral drugs are too expensive for many people. The reason for the HIV pandemic to be so high in these areas is usually down ~~to~~ to the lack of education especially women, also old tribal rituals involving young women. The HIV/Aids attracts men at the point for their life where they will do most labour work, this causes an economic factor on a smaller scale in an L.E.I.C but still has a devastating effect.



## Examiner comment – Pass

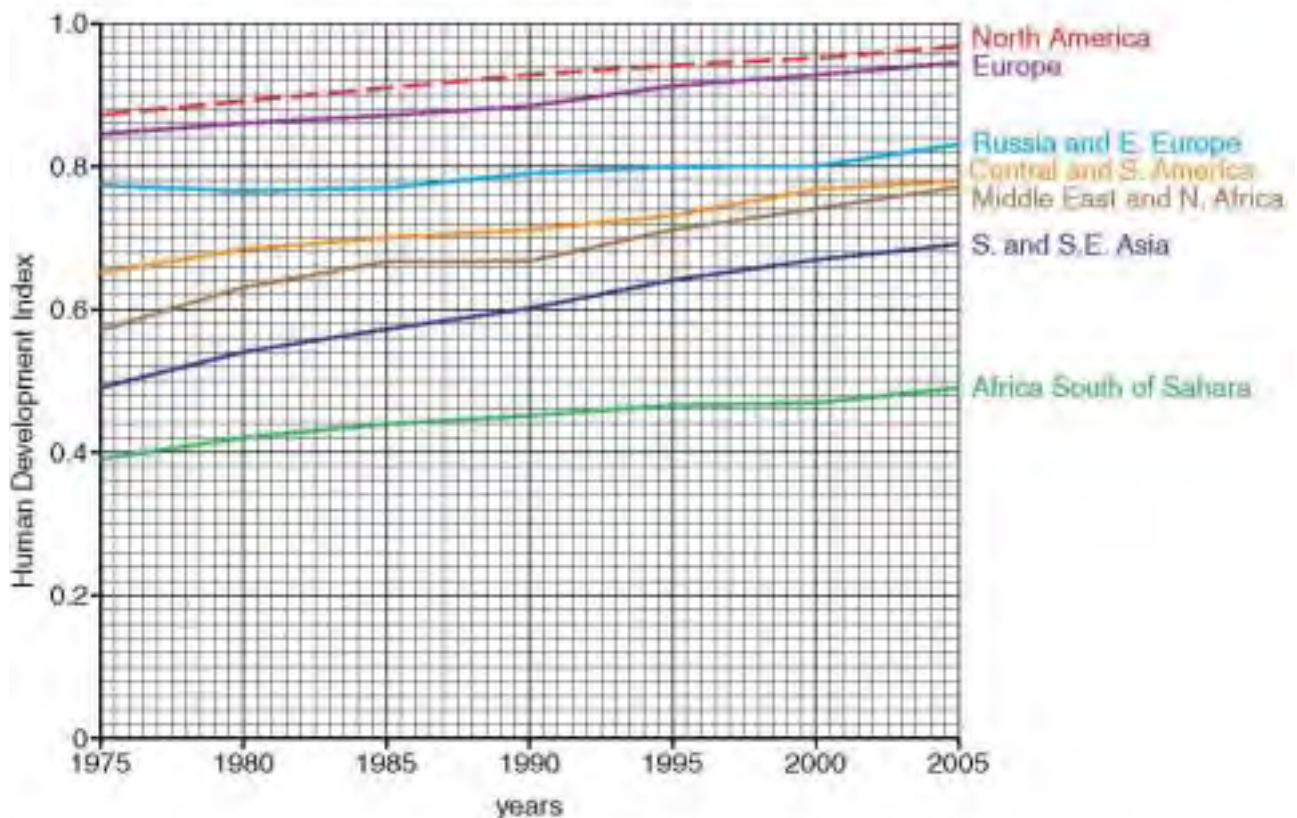
A little knowledge and understanding is demonstrated but not sufficient to produce coherent and relevant answers except where direct analysis of provided information is concerned. Thus, the definition of pandemic is complete and there is a partial discussion of changes demonstrated in the mapped resource, although that is not geographically exhaustive. For part (c) a correct country is chosen with one relevant reason identified and explained, although the candidate might have thought that two reasons were being offered. It is very often in part (d) where any limitations are exposed. The answer to part (d) illustrates this point. Swine flu and HIV/AIDS are the chosen examples and the discussion of impacts is very speculative. There are no statistical data to back up assertions. The analysis is limited on the social impacts and even the economic impacts are very vague. The answer also tends to wander off the question into reasons for the diseases. Thus, the answer is unstructured and ill-focused. The conclusion is basic, not linked to the rest of the response and the discussion is superficial.

## Question 6

- 6 Fig. 6 shows changes in the Human Development Index (HDI) for selected world regions from 1975 to 2005. Table 2 shows HDI scores for three newly industrialised countries over the same time period.
- (a) Name **two** of the indicators of development that are used in the Human Development Index (HDI). [2]
- (b) To what extent does Fig. 6 support the concept of a development gap? [4]
- (c) Describe, and suggest **two** reasons for, the changes in HDI scores shown in Table 2. [5]
- (d) 'At lower levels of development, the consequences of poverty vary greatly between countries.' To what extent do you agree with this statement? [9]

**Fig. 6 for Question 6**

**Changes in the Human Development Index (HDI) by world region, 1975–2005**



**Table 2 for Question 6**

**Changes in the HDI for three newly industrialised countries (NIC), 1975–2005**

Country	1975	1985	1995	2005
D	0.713	0.785	0.861	0.921
E	0.615	0.679	0.745	0.781
F	0.619	0.698	0.703	0.811

## Mark scheme

**6 Fig. 6 shows changes in the Human Development Index (HDI) for selected world regions from 1975 to 2005. Table 2 shows HDI scores for three newly industrialised countries over the same time period.**

**(a)** Credit **two** of: education (literacy rate combined with years of education); life expectancy; per capita GDP (adjusted for PPP). 1 mark per correct indicator. [2]

**(b)** Candidates might recognise the range of values of HDI, with some clustering and some breaks. Whilst the development gap is usually recognised to exist between countries at higher and lower levels of development, the evidence in Fig. 6 appears more complex. There is a clear gap between S and SE Asia and Africa S of Sahara, but another, smaller, gap appears between Europe and Russia and E Europe, which is not what the literature commonly refers to. Candidates may suggest a development continuum, which is changing over time (main gap increasing from 1975 on Fig. 6), but with breaks and/or distinctions within it, as shown. 1 mark per observation made, reserving 1 mark for some evaluative statement based on the evidence provided. [4]

**(c) Indicative content:**

1 mark for correctly identifying increasing levels of development, with some evidence, a further mark if levels and rates are described. Possible reasons might include:

- industrialisation, e.g. employment raises standard of living, tax revenue allows investment in infrastructure;
- investment of TNCs;
- government investment, e.g. in education, healthcare;
- international aid.

**Candidates show:**

L3 clear description of the changes in levels of development in Table 2; detailed explanation of the changes based on two reasons. [4–5]

L2 **either** clear description of the changes in levels of development in Table 2; identification of two reasons for the changes without development

**or** limited description of the changes in levels of development in Table 2; identification and explanation of one reason for the changes [2–3]

L1 limited description of the changes in levels of development in Table 2 or the identification of one reason for the changes. [0–1]

[5]

**(d) 'At lower levels of development, the consequences of poverty vary greatly between countries.' To what extent do you agree with this statement? [9]**

**Indicative content:**

Knowledge and understanding of a range of consequences of poverty in countries at lower levels of development. Consequences might include access to employment, housing and services; crime and prostitution, life expectancy, mortality and social tension. Assessment of how the consequences vary (or how similar they are) may appeal to other factors such as culture, ethnicity, gender or instability to

demonstrate variation, or, alternatively, observe that the consequences of poverty are observably similar amongst countries at lower levels of development.

**Candidates show:**

- L3 convincing knowledge and understanding of a range of consequences of poverty in countries at lower levels of development, supported by reference to examples; assessment of variation between countries, supported by evidence.  
[8–9]
- L2 knowledge and understanding of some of the consequences of poverty in countries at lower levels of development, supported by some exemplification; assessment is assertive, rather than supported by any evidence.  
[5–7]
- L1 some knowledge and understanding of some of the consequences of poverty in countries at lower levels of development, supported by limited or no exemplification; assessment is likely to be absent or simply to take the form of assertion, with no supporting evidence.  
[0–4]

[9]

**[Total: 20]**

## Example candidate response – Distinction

a) GDP per capita and life expectancy.

b) Figure 6 would indicate that there is a very much a development gap as shown by the (relative) HDI scores of the various parts of the world. The majority of HDI's are found in North America and Europe and they happen to be the regions that on average have the highest HDI scores, very close to 1. The highest numbers of LIC's are found in sub-Saharan Africa, or Africa South of Sahara, and again this is matched by the lowest HDI scores, ~~around 0.5~~ just under 0.5 in 2005, which represents almost half the score as was achieved by North America, indicating that there clearly is a significant gap in terms of development. A band of regions: Middle East and N. Africa, Central and S. America, and Russia and East Europe also occupy the middle ranking HDI levels with Russia and East Europe attaining a score of 0.82, being the best placed of these countries, would suggest that the graph is indicating quite very much is a development gap between the top and the bottom ~~parts~~ however there is also a cluster in the middle of these two extremes.

Good observations

- c) The general trend of table 2 for 3 NIC's is one of (relatively consistent) development in terms of HDI score, ~~with the exception of country Ecuador which declined slightly between~~ which could be accounted for by a number of things. One could argue that these countries are arguably benefiting from (globalisation) which has risen over the last 50 years, and promoted the interdependence of economies, creating higher levels of trade, and far higher levels of foreign direct investment, which if used correctly can greatly boost development, providing the financial stimulus ~~is~~ required for development according to (Rostow model for development.)
- A country where this could be the case is China, which as a result of FDI amongst other things has been attributed with lifting one billion people out of poverty.
- A further possible cause could be (structural adjustment) programmes, or changes within an economy, moving away from primary ~~product~~ product reliance, which is a characteristic of LICs ~~to~~ towards moving their economies on to secondary and tertiary sectors, which allows for far more sustainable growth and development which is reflected in the table, as South Korea converting from agriculture to manufacturing.

d) This is generally not the case as at lower ~~low~~ levels of development the consequences of poverty are generally (very harmful), for it is very difficult to get out of poverty in today's highly competitive world. It is far easier for a developed country to continue to develop because they already have the means to do so, i.e. infrastructure, finance and education for instance. However the general aim of things like creation of schemes such as 'fast heavily indebted poor countries initiative' of 1976 is to develop countries primarily on ~~the~~ International Monetary Fund based set of policies, because the consequences of poverty are broadly similar.

The presence of internationally applicable schemes such as the millennium development goals indicate the global necessity for countries to be free of poverty, especially aimed at low development countries because there is where the consequences are felt most prominently.

At low levels of development a country needs; infrastructure ~~and~~ a skilled workforce, which necessitates an efficient education system, and increase in consumption so

as to boost its economy into development, and there are very few cases where poverty in one LIC has any less of an impact than poverty elsewhere, especially dependant on the ~~same~~ ~~poor~~ level of poverty.

However one could argue that there is a case for saying this is not always true if some resource ~~are~~ abundant countries for even though they may have poverty they also have a means to develop thereby ~~making~~ ~~the~~ consequences of poverty in that country (weaker.) This equates to countries such as those in Africa,

which are resource rich and through globalisation are the recipient of attention from countries such as China, attempting to assert some form of neo-colonialism. For in some instances China provides infrastructure, and education, and even goods at low cost thereby creating the potential for a LIC to be in poverty that is not so consequential as another LIC. Also the failure of the World Bank's 'one size fits all' structural adjustment policies would advocate that poverty manifests itself and has different consequences in different countries, on occasion.

### Examiner comment – Distinction

This is an answer that demonstrates the value of producing full answers to all parts of the question. Two accurate components of the HDI are named and a very thorough analysis of the resource is provided. A complete perspective, supported by data from the graphs, is produced. Little more could be asked for from this response. For part (c) a clear description of the change in levels of development is produced but the description could have been improved with data obtained from the graphs. However, there is a detailed explanation of the changes with some possible examples. The relevance of particular models of development, such as Rostow's, is also discussed. In part (d) there is some confusion, among many candidates, over the meaning of 'lower levels of development'. This answer does tend to become a little confused and does not quite answer the question. There is a very firm conclusion but this has not been completely substantiated by the previous argument. The knowledge base is present but has, perhaps, not been used as efficiently as it might have been. However, overall this is a generally good answer deserving of the mark.



## Example candidate response – Merit

6 a) Gross Domestic Product and Life Expectancy

b) A clear and consistent development gap is shown in figure 6. Sub-Saharan Africa ~~has~~<sup>is</sup> at an average ~~average~~ HDI of 0.49 in 2005. This is considerably lower than newly developing countries and areas such as Central and South America, South East Asia and the Middle East and North Africa which all have an HDI score around the 0.7 mark, and have all developed significantly, unlike Sub-Saharan Africa, since 1975. Next is Russia at 0.8, a developed country, and then there is North America and Europe, which have high levels of development. This shows a clear development gap.

c) The first reason for a development in HDI is a growth in a country's economy. This can be due to increased foreign investment, location of resources such as oil, which ~~has~~ has done the Middle Eastern economy forward since the 1960s and 1970s. Economic growth can be rapid like China's during 1970, and this can improve GDP which boosts HDI. ~~Reasons~~ Construction of new healthcare can also significantly boost a

country's HDI. This has been witnessed in  
 Estonia where the banishment of ~~MSB~~<sup>malware</sup> has helped their  
 life expectancy to increase by 5 years, this has a knock  
 on effect on HDI, which increases as a result.

d) Effects of poverty ~~are~~<sup>can</sup> certainly be very different throughout  
 countries of lower level development and this is shown  
 by (Haiti) ~~as~~<sup>well</sup>. There are 78% of Haitians living  
 on less than \$2 dollars a day and the country  
 has hardly any skilled workers, as 500,000 have  
 moved to the US. Haiti is the 3rd hungriest  
 country in the world and the poorest in the North  
 and Western Hemisphere. Haiti is an extreme  
 example of poverty in a low level development  
 country, but there are other examples that also  
 disagree with the statement that poverty varies between LICs,  
 poverty is a worldwide problem for LICs, and evidently  
 it is more in some areas, ~~as~~<sup>well</sup> but ~~there~~<sup>are</sup>  
 areas like Dharavi in Mumbai, which ~~is~~<sup>houses</sup>  
 600,000 homeless people, and the favelas in Rio de  
 Janeiro, show a problem across all LICs. Consequences  
 of poverty in all of these 3rd world countries  
 (all include crime, disease and inequality) and  
~~are~~<sup>there</sup> there is a general theme of high poverty.  
 The consequences of poverty are the worst in Africa,  
 which has rates of 42% absolute poverty in some  
 areas, but there is not a great deal of improvement  
 in other LEDCs, so one can conclude that despite  
 fluctuating poverty levels in LICs, (their ~~levels~~<sup>relative</sup>  
 consequences of poverty are similar.)

## Examiner comment – Merit

This is a good example of an answer which demonstrates sound knowledge and understanding but does not always use them to their fullest extent. Two accurate components of the HDI are listed for part (a), but for part (b) a few values have been reproduced from the graphs but with little added value. There is no attempt at a general synthesis. The answer to part (c) has the same characteristics. The answer provides a few general statements about economic development and a change in the HDI values occasioned by foreign direct investment, but unfortunately, little use is made of the resource. The answer to part (d) uses Haiti and Mumbai to illustrate the consequences of poverty at lower levels of development. The exemplars are relevant and the factual detail is useful but the level of assessment is minimal. The answer just provides two cases therefore, if there is any comparison, it is implicit rather than explicit. The conclusion is limited and its links to the rest of the response are somewhat tenuous.

## Example candidate response – Pass

- 6a) - The quality of life of the individual.  
- The ~~known~~ level of education of the individual.
- b) To a ~~the~~ certain extent does the line graph support the development gap. It shows North America and Europe having the highest HDI; in 2005 both being between 0.9 and 1.0. Whereas, Africa South of Sahara has the lowest HDI between 1975 and 2005, with 0.5 in 2005. However, the graph does not show GNP, infant mortality rate or adult literacy rate, which are all factors of determining the development gap, therefore, Figure 6 cannot ~~prove~~ prove this.
- c) Country D changed from 0.713 in 1975 to 0.921 in 2005, country F also increased significantly from 0.619 in 1975 to 0.811 in 2005, whereas, country E moved from ~~0.615~~ 0.615 (HDI) in 1975 to only 0.781 in 2005. One reason for the change is the country has gone from exporting primary goods, to exporting high-value goods, like cars, due to the global shift, which allows more money to \*  
The second reason is a (new leader) has come into power - thus asserting new laws which result in better human development, like a new education system. \* spend on human development

d) To a large extent ~~to do~~ I agree with the statement. For example, (Bangladesh) has a high proportion of poverty, however, currently, due to the Grameen Bank, many people (of which 95% are women) are being eliminated from basic living. The Grameen Bank gives out 'micro-loans' to a group of five people at a time (none of which are family members) to invest in various projects to gain profit. ~~Their~~ Their Village Phone scheme has allowed women to gain money from ~~teaching~~ teaching a phone to people in the area so they can get fairer prices for their goods. Also, the scheme ~~is~~ is useful to families who may have a member working in a different country bringing back remittances to stay in contact to maintain an important relationship. In Bangladesh there have been 3.5 million borrowers; most of whom are earning money to get out of poverty.

On the other hand, in Uganda, (Sri Lanka), the rural village is hours of miles away from the nearest Kerombe ~~the~~ battery charging centre. These batteries are very dangerous and have caused many injuries to children. Also, water ~~to~~ pumps are very far away, so walking miles for water is very tiring and puts families under health problems.

Furthermore, Sudan has been split as a country due to civil war. Child soldiers and lack of education are some of the things experienced in poverty.

Overall, social inequality throughout areas of poverty is very evident throughout the developing world.

## Examiner comment – Pass

The answer lacks detail and is very speculative throughout but is not without credit. The components of the HDI are clearly understood in general terms, but not the specific indices used. The answer to part (b) is a very partial analysis with just a few basic points. It is not clear what point the last sentence is trying to make but it demonstrates the candidate does know the components of the HDI. It is not clear why these were not listed in part (a). The answer to part (c) is very speculative although there is some use of the data in the resource. The answer to part (d) is better with relevant examples chosen, although the scale of the examples is markedly different. Also, the issues relating to the consequences of poverty are somewhat limited in scope. The answer does not link the concepts together in any meaningful way and the conclusion is thin, speculative and not based on rational argument.

## Question 7

7 With reference to an area you have studied, examine the success of strategies to tackle the geographical issues it faces. [25]

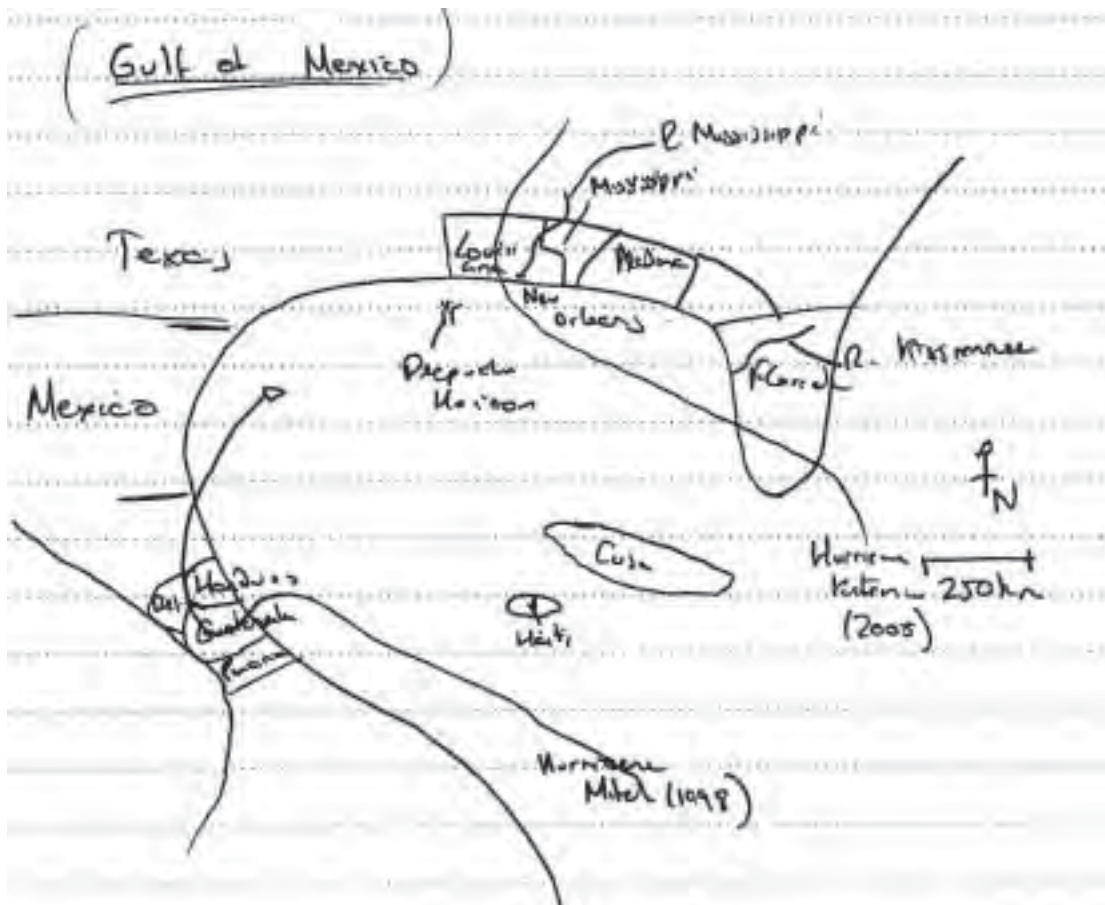
## Mark scheme

### Indicative content:

Candidates show knowledge and understanding of a range of strategies designed to tackle the different geographical issues the chosen area faces. These issues could come from either Section A, geographical hazards, (Tectonic, Weather, Hydrological) or Section B, socio-economic issues, (Crime, Health and Disease, Spatial Inequality and Poverty) or from both sections. The area chosen may be at any suitable scale from urban or rural to national or that of a world region. Candidates may examine strategies designed to tackle specific issues, such as cyclone prediction, building standards for earthquakes, crime prevention or disease eradication. The evaluation should consider how successful such strategies have been and may compare the relative success of different strategies, although this is not required by the question.

At lower levels, responses are likely to concentrate on the description of the chosen strategies employed to tackle specific geographical issues, but are likely to lack detailed exemplification. Evaluation of their success is likely to be assertive and lack support from evidence. At higher levels, candidates show detailed knowledge and understanding of a range of strategies to tackle a variety of geographical issues in their chosen area, and evaluate the success of these strategies on the basis of detailed exemplification that is place-specific. [25]

## Example candidate response – Distinction (D1)



Within the context of the Gulf of Mexico, there are a number of strategies to tackle the geographical issues it faces, such as hurricanes, earthquakes, flooding and the consequences of human activities. However, they are not always successful and indeed, some examples of clear failures.

One strategy which has proved very successful in the region to tackle the issue of flooding with a human cause, has been the returning of rivers to their natural state in order

to counter problems such as increased discharge and high cost associated with management schemes. The (River Kissimmee) in Florida (USA) uses, at a cost of \$700 million, techniques over a 90km stretch in an attempt to regain the natural meanders and floodplains of the river with the object of reducing flooding but also improving the natural environment. This strategy has proved very successful ✓

achieved these goals and is the best such scheme in the world, is now being followed elsewhere interactively.

(However,) this attitude toward river management is not the only strategy followed in the Gulf of Mexico with hard engineering solutions seen along the River Mississippi such as 1750 km of levees and the construction of canals, such as the 17<sup>th</sup> Street Canal in New Orleans, examples of (failure of) strategies to target flooding as a geographical issue. For instance, during the Great Flood in 1993, many of the defences along the Mississippi, such as the levees in St. Louis, were destroyed by flood water up to 16ft above flood level. Similarly, the 15<sup>th</sup> storm surge across Lake Pontchartrain during Katrina in 2005 led to over 50 separate breaches.



of the control system with both real events costing \$ 18bn in 1990s respectively.

An example of a (more successful) strategy employed in the area to mitigate harmful human activity is the success of the operators to counter the results of the Deepwater Horizon <sup>(see map for location)</sup> oil spill of the Macondo well which left 12 dead and 4.4bn gallons spilled of crude oil in the sea. Despite being the largest oil spill in history, its impacts were reduced by extraordinary efforts, including the "top-kill" system to stop the leak and the use of 2 aircraft to spray dispersant chemicals over the oil slick and the deployment of over 160km worth of protection soon to mitigate the spill effects. Even though, the event led to a \$28bn cost to the tourist industry and an estimated 5,000 animals washed up dead, it is an example of a (successful response) in that the effects could have been significantly worse and the environment appears to be beginning to recover.

(However,) not all strategies to tackle human activity in the region are successful. For instance, the issue of obesity challenges

look at the USA (more specifically Alabama and Louisiana) and Mexico which are the world's next or second-most obese nations. respective and mitigation strategies appear to have failed. For instance, in Mexico, the introduction of a tax on soft drinks (does not appear to) have led to a fall in obesity and indeed could be seen to be inequitable as a result of a tax the tax taking up a large proportion of poorer people's income. Similarly, in the US Louisiana and Mexico remain the 3<sup>rd</sup> and 4<sup>th</sup> most obese states despite several initiatives and continue to have to pay costs of \$1.4bn associated with obesity and suffer a lower development index 4.00 compared to the USA's 5.17 average.

An example of strategies to tackle natural issues associated with hurricanes can also be said to have universally failed across the Gulf. For instance, despite the simulation of Hurricane Pam by FEMA in 2004 the as a strategy to mitigate the effects of hurricanes on the US's Gulf states the impacts <sup>of Katrina (2005)</sup> were <sup>(ignoring for breach)</sup> the costliest hurricane in history (1902) and FEMA's poor response

led 26,000 people <sup>in New Orleans</sup> to have to take shelter in the superdome rather than to be evacuated. Moreover 80% of the ~~town~~ <sup>city</sup> was flooded even though the hurricane hit as a Category 3 rather than the Category 5 ~~or higher~~ event anticipated in P.A.M. Similar the failure of the ~~authorities~~ ~~own~~ Gulf community, in particular wealthier nations such as the US, to react to Hurricane Mitch in 1998 as an aid strategy to lessen its effects as a result of low media coverage meant that the 3 million people affected (led to worse conditions for longer follow-up) the event, and in the long term, led the Central American region to take over 10 years to recover.

This is in contrast to the reaction in the Gulf to the Hebron earthquake in 2010 when a Richter 7 earthquake hit 20 miles south of the capital Port-au-Prince and killed up to 26,000 people and destroyed 250,000 residences including finally the President's palace. ~~After~~ ~~the~~ ~~the~~ ~~the~~ following this event the arrival of aid as a strategy to reduce the impacts of secondary effects such as water contamination and

The provision of healthcare (was highly successful)  
 The US provided an aircraft carrier  
 to act as a floating airport and  
 Cuba supplied its healthcare system, which  
 has over 50 doctors per 100,000 people  
 domestically and, in conventional terms  
 helps provide healthcare to over  
 20,000 "healthcare tourists" a  
 year. However, just how successful  
 this reaction is remains to be seen  
 in the long-term as Haiti starts to  
 try and re-develop.  
 To conclude, the wide variety of  
 issues faced in the Gulf of Mexico leads  
 to differing strategies to correct it and  
 ultimately, their success can only be  
 judged on a case by case  
 basis as a result of this variety.

### Examiner comment – Distinction (D1)

The Gulf of Mexico is the area chosen for analysis. The account is very thorough with a good informative map showing where the main issues under discussion occur. Those issues are many and varied. As with most answers at the D1 level, the answer is well structured with a good introduction setting the scene, a comprehensive discussion and a substantial and reasoned argument. The best feature of the introduction is the statement that the respective arguments are not clear cut. Two examples of flooding are discussed in some depth, Florida and the Mississippi, substantiated with good data. The geographical detail is very good. The other issues discussed are the Deepwater Horizon oil spill, obesity, hurricanes and the Haiti earthquake. This is an eclectic mix that works very well. It is not only about natural hazards. The strategies are assessed in a very informative way. The answer overall is comprehensive, well argued and always focused.

## Example candidate response – Distinction

(7.) There are very many strategies for coping with any number of geographical issues. However, very very rarely do multiple geographical issues and hazards occur simultaneously. In the Caribbean Island of (Haiti) <sup>(c-9)</sup> there is massive poverty, hurricanes, earthquakes and other issues at the same time, and is a very good example of how well ~~these~~

strategies to tackle these issues work.

Haiti is the poorest country in the western Hemisphere, and is the third hungriest country in the world. Its HDI ranks 142 out of 181 ~~countries~~ nations. It faces yearly hurricanes, major earthquakes (such as in 2010), and widespread poverty, alongside ecological issues such as ~~cutting~~ (massive deforestation) (now to 95% of the ~~rest~~ country's forests) and <sup>a long time</sup> political instability and brutal dictatorships.

One of Haiti's most pressing issues is that of deforestation. ~~When first discovered~~ <sup>In 1900,</sup> Haiti was over 85% forested, ~~and~~ <sup>but</sup> is now down to less than 2%. The wood has been used to power Haiti's old-fashioned power stations as well as being the populace's primary fuel, and the resultant deforestation has left entire hillsides bare. This places them at ~~at~~ the risk from landslides during earthquakes, and during the heavy rainfall from hurricanes. A number of programmes to deal with this have been implemented) with varying degrees of success. Fast-growing eucalyptus trees were planted on the slopes, and although this has begun to resolve the issue, it has taken some time) to persuade the locals from cutting them down for fuel.

Haiti suffers from a major earthquake hazard, as the magnitude 7 earthquake in 2010 demonstrated. The earthquake devastated the capital Port-au-Prince, <sup>causing 13bn dollars worth of damage, and</sup> the country has yet to fully rebuild. Outbreaks of diseases such as cholera in the relief camps had only worsened the situation. Similarly, the hurricanes that batter the island yearly have similar destructive effects on a smaller scale, devastating the economy regularly. It will be a tough job to turn Haiti around, but the first step towards it will be the development of a stable, democratic government (and, hopefully, less corruption). Only when this is achieved can Haiti begin to implement effective and efficient policies to alleviate the poverty of its citizens through economic development.

This will also be hard. Although Haiti has a long legacy of exploitation by stronger powers that continues to the present day in the form of neo-colonialism (exploitation for markets rather than 19<sup>th</sup> century colonialism). Despite this, Haiti has significant potential as low-cost manufacturing zone that is much closer to the American markets than China or India. (By creating jobs) through growth, the Haitian government can begin to lift its people out of the poverty trap, and

although they have made a start on this by securing a number of trade deals with American manufacturers, it is very much a (long-term policy.)

In the meantime, foreign aid is going to be the only realistic way that Haiti can provide enough basic necessities to its citizens. However, if aid is to be fully effective, then the developed nations of the world will actually have to deliver on their promises. The USA, at the time of the 2010 earthquake, promised over \$1.5 billion to help rebuild, but has delivered only around ten percent of this.

Haiti will continue to be mired in a poverty trap due to the geographical issues it faces. However, although earthquakes and hurricanes cannot be stopped, economic development can be delivered.

### Examiner comment – Distinction

In this answer Haiti is chosen as the geographical area. The issues discussed are wide-ranging including poverty, hurricanes, earthquakes, deforestation and soil erosion. These are discussed in a sensible and informative manner, although a little more factual information would have enhanced the answer. A range of strategies are put forward related to each issue but evaluation of the success or otherwise, although mostly sound, is limited in some aspects. Most of the strategies seem to be subsumed under the general concept of development. Economic development is seen as the answer to all Haiti's problems. Although there is some credit in this, some of the issues raised need more specific and sometimes individualistic strategies. If this approach had been taken, the overall quality would approach D1 level. However, there is generally clear communication of ideas with sound knowledge and understanding of the subject. There is just a lack of depth in some areas.



## Example candidate response – Merit

7 There are 8 million people living in (Haiti), an island shared with the Dominican Republic in the Caribbean Sea. It is notoriously the poorest country in the Western hemisphere, and its low level of development is shown by its GINI index of 59.2, and the fact that 78% of people in Haiti live on less than \$2 dollars per day. Haiti faces political, social, natural disasters, economic issues and many problems inherited from 19th Century colonisation.

(Natural disasters) have had a profound effect on Haiti, and the ~~weather~~ cyclones that ravage the Caribbean every year pose great threat to Haiti, and 7 were killed during Hurricane Tomas in 2010. However, on the 12th January, Port-au-Prince was struck by a huge earthquake that left 230,000 dead. Strategies to tackle these natural disasters have been limited, and the information received regarding earthquakes and cyclones comes mainly through the US Geological Survey. The 2010 earthquake left 1 million homeless and affected over 3 million. Tackling the rescue operation was managed poorly, and over 30 rescue teams were simply turned away at the airport due to lack of space. The Nepalese relief team triggered a cholera outbreak by transmitting the disease from Nepal, and many studies show that the Haitian emergency services were thoroughly unprepared. NGOs and others were barred from providing aid because of having incorrect paperwork, and a mere 20% of promised aid was collected and used.

by the Haitian government. Few contingency plans were in place before the earthquake, but since 2010, new land use zoning maps and building codes have been drawn up to mitigate against natural disasters.

Strategies to prevent (environmental degradation) have almost completely failed. A eucalyptus tree planting scheme was introduced to encourage locals to plant and use their own fuel, but most simply burnt these trees, further increasing the energy crisis. 25 out of 30 Haiti water basins have been (clogged) due to deforestation, a memory of a part where Haitians were exploited by large colonial powers. Many of Haiti's resources have been used up, and environmental degradation has barely been tackled.

Migration is another huge problem for Haiti, and not one that is being tackled. There are 500,000 Haitians living abroad, and the estimated \$2bn dollars, an exact figure is difficult to find due to cash transactions, that is remitted each year is slowly decreasing, further buckling the Haitian economy, as entire families move away. This has created a 'brain drain' whereby 80% of Haitian teachers have now left the country. Management of this migration is not easy, as huge development needs to be undertaken to encourage people to stay.

Haiti suffers from huge geographical issues, including a distribution of wealth where 1% of the population possess half of the money. Strategies are difficult to manage in such an impoverished country, but because of its geography, the exploitation which it has undergone, and the huge environmental degradation that occurs, Haiti has become known as a 'failed state', and many strategies to combat degradation or other issues such as forestry building design have simply been ignored by a ~~population~~ <sup>country</sup> that is one of the least developed in the world.

### Examiner comment – Merit

The area chosen for analysis is Haiti. A number of issues are described (hurricanes, environmental degradation, out-migration) but are analysed with little detail. Thus, environmental degradation is used as a general term with little elaboration. It seems as if deforestation and soil erosion have been chosen as the issues but this is not specified. Migration loss is also described in very general terms. Hurricanes and earthquakes are chosen as the natural hazards facing Haiti with one example of each. The level of description of both examples is fairly minimal. The analysis of strategies is superficial with little assessment of their success. Therefore, the answer does not establish the geographical issues or analyse the strategies in any great detail. The conclusion could be valid but has not been substantiated in the answer. However, the issues are valid and there is some relevant knowledge and understanding but both are lacking in depth.

## Example candidate response – Pass

7) (Haiti) is the poorest country in the western Hemisphere. It suffers a range of geographical hazards including political instability, colonisation, trade barriers, natural hazards, desertification and disease. After the multiple devastation of Hurricane George, Thomas and the 2010 earthquake along the strike slip fault Enriquillo in Léogâne, \$3 billion was pledged in international aid, only 60% has been received. Furthermore, an overreliance on international aid is never a good thing, particularly with the corrupt dictators Haiti has suffered – Papa and Baby Doc Duvalier, Aristide – embezzling. (As Bertrand Aristide was found to be doing by the US government in 2000. An important scheme to send in targeted funds where they are most needed has been through remittances. However, this has lead to the so called "brain drain" or situation where all the most qualified personnel leave the country.

Throughout the 90's, Haiti underwent mass (deforestation) to fuel its primary fuel source: charcoal. As a result, the country is suffering from extreme desertification, drought and aridity. A significant lack of environmental controls has not aided this situation, although at last some "grass roots" systems are beginning to spring up - including (re-forestation projects.)

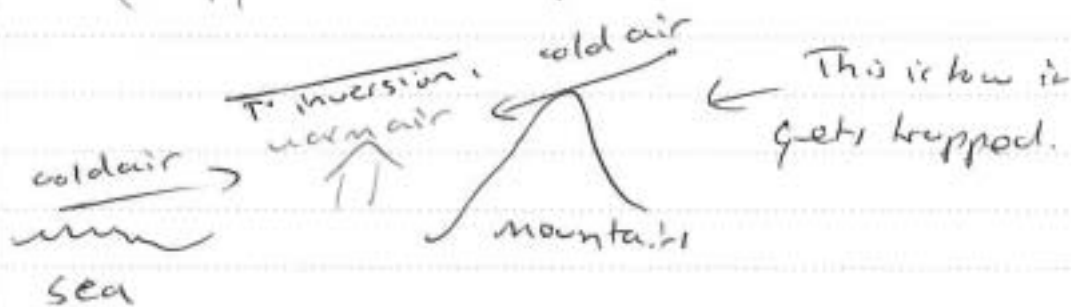
Haiti suffers severe barriers to trade due to international isolation. Associations such as the UN peace corps have attempted to apply aid but it is exceedingly difficult with US intervention hindering relief attempts. Haiti still suffers

from severe Neo-colonialism. The US acts as its biggest trade partner, enforcing strict, deep labour regulations on sweatshops and the agribusiness. In the 1990's, US rice imports undercut the local farmers causing great disruption. Furthermore, the sharp rise in food prices in the 2008 food crisis did little to help.

✓ (LA) has had far greater successes in dealing with its geographical hazards.

The Northridge Earthquake of 1994 killed 60, left 3 million homes without water and 200,000 without electricity. Since then, (steel encasing) have been fitted to the concrete pylons and hinges to add strength.

(Smog) is an intense problem in LA.



A number of policies have been implemented in order to combat the problem. Firstly, there are now government incentives for car-pooling and a fixed percentage of all sales revenue is given to the development of public transport.

Under Governor A.S., there has been a move towards the 'Hydrogen Highway' as it is this car culture, where 90%

of people own cars that creates such a big problem.

Flooding is a major issue as coastal subsidence has occurred as <sup>accessibly</sup> oil has disrupted the rock strata.

### Examiner comment – Pass

Only one area is required but this answer has provided information for both Haiti and Los Angeles. Either of the accounts could be chosen to illustrate the characteristics of an answer at the P2 level. A limited range of issues is discussed for both areas. Some knowledge and understanding are present in both accounts but the issues and strategies presented lack depth and detail. The issues discussed for Haiti are the aftermath of hurricanes and earthquakes and mass deforestation. For Los Angeles the issues are earthquakes, smog and flooding, although flooding is only given limited attention. Evaluation of the success of the strategies is also limited. There is really no conclusion. Thus, in general, the question is only addressed very broadly.

### Question 8

'The higher the population density, the greater the problems associated with geographical issues that areas face.' Discuss the validity of this statement. [25]

### Mark scheme

#### Indicative content:

Candidates show knowledge and understanding of the problems associated with geographical issues and use examples to illustrate these problems. These issues could come from either Section A, geographical hazards, (Tectonic, Weather, Hydrological) or Section B, socio-economic issues, (Crime, Health and Disease, Spatial Inequality and Poverty) or from both sections. Evaluation should consider the effects that population density might, and might not, have on such problems. Discussion of the validity of the statement will depend on the issues and contexts chosen. For example, some problems associated with disease, crime and spatial inequality and poverty might be expected to increase with population density because of factors such as contagion, increased opportunity and overcrowding. However, it could be argued that problems might be greater in areas of lower population density because of isolation and poorer access to services, for example.

At lower levels, responses are likely to show some knowledge and understanding on the problems associated with geographical issues, but are likely to lack detailed exemplification. Evaluation of the statement is likely to be assertive and to lack support from evidence. At higher levels, candidates show good understanding of the problems associated with geographical issues and evaluate the role of population density effectively on the basis of detailed exemplification. The significance of other factors may also be recognised at higher levels. [25]

## Example candidate response – Merit

⑧

Intro - egs of geographical ~~hazards~~ issues  
 - egs of densely populated areas.

Yes - ~~Haiti~~ Haiti Earthquake 2010, 200,000  
 Primary effects - Poorly built houses due to rapid expansion of the city -  
 Secondary effects - Disease  
 - Lack of aid

Primary effects similar but secondary different?

Slums - Dharavi, Mumbai

Poor sanitation

Illness spread quickly

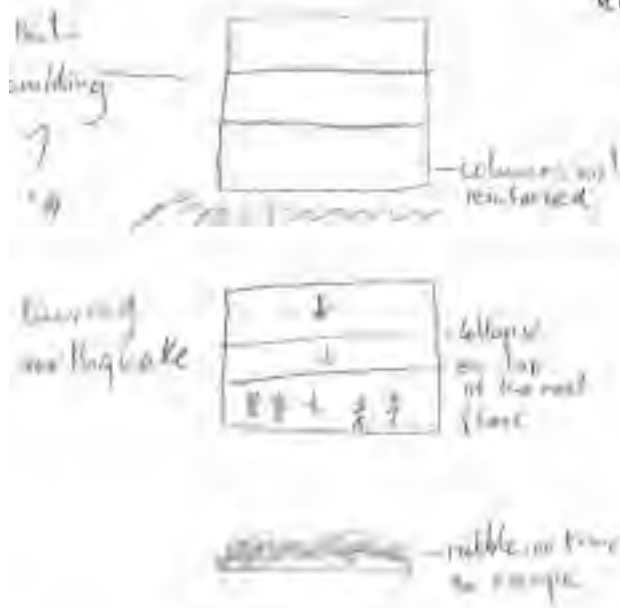
1 fire could kill hundreds of thousands of people

No - Indian Tsunami - 240,000 dead 2004  
 Not particularly densely populated areas  
 Still affected greatly

Extreme events will still affect dense sparsely populated regions

Geographical issues affect people all over the world, and people in different situations. Some issues include hazards like earthquakes or different types like slums, and rapidly urbanised and densely populated areas are said to be most affected by geographical issues, and but there are some anomalies to this statement.

In 2010, Port Au Prince in Haiti was hit by a 7.0 earthquake. <sup>over</sup> 200,000 people died from primary and secondary effects of the earthquakes. Haiti is the poorest country in the western Hemisphere and in the 20th century Port Au Prince experienced rapid urbanisation. This meant that houses were built in unstable areas and with poor quality materials as the people could not afford to build properly. In the earthquake many people died due to the 'pancake' effect, where buildings just collapsed and became flattened by the shaking. The secondary effects experienced by Haiti included disease due to poor



sanitation and overcrowding of people who were living in shelters for those who had lost their homes. The overcrowded camps meant that disease spread quickly and aid could not arrive because the airport and many roads had been destroyed.



In the case of Haiti in 2010, the high density of people caused a great number of problems, many of which would not have been encountered in a low density area.

The slums of Dharavi, Mumbai contain over 1 million people, all of which are ~~at~~ living in about 5 km<sup>2</sup>. This is one of the most densely populated areas in the world and it faces numerous problems. Firstly, disease spreads extremely quickly and many people die of water-borne diseases like cholera as the majority of drains are open and simply run through the roads. Secondly, if a fire were to break out, thousands of people would die as the houses are usually makeshift and made of wood. They are very tightly packed so the fire would spread very quickly. ~~Finally, one has~~

On the other hand side of the argument is the tsunami of 2004, in the Indian ocean. 240,000 people died when the tsunami struck over 20 countries. ~~and~~ A massive amount of destruction was caused despite the fact that the coastal regions affected were not especially densely populated. The sheer size of the tsunami meant that it ~~was~~ would cause massive amounts of destruction anywhere (as long as it ~~was~~ populated).

Also, when managed properly like in 2000 when Popocatepetl volcano erupted near Mexico City, people were swiftly evacuated and loss of life was avoided, despite the eruption occurring in a densely populated

area.

To conclude, there are many factors that can affect the problems with geographical issues, like poverty, development and management of the issue. It could, however, be said that in a densely populated area, (secondary effects are magnified). Haiti is a good example of this and so is the earthquake 1995 where the initial earthquake was overshadowed by the secondary fires which killed more people. The nature of the issue also affects problems caused. A volcano in a densely populated area can be less destructive than an earthquake in a densely populated area. Similarly, extreme events like the tsunami of 2004 will massively destroy even sparsely populated areas.

### Examiner comment – Merit

This answer produces sensible arguments based on a broad range of issues and areas of high population density. But it tends to be slightly one-sided in the approach it takes. The examples are very relevant and could form the basis of an excellent answer but the potential is not fulfilled. The communication is clear but the structure is a little disorganised. The conclusion is sensible and quite detailed and does link back to the question and the issues discussed. However, there are some statements that are assertive and not substantiated by precise argument.

## Question 9

9 'People are more at risk from geographical hazards now than at any time in the past.' How far do you agree? [25]

### Mark scheme

#### 'Indicative content:

Candidates show knowledge and understanding of the risks posed by different geographical hazards and the factors that influence such risks, supported by relevant examples. Risk may be examined through potential and actual threat to life, property, livelihood, health and political stability, or may be approached through the primary and secondary effects of hazards. Factors influencing the level of risk might include scale and nature of the hazard, population density, level of economic development, scientific knowledge and the ability to predict and prepare for hazards. Evaluation of the variable nature of risk through time is required and is based firmly on the evidence presented through exemplification. Evaluation might suggest that risk might be greater because of larger numbers of people living in areas at risk, or that risk might be lower because of more knowledge and understanding of hazards allied to greater preparedness and education about how to reduce risk.

At lower levels, responses are likely to show some knowledge and understanding of the risks posed by geographical hazards and the factors influencing such risk. Such responses are likely to contain exemplification limited in detail. Evaluation of the variable nature of risk through time is likely to be assertive and to lack support from evidence. At higher levels, candidates will show thorough knowledge and understanding of the risks posed by geographical hazards and the factors influencing such risk, supported by detailed and relevant exemplification which will be used to evaluate the variable nature of risk through time. At higher levels, candidates might recognise that place as well as time influence the level of risk. [25]

## Example candidate response – Distinction (D1)

9. The population of the world, having recently passed 7 billion, is larger than ever before, so we can expect the increased number of people to live in more areas, at risk of more hazards. However, urbanisation has recently passed 50% which means the larger high density of physical population means more people are at risk of urban geographical issues.

Over 30000 people now live in Pompeii, almost six times the Roman era population, so, should Mt Vesuvius erupt again, more people are at risk of physical flows. (However,) the increases in development mean that, using seismology and morphology, we can accurately follow magma surges and act accordingly. Thus, though more people are at risk, we are better equipped to deal them.

Globalisation, the result of increased communication technologies and personal air transport, means that diseases spread faster than ever. This means the Hagström model is less applicable because relocation diffusion can happen so quickly. Ebola has too short an incubation time for any patient to have left the region affected region unnoticed but, should someone take the virus to a core transport city, like London, the disease could quickly spread to airports globally and, from there, to peripheral regions.

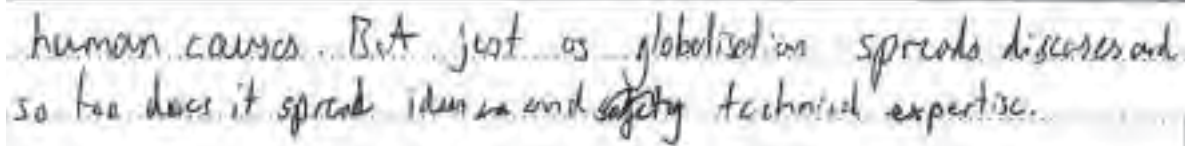
However, increased communication also helps reduce geographical hazards. During the recent Alabama Tornadoes (25<sup>th</sup> to 28<sup>th</sup> April) the National Weather Service was unable to keep ahead of the ~~20~~ 275 tornado formations. Instead, phone-in radio programmes allowed local news to travel as quickly as each new tornado formed so locals could alert locals. Similarly the USGS was able to transport advanced seismic equipment to Mt Pinatubo due to the proximity of the Clark Air Base. They were thus able to work with the less funded, local PHIVOLCS and reduce casualties. So communication of ideas can help reduce risk.

The population boom has also placed a strain on our natural resources. Haiti was once 80% forested but now has only 3% forest cover because charcoal, their (inefficient) primary fuel source, has been created unsustainably. The removal of these trees has now placed communities at greater risk of drought and mass movements because the trees used to act as both a slope ~~retarder~~ and consolidate the soil with roots.

However, poor location and governance is just as much to blame for these problems in Haiti. The recent Chile earthquake (9.1 on the Richter scale) was 501 times more powerful than the 2010 Haiti earthquake but killed just 500 people (1/600 of the Haitian ~~casualties~~ fatalities) because of government sponsored anti-earthquake measures like building codes and evacuation drills.

We are certainly more at risk of man made geographical hazards now. The ~~1984~~ Bhopal Disaster, the escape of MIC gas ~~that~~ near a town of over 50000, may have ~~caused~~ caused over 15,000 related deaths over the ~~next~~ following 25 years. Other large-scale industrial projects like the 3 Gorges Dam also place us at greater risk. Though dam failure is highly unlikely ~~the~~ over 100 000 people were moved due to enforced flooding and drought is currently being suffered ~~downstream~~ because the dam not retain so much water to ensure optimal power generation.

(In conclusion,) as more humans live in increasingly dense conditions we do put ourselves at greater risk of localised events. Global warming, though impossible to predict, may cause flooding of unsuitably populated areas like the Bangladesh Delta ~~is~~ (which is 90% below 3m above sea level). The risks of living in the anthropocene will only become more dependent on



human causes... But... just... as... globalisation spreads diseases and so too does it spread ideas and safety technical expertise.

### Examiner comment – Distinction (D1)

There is a good general introduction to this response which sets the scene; always a suggestion of a D1 answer. Also, at this level there is usually a different insight into the question, whether it is an unusual example or a demonstration of lateral thinking. The answer makes an interesting point about globalisation and the spread of disease with increased travel increasing risk. However, this is counterbalanced by increased communications and spread of knowledge. The example of tornado watch is used to justify this idea. The other point that, with increased population and deforestation, countries are more at risk from soil erosion and land degradation, is well argued, as is the point that with increased development, disasters such as Bhopal are more likely to occur. The speculation on global warming is also useful. This is an extremely well-argued answer, often taking a different slant on many issues.

## Example candidate response – Distinction

9. The threat posed by geographical hazards is a huge one. Their variety and ability to be controlled makes them a great threat to people across the world.
- Greater movement of people and an increase in the global human population is a factor which suggests that more people than ever before are at risk from geographical hazards. Migration to large urban areas is a fact which accompanies the development of many countries. Growth in the economies of countries in Asia such as China and Thailand has been accompanied by large scale migration into these cities. Greater density of population means that geographical hazards such as earthquakes and ~~tsunamis~~ tsunamis are more likely to pose a greater risk to more people as these areas are more densely populated and the populations of more countries are becoming increasingly less spread out. More people are living in our cities than at any time in the past. The largest amount of people on earth are those that therefore will put more people at risk from geographical hazards.
- Much research has been done into whether there has been any increase in geographical hazards over time. One that has attracted particular attention is whether climate change is having any effect on hurricanes. Studies conducted since 1990 show that since that time there has been no increase in the amount of hurricanes in the Atlantic Ocean. However, the studies have found that the intensity of the hurricanes, that is the wind speed and

duration, has increased during this time. This itself could put more people at risk from geographical hazards. Increases in sea surface temperature resulting from climate change may pose more threat to people in certain

Mitigation and Management of geographical hazards has improved immensely over time. Whilst there are differences in this across areas of different levels of development, more capital and time than ever before is being used to help manage and mitigate geographical hazards. Seismographs and carbon gas canisters help to predict earthquakes, whilst the DARTS Tsunamiator is currently being put in place across the world's oceans to help predict tsunamis.

The Internet has also proved a valuable resource to help prevent risks to humans. In Los Angeles where its citizens are at risk from a variety of geographical hazards, the state authorities have a website where they give out daily updates and information on hazards such as the smog whilst there is also in depth information on vulnerability to earthquakes and wild fire. In Canada, the internet is used as a slightly different way to help reduce the risk of these hazards to people. All citizens who have internet access are reminded once a week / during the winter to ensure their properties against blizzards by doing things such as keeping fuel and blankets in vehicles.

Schemes outside the internet also help to reduce the threat of hazards. The 'StayWise' scheme in the USA was launched in the mid-1970s and has since trained approximately 250,000 people from all a range of careers to help spot conditions which might lead to hazards such as hail storms, tornadoes and blizzards occurring to help reduce the risk to people across the country.

Whilst the world's population continues to rise



increase, so does our capacity to try to mitigate and manage geographical hazards. Once the world's population does halt, which it will in the future, our ability to mitigate and manage these hazards should mean we are making our least people at risk from hazards than ever before.

### Examiner comment – Distinction

This question posed a number of issues for candidates. Many interpreted it as 'more people are at risk' rather than 'people are more at risk'. Thus, the majority of the answers concentrated on increasing population numbers and density in high risk areas. Although this could be part of the answer, if it is the main focus then the answer becomes unbalanced. This answer does not take that approach. It does stress the increase in population and density but it is not the focus of the answer. Quite perceptively, the answer focuses on the time dimension and examines whether hazards are becoming more frequent or of a higher intensity and assesses the increased knowledge and understanding of such hazards which underpin prevention and mitigation. There is a sensible discussion of the role of climate change and concludes that the evidence so far is inconclusive. The second half of the answer examines prediction techniques for various hazards and concludes that, with a few exceptions, we are getting better at prediction and mitigation. The conclusion, sensible in terms of the arguments presented, is that people are less at risk from geographical hazards. There is the basis here for D1 answer, if the discussion had been better integrated.

### Example candidate response – Merit

9. To an extent this could be said to be true in the sense that in recent times there have been a high number of instances whereby there have been severe hazards that have resulted in large scale loss of life, such as the 2010 Pakistan floods killing 5000 people, and that this year in Alabama in the US has been

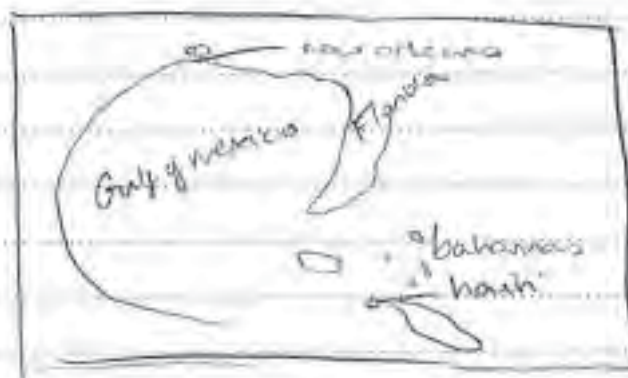
the ~~was~~ 2nd worst set of tornado events in history. However it is perhaps more prudent to analyse the term 'risk' for to a degree that can come down to level of development in a region. For instance hurricane Katrina (2005) was one of the top 5 worst hurricanes in US history, and the damage was huge, namely 1836 people dead, 80% of New Orleans flooded, and a total loss of around \$30 billion in damages. However the USA is in a far (better position to deal) with events such as these and limit risk in terms of loss of life, and economic damage, than other countries in the Gulf of Mexico such as Haiti.

In the case of the 2005 hurricane Katrina, despite being an MDC and the largest economy in the world its defences were only designed to be able to deal with a (category 3 hurricane) which would indicate that people are ever now at greater risk however, despite what was deemed to be a ~~the~~ thoroughly inefficient response to the disaster by the Federal Emergency Management Agency, that led to the resignation of its director, and the inefficient way it coordinated disaster relief efforts with other agencies that led to thousands of people going without food & water, people still were warned and advised to evacuate the area of Louisiana on the 26<sup>th</sup> of August, 3 days before the hurricane hit the area on the 29<sup>th</sup> of August providing people with a ~~an~~ opportunity to leave if they wished. There was criticism that the mandatory evacuation order was not given out

earlier however of the 100,000 residents that remained in the city when the hurricane hit. The majority of these residents remained because they disobeyed the mandatory evacuation order. Therefore had they complied, surely there could have been a lower count of deaths.

Within 4 days of the event taking place the government released a relief package of \$10.5 billion to contribute to relief from the disaster. Despite there being around \$30 billion of damage and despite the hurricane continuing deep inland there was only 1,836 deaths with is comparatively low when you compare it to other locations within the Gulf of Mexico. Despite such high economic losses, the USA as a developed economy has the means through which it can provide temporary housing to those who are displaced by these forms of event.

If you compare this to Haiti another country in the Gulf of Mexico that is ranked 145<sup>th</sup> in the world in terms of HDI you can note that the risk associated with these forms of ~~event~~ hazards (is less ~~an~~ exacerbated by time) as opposed to levels of development.



Haiti has had a history of political instability and inequality. ~~8~~ One percent of the population (the French speaking minority) owns almost 50% of the wealth. This ~~is~~ with Haiti being the most impoverished nation in the western hemisphere and 70% living under the  $\$2$  a day standard you are at a far greater risk from hazards, both in terms of loss of life, and in terms of economically. The (2008 tropical storm) destroyed 70% of the nation's agricultural output which is of huge significance as ~~62~~ 62% of the population is reliant on agriculture as their work. It has left 3.3 million people reliant on food programmes. After the 2010 earthquake more people died from cholera than the earthquake itself.

What this would indicate is that although recently there (may have been a rise in hazardous events,) what determines the level of risk to your society is not this, but (level of development). Therefore I would disagree with the statement that you are at greater risk now from hazards, as it is dependent on the resources available to where you are located as demonstrated by the above.

### Examiner comment – Merit

This does not quite answer the question which was set. Two interesting and relevant examples of hazards (Hurricane Katrina and New Orleans, and the Haiti earthquake) are discussed in some depth. These examples demonstrate that such hazards can affect significant numbers of people, but the general issue as to whether people are more at risk is not really addressed. They are used as two 'stand alone' examples. The conclusion is assertive and not linked to the discussion. The statement 'there may have been a rise in hazardous events' recently has not been discussed in the answer. The detail on the two events is sound but is not used well in the discussion. The general conclusion is that level of development decides whether people are more at risk but this is again assertive and not backed up with rational argument.

## Paper 2 – Global Environments

### Generic Mark Scheme

#### Guidance notes for marking 9768/02

In marking questions in Sections A and B of this paper, the indicative content and levels descriptors are used throughout. In marking questions in Section C, which are worth 25 marks and based upon extended writing, the Generic Mark Scheme (GMS), used for assessing all pieces of extended writing bearing 25 marks in the Cambridge Pre-U Geography, should be used in conjunction with the indicative content for each question.

Whilst the GMS captures the essential generic qualities of responses in five mark bands, the indicative content is what it says: some indication of the probable content in responses, or possible approaches, to the questions and titles set. Candidates may develop their own approaches to questions. Examiners should not expect to find all the indicative content in any one response, such as to achieve a Level 5 award. The same mark may be awarded to different pieces of extended writing for different reasons.

Cambridge expects examiners to use their geographical judgement and professional experience, combined with guidance given by senior examiners at the Standardisation Meeting and during the standardisation process, in assessing responses appropriately.

#### Use of the Generic Mark Scheme

The Generic Mark Scheme is used together with the indicative content for each essay question.

Responses may be placed in any level without fulfilling all the descriptors for that mark band, for example where the essay does not lend itself to the use of sketch maps and diagrams. Responses may exhibit characteristics of more than one Level and so examiners use the principle of best fit in determining response quality. The grid below gives an indication of the relative weightings of the Assessment Objectives (AO1, AO2, AO3) at each Level.

Level	Marks	AO1 Knowledge and Understanding	AO2 Skills	AO3 Analysis and Evaluation
5	22–25	15	3	7
4	18–21	14	2	5
3	14–17	12	2	3
2	10–13	10	1	2
1	0–9	8	0	1

**Generic Mark Scheme (GMS)**

<b>Level</b>	<b>Marks</b>	<b>Assessment criteria</b>
<b>5</b>	<b>22–25</b>	<ul style="list-style-type: none"> <li>• Wide-ranging, detailed and accurate knowledge and clear, high order understanding of the subject content</li> <li>• Relevant, detailed and accurate exemplification used effectively</li> <li>• Logical and clear organisation; good English expression; full and accurate use of geographical terminology</li> <li>• Well annotated and executed sketch maps/diagrams integrated fully with the text</li> <li>• Fully focused on the specific demands of the question</li> <li>• Systematic analysis and a critical approach to evaluation; appropriate application of concepts and theories</li> <li>• Conclusion shows high level insight and is logical and well founded on evidence and argument</li> </ul>
<b>4</b>	<b>18–21</b>	<ul style="list-style-type: none"> <li>• Good knowledge and depth of understanding of the subject content</li> <li>• Appropriate and well developed exemplification</li> <li>• Logical organisation; sound English expression; appropriate use of geographical terminology</li> <li>• Clearly annotated sketch maps/diagrams well integrated with the text</li> <li>• Well focused on the demands of the question</li> <li>• Elements of systematic analysis and ability to evaluate; generally appropriate application of concepts and theories</li> <li>• Conclusion is sound and based on evidence and argument</li> </ul>
<b>3</b>	<b>14–17</b>	<ul style="list-style-type: none"> <li>• Sound knowledge and understanding of the subject content lacking depth in some areas</li> <li>• Appropriate but partial exemplification, may not be integrated with the text</li> <li>• Generally clear communication but lacking some organisation; English expression and use of geographical terminology are mostly accurate</li> <li>• Sketch maps/diagrams generally used effectively and appropriately</li> <li>• Specific demands of the question mostly met</li> <li>• Some ability to analyse and evaluate; limited application of concepts and theories</li> <li>• Conclusion is limited and has some links to the rest of the response</li> </ul>
<b>2</b>	<b>10–13</b>	<ul style="list-style-type: none"> <li>• Some knowledge and understanding of the subject content lacking depth and detail</li> <li>• Exemplification used may be limited or not fully appropriate</li> <li>• Limited organisation; English expression is basic with some accurate use of geographical terminology</li> <li>• Sketch maps/diagrams may have inaccuracies and limited relevance</li> <li>• Question is addressed broadly or partially</li> <li>• Analysis, evaluation and application of concepts and theories are limited and may be superficial</li> <li>• Conclusion is basic and may not be linked to the rest of the response</li> </ul>
<b>1</b>	<b>0–9</b>	<ul style="list-style-type: none"> <li>• A little knowledge and understanding of the subject content; response may also contain unconnected material</li> <li>• Exemplification, if used, is simple and poorly related to the text or may not be relevant</li> <li>• Lack of clarity and organisation; English expression is simple with inaccuracies; geographical terminology, if used, is basic or not understood</li> <li>• Sketch maps/diagrams are limited or poorly executed and may lack relevance</li> <li>• Question is understood weakly and may be addressed slightly</li> <li>• Superficial statements replace analysis and evaluation; application may be minimal or absent</li> <li>• Conclusion may be absent or simply asserted</li> </ul>

## Question 2

### Arid and Semi-Arid Environments

'The hydrological cycle in desert environments is mainly characterised by a lack of precipitation'.  
To what extent do you agree with this view?

[25]

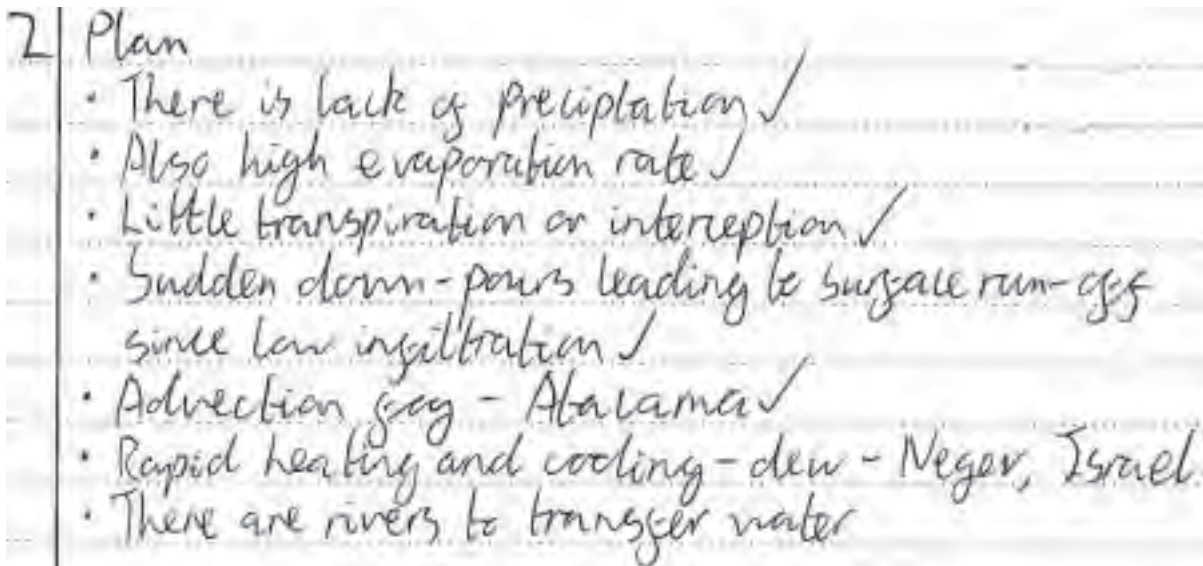
### Mark scheme

#### Indicative content:

The lack of precipitation in desert environments is clearly a key characteristic with many classification systems using this as the principal distinguishing feature (i.e. less than 250mm = arid). However there is considerable variation within this and candidates may well discuss contrasting deserts with some areas (e.g. Patagonia) being termed desert but with relatively high rainfall (up to 500mm). Most importantly is a consideration of the many other unique qualities that characterise the desert hydrological cycle – in particular, the high evapo-transpiration rates and also other flows (high surface run off, low infiltration etc.) and stores (low interception, low soil storage etc.). Whilst it is possible to generalise the desert hydrological cycle, candidates are expected to appreciate that cycles will vary considerably depending on the location in which they are discussing.

Lower level candidates will be likely to generalise the cycle and not see it as varying by desert region. They are unlikely to discuss, in detail, other stores and flows and will see the desert cycle as being characterised by low inputs and high outputs. Higher level candidates will have a far greater knowledge of the complexity of different desert systems and will, in particular, make detailed reference to a range of other stores and flows.

### Example candidate response – Pass



The hydrological cycle is made up of a variety of inputs, outputs and stores (also called transfers). Many environments have different emphasis on different parts of this system. In a desert there is a lack of precipitation and this is considered to be one of the most basic definitions of a desert. However there may be more to a desert's hydrological cycle than just lack of rain.

A desert's lack of surface water is also due to high evaporation rates that result from the high daytime temperatures that occur in many deserts. This has a large impact on a desert's hydrological cycle since much of this water, ~~is then transferred~~ by ~~the~~ now in the form of vapour, is transferred away from deserts (which are usually areas of high pressure) by winds to other areas (those of low pressure since air moves from areas of high pressure to areas of low pressure).

Plants which often have a role to play in area's hydrological cycle are not often found in desert environments. Therefore when any precipitation does occur there is little interception by vegetation and since there are few plants there is not very much transpiration to return water to the atmosphere. It should also be noted that low rates of transpiration are exacerbated by plants that have adapted to live without losing water due to the dry environment.

Infiltration, the process by which water seeps into the ground below, is difficult in desert



environments since the ~~ground is~~ ground is often too hard and dry to allow water to pass through. The ground may also be covered in duricrusts which water cannot permeate. Often in deserts water flows as surface run-off but is often quickly evaporated.

In some deserts a lack of precipitation is countered in other ways. In the Atacama desert in western South America advection fogs occur where cold, moist air above the Pacific Ocean moves inland over the warm desert causing a fog. In Negev, Israel there are 175 days a year where dew can be found caused by the extreme heating and cooling of the ground and the air above it at different times of day.

To conclude I do not believe that desert environments are mainly ~~set~~ characterised by a lack of precipitation. There are many processes in the hydrological cycle and these are often present in deserts even if they do not play as vital a role as they do in other global environments. As I have demonstrated earlier a number of different characteristics make up a desert's hydrological cycle. Although I must say that a lack of precipitation is a key characteristic I do not believe it to be the main one in a desert's hydrological cycle.

## Examiner comment – Pass

This was awarded a P2 mark because it shows some basic awareness and explanation of the processes within the hydrological cycle which is the subject of the question. However, it missed the three dimensional aspect by omitting sub-surface flows and stores. The spatial context is not defined, i.e. there is no definition of a desert (less than 250mm of rain for arid and less than 500mm of rain for a semi-arid area). The question asks for knowledge of lack of precipitation so a contextual definition is advised. However there were other major omissions. It contains limited exemplification for instance; there is little variation between the major deserts of the world. Only one paragraph appears which contrasted the Negev in Israel with the Atacama in South America. Overall, it is a superficial answer which lacks content but has a basic understanding. The simplistic conclusion is basic although it does relate to the discussion made.

## Question 3

### Glacial and Periglacial Environments

With the help of annotated diagrams, examine the sequence of processes responsible for the formation of corries and of ribbon lakes. [25]

### Mark scheme

#### Indicative content:

Processes and sequence and fundamental to this question. Candidates are expected to understand the processes of movement, energy and erosion / deposition and be able to relate these accurately to landform formation. Sequentially it is expected that candidates will show the gradual evolution of these landforms.

Lower level responses are unlikely to have detailed and / or accurate labelling of diagrams. Such responses will likely find it difficult to link process to landform and will tend to be general in the sequential analysis. They may well skip stages of formation or offer just one plausible theory (in the case of ribbon lakes). Higher level responses will contain detailed and well annotated diagrams for **both** landforms showing a thorough understanding of process and sequence. However it should be noted that there does not have to be a perfect balance between the two landforms for a higher level response. Candidates will have a good understanding of the way in which ice movement links to process which in turn links to landform.

## Example candidate response – Distinction (D1)

3. With the help of annotated diagrams, examine the sequence of processes responsible for the formation of corries and of ribbon lakes.

Corries and Ribbon Lakes form a key part of post glacial areas, such as Snowdonia. Both are associated with warm based mountain glacial areas across Europe, as corries can be known as Cirques in France and Cwms in Wales. The process of corrie and ribbon lake formation is to some extent a continuous process and requires changes to the glacial conditions as it occurs.

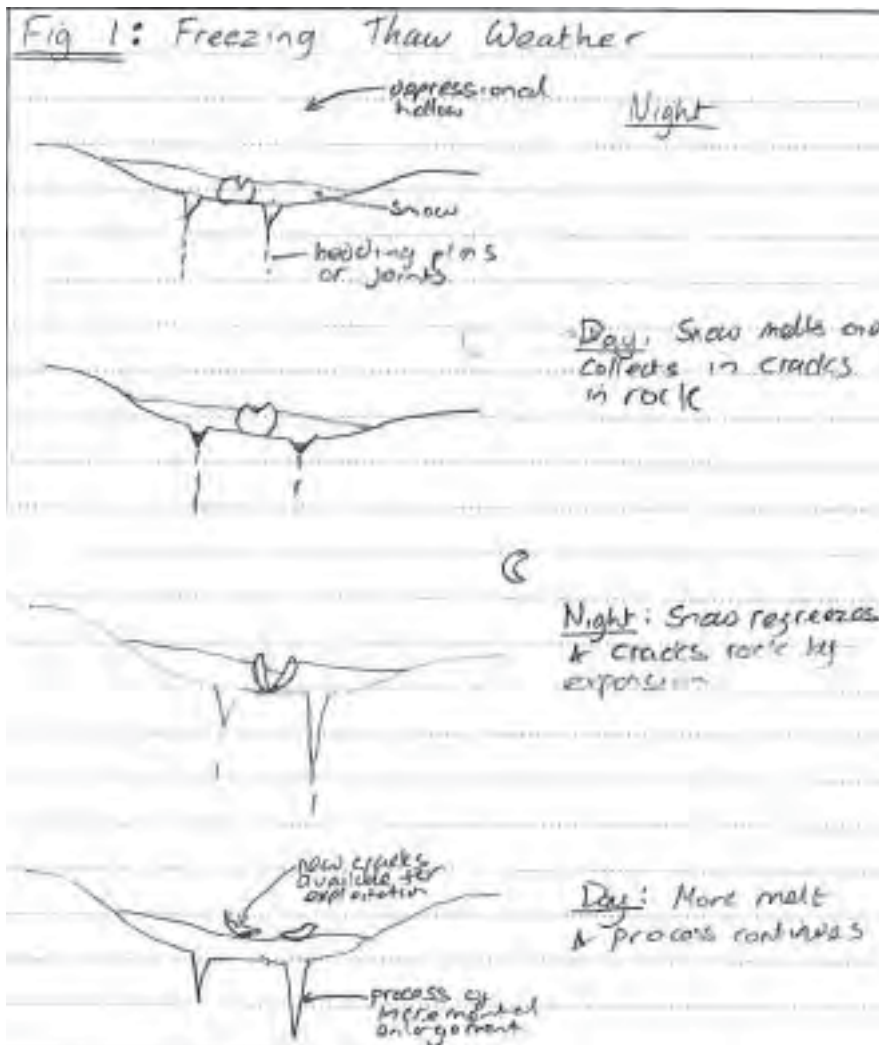
The initial formation of a corrie occurs when a depressional hollow on a hillside is filled with snow over a winter period. The snow melts and refreezes through the winter and spring due to diurnal temperature variations above and below 0 celcius. These variations lead to a series of weathering processes such as freeze thaw weathering, as melt water enters existing cracks in the rocks and then freezes, enlarging by around 9% and widening the crack (see fig. 1). This process is repeated until the snow melts and follows away carrying with its glacial debris, enlarging the depressional hollow. Some of these depressional hollows go on to become nivation hollows, where snow survives through the summer without complete melting. Snow patches survive based on low insolation (often linked to aspect most are North Easterly in Snowdon), protection from the wind, gradient (shallow enough to avoid destabilisation and movement early in snow accumulation process) and existing geological weaknesses which allow erosive processes to proceed quickly. Once the snow patch can survive over summer warm period, nivation begins. During this process, snow turns to glacial ice. Snow is compact and compressed by the weight of layers above, removing air bubbles with make up more of snow mass and compressing the crystals. Eventually Firm, or glacial ice forms, though it can take between 6 and 100 years depending on location and environmental conditions.

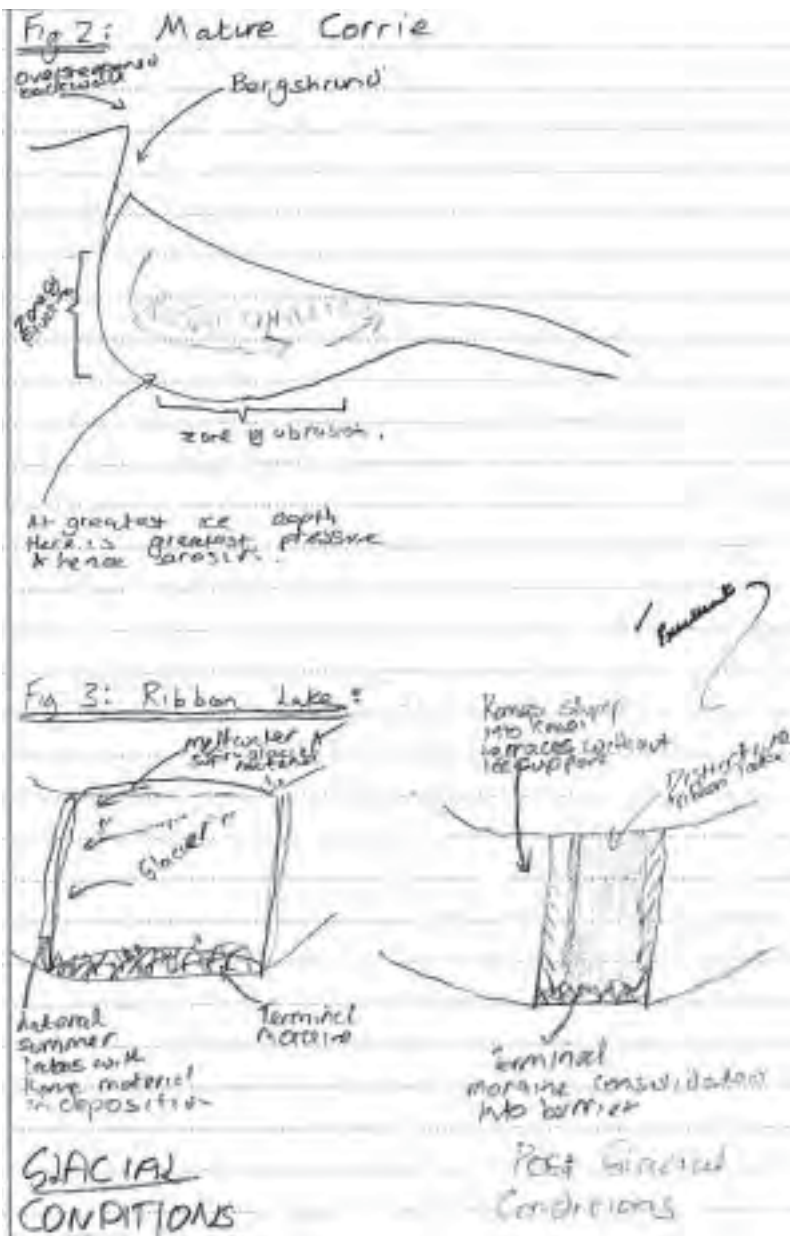
Once firm and glacial ice are established in the hollow, the weathering processes and snow accumulation continue. As the protocorrie deepens and more snow accumulates, there is a positive feedback cycle creating a localised cooler spot. Ice has an albedo of around 0.8 - 0.9, meaning the majority of incoming insolation is reflected, hence the areas does not warm as much in the snow. The deeper corrie is more shaded, enabling further ice accumulative. When the ice reaches a critical mass, defined by gradient and other local factors, it begins a rotational flow with its protocorrie due to shear forces, beginning the final processes before it becomes a true corrie. This rotational flows occurs by internal deformation and basal sliding and is consequently vital for the distinctive shape of a mature corrie.

Rotational flow accelerates the deepening of the protocorrie into a full corrie (fig. 2), by the processes of plucking and abrasion. Plucking is a key process at the backwall of the Corrie. Meltwater and precipitation percolates through the glacier most easily at the bergschrund, where the glacial comes away from its backwall. Water soaks through the upper layers of ice, and tunnels underpressure through lower lays, some becoming a thin film between the backwall and glacial ice. This freezes and melts depending on temperature and pressure around existing rocks, such that when the glacial moves they are "plucked" from the rock face. Process is highly effective and tends to remove angular rocks along joints or bedding plans, leading to the angular and irregular structure that characterise the backwalls of glaciers, such as Cwm Idwal in Snowdonia. Even without meltwater regelation allows plucking to occur due to pressure melting at the backwall. This entrained material then moves rotationally along the floor of the corrie, causing striations and chatter marks and eroding more material. The effectiveness of this process is defined by depth of ice as the weight of ice provides the force, causing the distinctive overdeepened area nearest to the backwall in glaciers. This is almost a positive feedback process leading to the distinctive bowl-like shape of corries, and the apparent "lip" at the edge of the corrie itself. The distinctive "bowl" shape of corries in hillsides are due to the processes of different methods of erosion that occur throughout the corrie. This unique shape is exposed when ice recedes during interglacials such as the current Holocene, leaving the recognisable bowl in the hillside with a sheer backwall.

Ribbon Lakes form in overdeepened parabolic valleys, or more commonly glacial troughs, active ice has receded. One again they tend to be a feature of upland areas, a good example being in the Gap / Briançon Valley in the French Alps. In upland areas, glacial ice tends to follow existing drainage patterns. Glacial ice is both an agent of deposition and erosion, and as such in classical theory develops them into overdeepened parabolas, though most valleys never become truly parabolic. The terminal moraines formed by glaciers are crucial in ribbon lake development. In some cases they can be up to 400 m high, a considerable barrier. The material is unsorted, mixing fine glacial clays and large boulders. As ice retreats these are often colonised by plants and solidified, as shown by the pine colonisation of farthest terminal moraine in Tungsbergdaalsbreen Glacier in Norway. This forms a "dam" to water at the end of glacial trough. As a glacial retreats and in some cases, such as Nant Ffrancon Valley in Snowdonia, disappears it leave a valley with its still connect to existing highland drainage patterns but with no exit. Hence water tends to form a lake, with a distinctive ribbon structure due to the linear nature of the valleys. They can be narrow further by Kame Terraces, where lateral deposited kame material in lakes has slumped. This process hems in a lake, forcing into its elongated structures (see fig.3).

Both Ribbon Lakes and Corries are distinctive examples of how the glaciation processes (individual processes occurring with glacial environments are pivotal in understanding the unique landforms they produce. Corries bowl like shape is a product of the rotational flow and zoned erosional processes with exaggerate its depth and backwall steepness into the distinctive features common as Snowdonia. Ribbon lakes are similarly easily recognizable, but are a product of the unique topography created by the glacial landscape that forewent them. It is impossible to explain or examine either feature without fully understand a complex sequence of processes, requiring climatic warmings and coolings, that preceded them.





**Examiner comment – Distinction (D1)**

This is an outstanding answer. Not only is it extremely well written but it contains excellent use of Geographical terminology and has detail where necessary, for instance time taken for firm to form and albedo figures which reinforce the points being made. The diagrammatic material is well integrated into the answer by the use of Figure numbers which could be a useful blueprint for answers generally. The use of conceptual ideas such as positive feedback also plays a part in the answer and the processes are well explained and their sequential nature made clear. There are appropriate examples for instance Snowdonia and Norway. Although ribbon lakes are not as comprehensively treated as corries and the possible rock hollow origin of such features is omitted it is clear that this is an above average exceptional answer for which the highest mark is applicable.

## Example candidate response – Merit

3

A corrie, such as Cwm Idwal in Wales, or one of the 128 ones in the Peak district, starts its life as a nivation hollow.

A nivation hollow is the result of the periglacial mass movement actions of frost creep, frost heave and soil desiccation. The nivation hollow then becomes the base on which a corrie glacier sits.

← snow fall

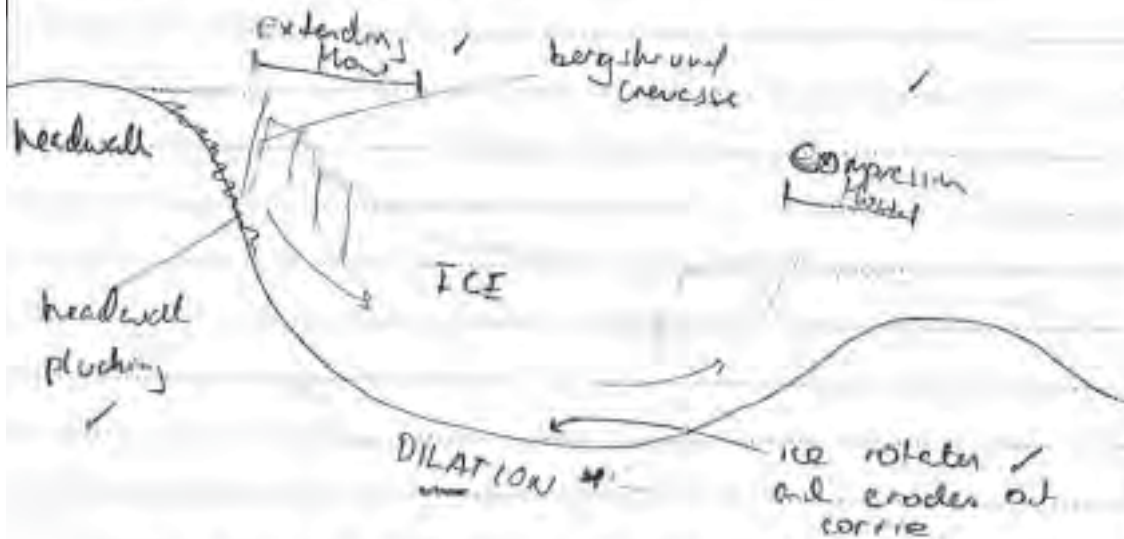
← snow fall

← snow fall

↑  
nivation  
hollow

Corries are usually northward facing when the effect of summer insolation is less marked. An event may snow falls in the nivation hollow and, depending on the region, quickly transforms into firm or neve. Snow falls with a density of  $40 \text{ kg m}^{-3}$ . The edges of the flake melt and then granulate, now with a much greater density of  $500 \text{ kg m}^{-3}$ . The final process

is the formation of glacial ice is the reduction in air pockets normally the firm, pure a density of  $900 \text{ kg m}^{-3}$ . This process begins on happening until the air pockets hollow is infilled.



Eventually the weight of the ice is so great that gravity starts to rotate the ice in on itself. Extending flow stresses the top of the glacier and causes large crevasses called ~~Bergschrand~~ Bergschrand crevasses, through which supraglacial debris can enter the glacier and aid with the erosion of the rock hollow.

Another process that aids in this erosion is the headwall plucking that takes place. The material picked up by the glacier from the headwall also erodes the bottom of the hollow.

Dilation occurs in the hollow where less dense ice now covers rock that

used to be covered in rock. The rock rebounds upward in response to this lighter weight, shattering and becoming trapped in subglacial debris.

As the glacier continues on, reaching the overwall of the hollow it is forced upward and compressive flow takes place, closing up the crevasses that were created from the retreating flow.

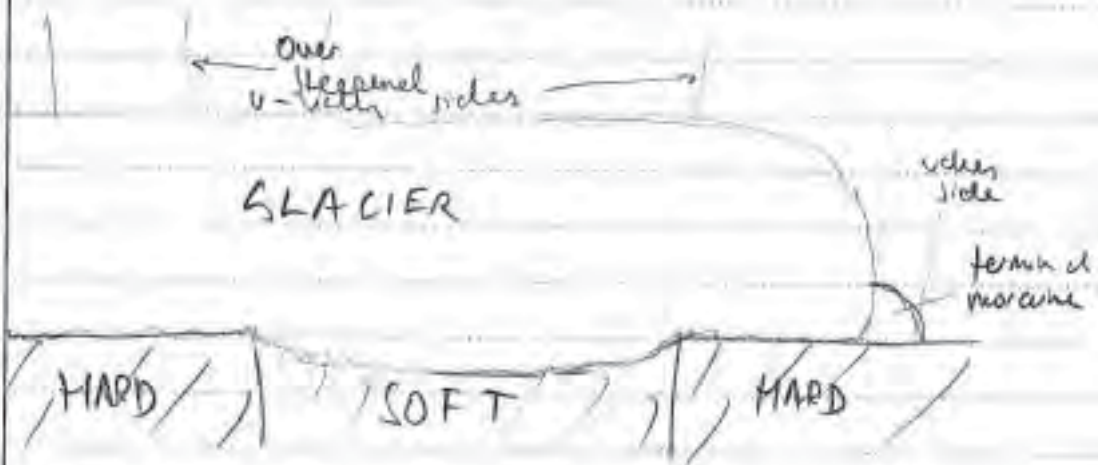
When the ice melts away, we are left with a formation that has been deeply eroded by a glacier, giving it a distinct 'arm-chair' shape.

Robban lakes are often found in U-shaped (more like over-steepened parabolic) valleys such as the one in Yosemite Park USA. They are formed when a glacier moves over extremely hard rock types.





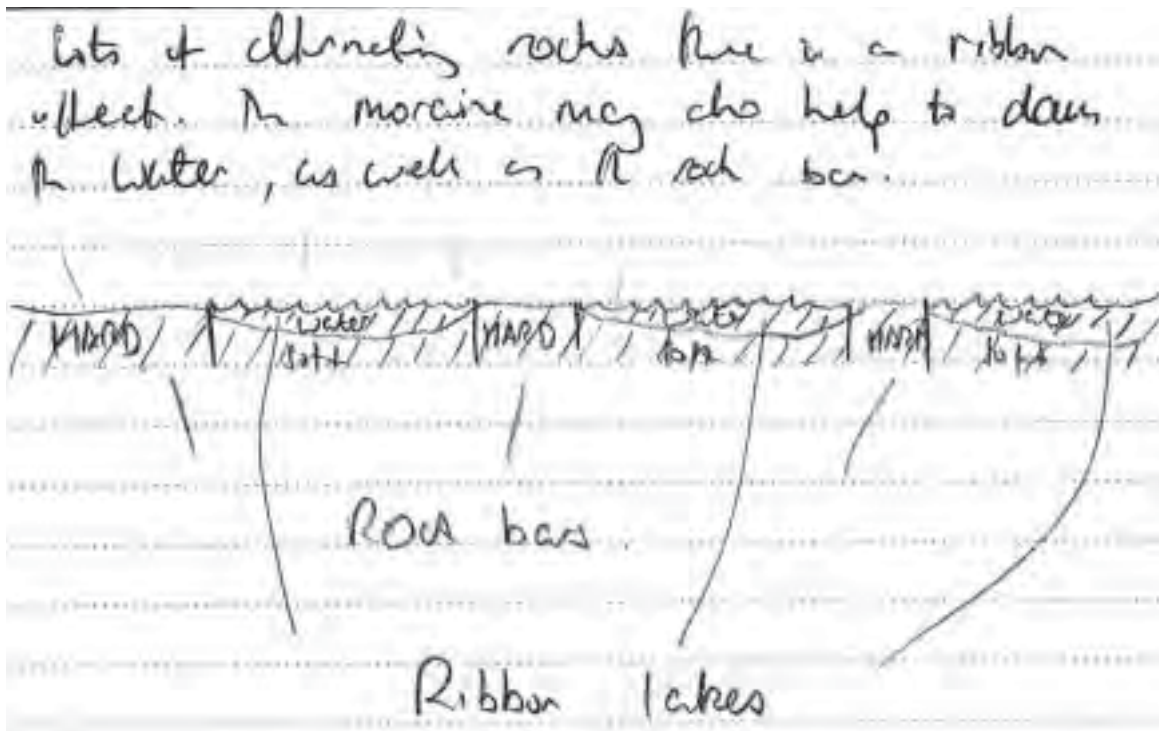
The softer rock inbetween 2 harder rock (known as a rock bar) is eroded to much more easily by the glacier through abrasion and plucking (if jointed rock occurs)



When the glacier retreats it may leave behind recessed or terminal moraine. The glacier has left a ~~feature~~ large space in the soft rock, inbetween the rock bars.



Water flows into this depression to create a lake, a ribbon lake. When the happens on a large scale ie.



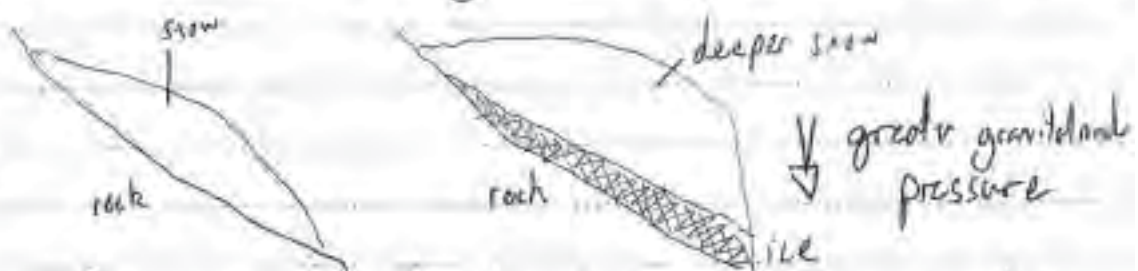
### Examiner comment – Merit

This is a good answer that would have reached distinction level had it not lacked a conclusion. It contains detailed content, well-annotated diagrams which form an integral part of the argument as they are dispersed throughout the text. Knowledge of the sequence of processes is evident and such knowledgeable details such as ice densities impress. On the other hand, mis-spelling of the process of dilatation and references to 'hard' and 'soft' rock are unfortunate at this level. The lack of a conclusion depresses the overall achievement.

## Example candidate response – Pass

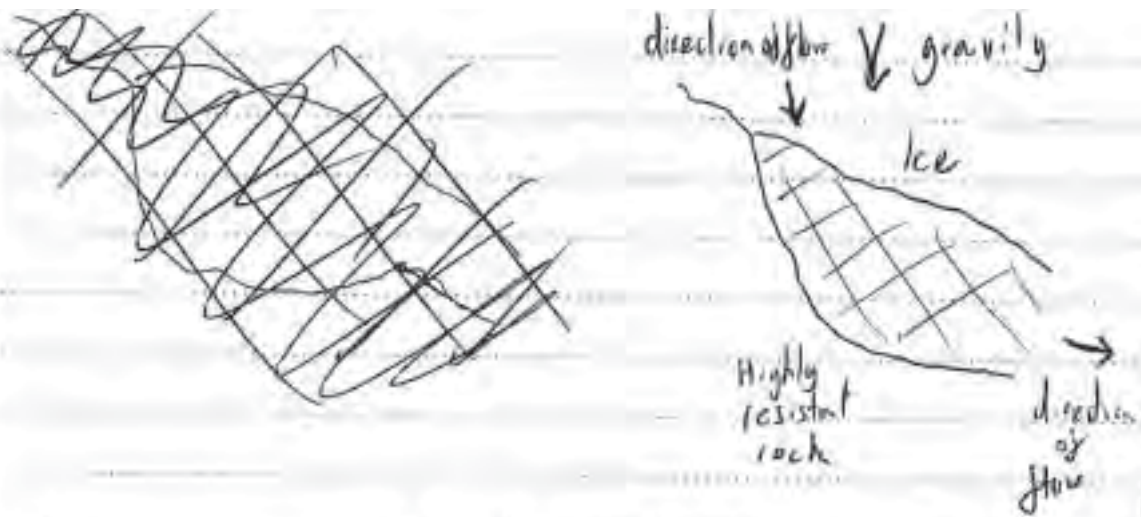
3. The principal method of glacial erosion is abrasion. The frozen water bodies accumulate subglacial debris and, as the ice moves downhill, drags this along the area of erosion area, scouring it. This is most well evidenced by the striation marks (striae), found on glacially eroded base rock, that run parallel with the direction of flow, marking the former location of particularly tough debris. Corries, which are, in effect, miniature glaciers, form alongside major glaciers, parabolic troughs in which ribbon lakes later form.

Corries are formed by the process of nivation along rock outcrops like exfoliated domes? Snow accumulates in what is known as a nivation hollow and, as the layer thickens, the lower layers become compacted until their gas content is so low that they are classified as ice. (Archives)



This ice, ~~hypothetically~~ of which is now dense and therefore heavy, is then subject to vertical and horizontal stress so, upon the weight exceeding the large coefficient of friction associated with rock, it begins to move.

This movement ~~any~~ occurs in a rotational manner. Although gravity pulls the ice downwards, the density of the rock causes the ice to move in both directions. (see right).



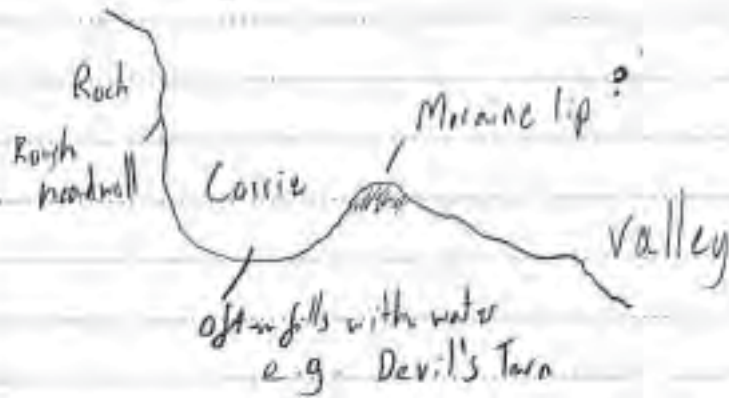
This causes a hollowed, bowl shape to form on the underneath the ice until a full cirque glacier forms like below.



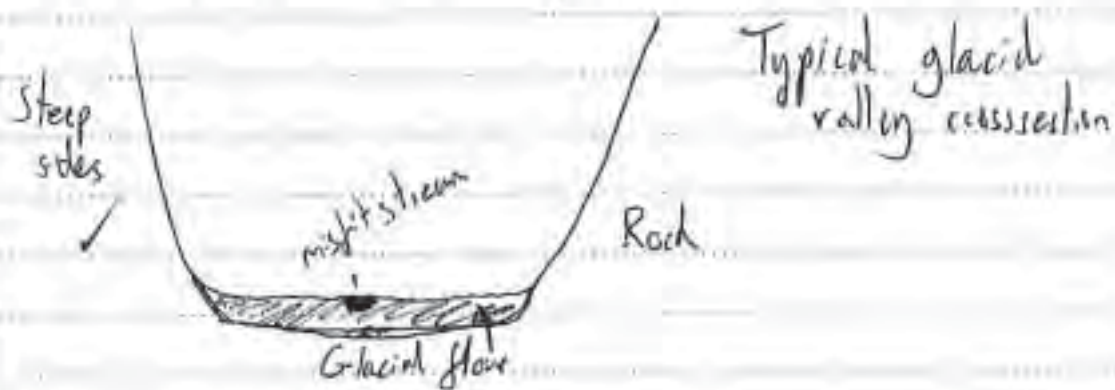
The deepest area is caused by erosion via abrasion and occurs along the red line beneath 'a'. This is because 'a' is an area of compressive flow and has the greatest weight. 'B', on the other hand, has crevasses because it is an area of extensive flow and therefore has less ice and is eroded less, creating a rise marked 'c'.

The backwall becomes is often marked by a bergschlund crevasse because plucking erosion dominates. This occurs when ice water freezes over and onto rocks and then pulls them apart when the ice moves. This creates a steep headwall.

When the ice melts the glacier will typically leave moraine formations on top of the uneroded ridge, further increasing its height. When all the ice has gone a corrie is left.

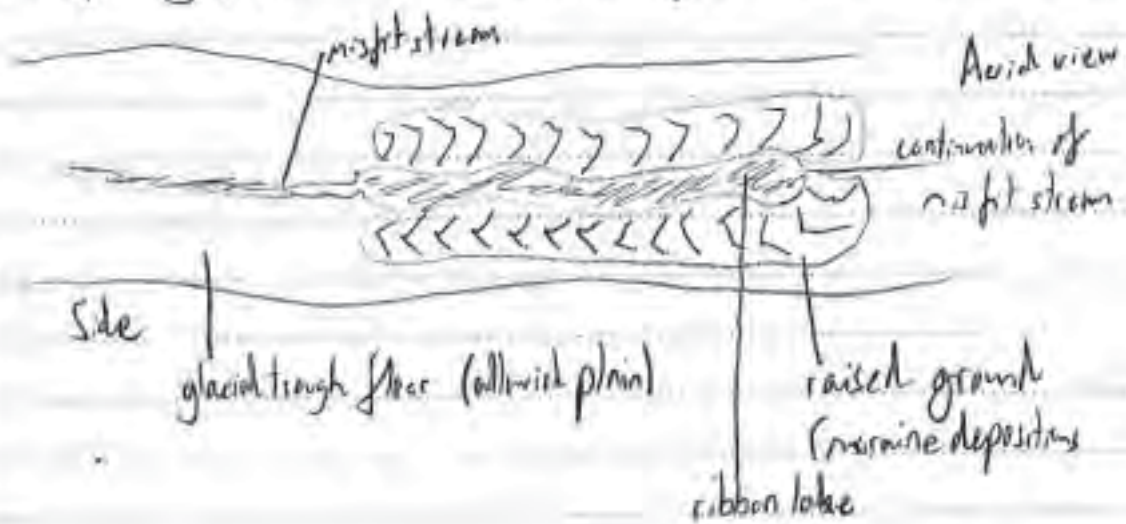


(Ribbon lakes are not purely features of erosion but also deposition and thus they often form in post-glacial landscapes after the ice has retreated. Larger scale glaciers, such as the Damar glacier, erode parabolic valleys with steep sides, and flat bottoms though their precise shape depends on the erodibility of the rock and outcrops, like El Capitan in Yosemite valley, may remain. Most importantly, they have wide floors, known as alluvial plains due to the highly fertile, flat deposition of ~~moraine~~ ~~and~~ glacial flour that was left behind when the glacier retreated.



This means they do not have the V shape associated with fluvial erosion. Instead, misfit streams are often found draining meltwater from glaciers further back up the valley. They are called this because it is obvious that their erosive power was not great enough to form the valley.

Ribbon lakes form when elongated streams become blocked by moraine lips such as those described above. Terminal moraine depositions are called moraine kets, which form where supraglacial and englacial load is deposited at the former location of the snout. Push moraines formed along the side of former glaciers also trap the water. As such, long, thin 'Ribbon Lakes' form like shown below.



Both features, corries and ribbon lakes, form due to the erosion of rock via abrasive ice. They are also characterised by the presence of multiple moraine hillocks parallel to the direction of flow that mark where ice 'conveyed' debris to the snout. However, corries are formed entirely by ice while ribbon lakes depend on the presence of meltwater or other fluvial source.

### Examiner comment – Pass

This answer was awarded an upper Level 2 mark. Whilst it focuses on the two landforms requested, corries and ribbon lakes, there is a lack of recognition of the sequence of processes. There are distinct stages in the formation of a corrie and a ribbon lake and these are not followed clearly in this answer. For instance, although nivation (the first stage in the formation of a corrie) is covered, the build-up of ice and the attendant processes of erosion are not covered in detail explaining backwall steepening and over-deepening. The latter is discussed before the former which is the wrong order as the material eroded from the backwall provides the tools for abrasion of the base of the corrie. Ribbon lakes are accounted for only by morainic blocking although rock basin lakes are the more commonly found ribbon lakes. This was a fundamental omission. The question demands well-annotated diagrams and although there are several in this answer which is to be applauded, they are not always illuminating. For instance, the diagram of the glacial trough per se has limited value and the aerial view omits the presence of a moraine. The corrie diagrams lack any indication of processes so that there appears to be few links made between process and form. Also they lack integration into the text. Finally there is a superficiality about the answer throughout.

## Question 4

### Glacial and Periglacial Environments

Examine the extent to which human induced climate change is changing glacial and periglacial landscapes.

[25]

### Mark scheme

#### Indicative content:

Human induced climate change implies fairly recent changes which have had effects on both glacial and periglacial landscapes but it is difficult to generalise. Clearly many areas are suffering from warming and as a consequence ice (both ground and surface) is retreating. This offers significant changes to the landscape, such as ground subsidence and mass movement. The emphasis here is to do with the impact on landscape and this could include geomorphology, ice cover and vegetation. It is important to note that other climatic changes have led to different landscape changes. Greater volumes of snow fall in East Antarctica, for example, have led to glacial surge and greater rates of erosion associated with thicker ice. It ought to be added that there are few (if any) areas where permafrost is expanding.

Lower level responses are likely to focus exclusively on ice retreat and may well not make the link to landscape change. Such responses are likely to offer an imbalance between the treatment of periglacial and glacial change. Higher level responses will tackle both glacial and periglacial landscapes in some detail, discussing the link between changing climate and specific features of landscape. These responses are likely to show a sense of 'landscape' rather than landforms per se. Also, these responses may well refer to the notion that the climate is not changing equally and that some areas are not warming to the same extent and that other areas are experiencing positive mass balance due to increased precipitation.



## Example candidate response – Distinction

4) ~~Ques~~ To answer this question, we must question what human induced climate change is. This is the process of global warming, due to increased greenhouse gas levels. Temperature changes are particularly significant when dealing with glacial and periglacial environments, as the formation and maintenance of ice and permafrost in warmer temperatures is not feasible. Let us now consider the ways in which climate change may alter glacial and periglacial environments.

In glacial environments the increase in temperature will have a number of effects on glacial landforms. Higher temperatures means higher ablation rates. If ablation rates are higher than accumulation, glaciers will retreat. This may happen ~~by~~ by calving, whereby icebergs break off from glacier fronts, or simply an increase in the rates of meltwater flow. Increased meltwater will lead to a number of features which will be left behind when glaciers retreat. Features such as eskers and terraces, evidence of which can be found in Norfolk (Blakeney, estuary) with increase in quantity. As well as this, the size of outwash plains, such as those found in Iceland, will grow larger due to increased meltwater output. As glaciers retreat, a number of features formed by erosion, such as roche moutonnées and striations will be found, where before there was ice. The size of proglacial lakes will increase due to more meltwater, and features such as overflow channels may develop, such as the overflow

channeled from Lake Pichering into <sup>the</sup> Tranbridge gorge. The loss of ice will have global impacts as well, such as sea level rise and further changes to climate as the thermohaline conveyor <sup>will</sup> change dramatically due to the inflow of fresh water.

Periglacial environments will also undergo large changes. The latitude of permafrost will change, and continuous permafrost will only be found in the northern latitudes of areas such as Alaska and Russia. Similarly, the depth of the active layer will increase due to greater summer thawing. This will have a number of impacts on the landscape and on the people living in them, such as those living in Nunavut. The increased <sup>thickness of the</sup> active layer will mean that there will be increased subsidence of land, which is particularly damaging to infrastructure and buildings in these areas. As well as this, the landscape will change with increased rates of solifluction <sup>or</sup> ~~and~~ stages above 20°, and gelification lobes will become more frequent. With the northward shift of permafrost, periglacial features such as pingos as found in the Mackenzie delta will become scarce in subarctic climates and will also shift northwards. The decreased levels of permafrost will allow increased tourism, trade and agriculture in periglacial areas.

In glacial areas, the ~~decrease in~~ <sup>increase in</sup> temperature will change the nature of the glaciers themselves. Glaciers will be more commonly found in areas of high altitude,

as those at low altitude will tend to disappear. There will also be a shift from cold-based glaciers to warm-based glaciers with this increase will come a change in the way glaciers flow. If they are warm-based they will experience a greater velocity due to lubrication from meltwater, and subsequent basal sliding. An increase in velocity will lead to greater rates of glacial erosion, and processes such asivation, plucking and entrainment will occur. This in turn will lead ~~to~~ to an increased glacial load. Combined with greater levels of meltwater, it could be expected that the size of erosional and depositional features will occur. In this way the size of moraines, ~~and~~ may increase. Recessional moraines will be revealed as the glaciers retreat, and the quantity of features such as erratics may increase, as increasingly larger boulders are entrained before being deposited many miles away.

This argument is focused ~~on~~ on the scenario whereby the global temperatures rise. However, changes in ocean currents may see a decrease in temperatures in ~~the~~ some areas of the world, and a subsequent increase in glaciation. This ~~is~~ could be the case in the UK, which ~~will~~ may become colder due to ~~the~~ the reallocation of the North Atlantic drift and hence experience periglacial or even glacial conditions. It could also be the case that changing temperatures have little effect on glacial and periglacial areas.

To conclude, if global temperatures rise, as they may well do, then the distribution of glacial and periglacial areas will move towards the poles of their respective hemispheres. In periglacial areas, the active layer will become more active and play a greater role in shaping the landscape than before, and in glacial areas, the meltwater, erosional and depositional features may increase in size <sup>and</sup> quantity, and will be revealed from beneath the ice as valley glaciers retreat to higher altitudes. The extent to which human induced climate change will influence these areas is not fully known yet, but evidence is getting that temperature rises of up to 1.0°C in periglacial areas have resulted in some of these changes and in the future this will merely increase over time.

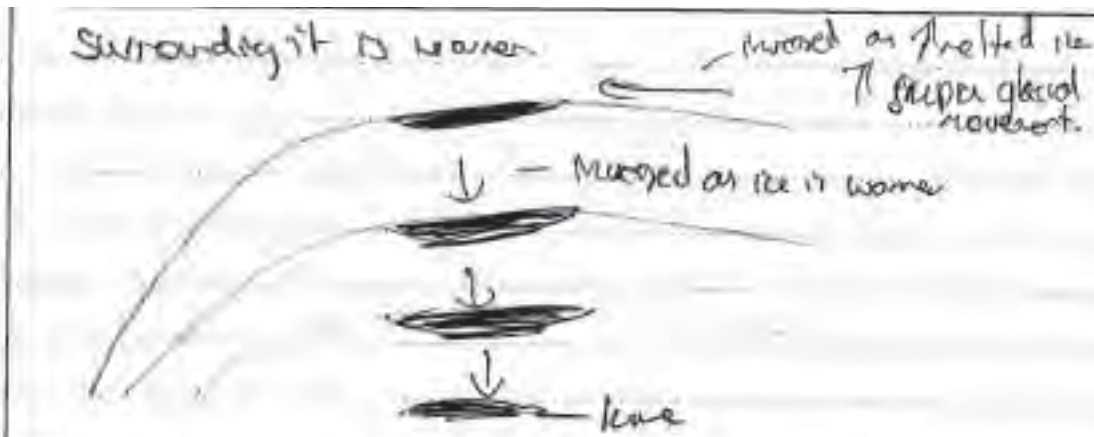
### Examiner comment – Distinction

This answer was just of Distinction level because although it lacked diagrams and references to vegetation, it answered in relation to physical processes and geomorphology. It also demonstrates an awareness of landscapes in terms of spatial shifts so latitude was invoked as was northward shift of periglacial areas in North America. The conclusion is intellectually rigorous and based on the evidence provided.

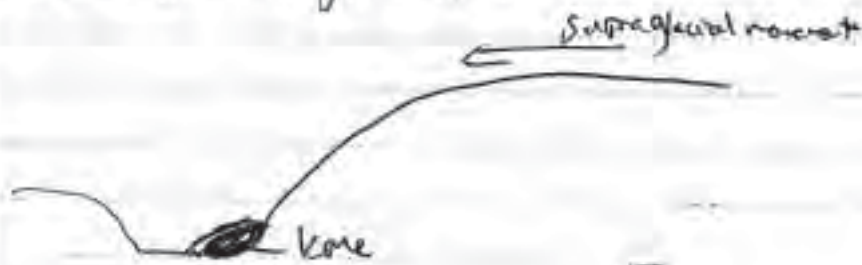
## Example candidate response – Merit

4. It is commonly recognised that global warming is occurring. The debate over whether it is human induced rages on. But it is impossible to ignore the significant rise in temperature over the past century. Worldwide there has been an increase of around 0.5 degrees in just the last 30 years! Although there are localised areas such as Scandinavia which have actually experienced ~~the~~ cooling the general picture is one of warming due to human activity. The extent then measured is huge but, how does this effect the landscape? Many <sup>previously</sup> hidden by ice are now on show.

Glacially, Moraines are moving backwards along with the ice sheets (glaciers) that used to push them. They are generally now moving back from their former position in a series of rotational moraines. Many glacial landscapes formed by erosion and deposition have been uncovered. The water previously trapped in the ice ~~and snow~~ of the glacier has to be released and forms ~~the~~ <sup>lakes</sup> on the periglacial plain including ribbon lakes. As all form, supraglacial and englacial and subglacial small pools. There may be a high frequency of kames + kame terraces. Due to increased warming the sides of the glacier are ~~more~~ likely to erode and then sediment will fall down ~~the~~ creating the kamic kame terraces where the glacial walls met the side of the U-shaped valleys. Both theories of kame formation could be accelerated given warming. The Holmer theory could be accelerated in that the sediment would erode faster as the ice



The second theory would also be accelerated as the increased supraglacial run-off would carry more sediments faster speed.



In both cases there is more supraglacial transport as there is increased melting.

Periglacial environment would also be heavily effected. The fragile system of set ma balance which could very easily be upset. An increase in temperature would affect both the permafrost and the active layer. It may stop the active layer from re-freezing in the winter which may turn it into its summer bog. Eventually the ~~short~~ short-wave radiation allowed in by depleted ozone and the warmer atmosphere will begin to melt the permafrost. At first just first few metres but over time possibly the entirety of it all year round. This would take extreme measures.

intermediate but would change a fairly solid inhabitable area into a 'bog'. There would be changes in things such as vegetation. The increased warmth and nutrients not locked up in permafrost will be released and allow many more varied species to grow which may even allow the bog to be turned into a better quality environment similar to tundra/ even grasslands. Ice lenses will form as the ice that had driven apart melts and joins a lens eventually joining up into large water features.

This exchange of increased temperature only in one direction - 1) Human activities allow for the permafrost to melt this could accelerate all the changes to the glacial and periglacial landscapes. This is because permafrost holds 20% of the ~~earth's~~ Earth stored methane, its release could accelerate ~~the~~ temperature rises in the near future by 40%! This could be part of a vicious cycle as the temperature increases and the glacial landscapes retreat. Similarly if atmospheric temperature rises cause the ice + snow to melt there will be a decreased albedo effect on the shortwave radiation from the sun and therefore more would be melted by the sun's radiation, accelerating effect.

Several other periglacial landforms will be affected. Pingos will go on the ice inside will be melted. 2) exposed to atmosphere heat rises.



There will therefore be more deposition as this occurs. More boulder jets as the glacier retreats. ~~the~~

Human induced climate change has reduced glaciers in North America by 75%. Iceland has experienced many of its largest glaciers retreating by hundreds of metres. This will show boulder jets such as Esker as they are uncovered by the retreating ice. Although due to the speed of retreat many erosional features are able to occur as subglacial and ice marginal transportation is much quicker due to an increase in lubricants due to water between the bedrock and base of glacier. This will reduce ability of plucking and abrasion to occur. so it

This will leave many bare post glacial landscapes dominated by stonelines, pyres and kames. This is the change that we are experiencing currently with climate change increasing temperatures overall worldwide.

### Examiner comment – Merit

This answer has merit in that it covers changes to the landscape. What is pleasing is that that it includes some physical processes such as kame formation to support the argument that their formation may be accelerated due to climate change. Equally there are useful observations such as the fragility of periglacial environments and coverage of ecosystems as part of these landscapes which is exactly what the question demands. The virtues are evident but overall it lacked a spatial context due to few references to places and past and present extent of ice coverings. So although geomorphology and vegetation was identified, overall the answer lacked detail and awareness of the spatial variations in ice covering due to inequalities in climate change and there was little more than a basic conclusion.



## Question 5

### Coastal Environments

To what extent are soft engineering strategies preferable to hard engineering when preventing cliff erosion?

[25]

### Mark scheme

#### Indicative content:

Soft engineering is an increasingly popular form of cliff protection mainly due to its environmental sustainability and also as a low cost alternative. Strategies include beach nourishment and sand dune stabilisation (as mentioned in the syllabus) but also many other forms that would be worthy of discussion (eg. tree growth to prevent sub-aerial processes, salt marshes and mangroves). Hard engineering involves a great range of strategies and techniques all of which tend to be more costly and environmentally less sound. Evaluation is implicit in this question, as responses should encapsulate an understanding of 'preferable'. This could be approached by Cost-Benefit Analysis or from the point of view of interest groups/stakeholders – different people will prefer different strategies depending on their agenda. Environmentalists will have preference for low impact soft engineering approaches whereas residents and local businesses will tend to prefer hard engineering approaches. Local government may well have more of a concern over finance and therefore take more of a cost-benefit approach. Exemplification is expected with examples which may be drawn from a range of places, scenarios and stakeholders. Alternatively one case study could serve to exemplify the points made about preferred strategies and interest groups.

Lower level responses are unlikely to appreciate the complexity of this debate and may well be immediately conclusive in the relative benefits of one approach as opposed to the other. Such responses will lack exemplifying evidence and are unlikely to consider the range of stakeholders engaged in the debate. Higher level responses will consider the relative merits of both and will acknowledge that the answer is highly dependent on the stakeholders involved and the location in question.

## Example candidate response – Distinction

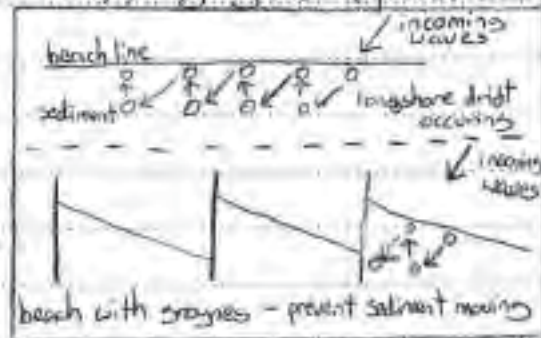
5 To what extent are soft engineering strategies preferable to hard engineering when preventing cliff erosion?

Managing coastlines have two main aims, preventing the risk of coastal flooding and preventing coastal erosion. When it comes to preventing coastal erosion there are two types of management strategy - soft and hard engineering.

Hard engineering involves constructing a structure (usually made from concrete) which alters the coastal processes happening. Examples of hard engineering techniques include sea walls (which propel incoming waves back out to sea), groynes (prevent longshore drift and therefore build up the beach), rip rap (rocks on beaches which dissipate wave energy) and gribans (rip rap in cages).

All of these techniques are very effective at preventing cliff erosion in the area where they are constructed but they can have major effects further down the coastline.

The Holderness Coastline in East Yorkshire, UK is the fastest receding coastline in Europe (average rate of 2m per year). To combat this erosion, the local council decided to construct two rock groynes and a sea wall in front part of the coastline where a major road passes. These two management techniques



worked perfectly in stopping coastal erosion in that area but the consequences of the construct of the groynes was devastating to areas further down the coast. The Town of Mableton is just south of these groynes and the coastline there is receding upto 10m per year (fastest in the world). As a result almost half of the town has disappeared. The reason for this such high receding rate is down to the rock groynes. The groynes are preventing any sediment from travelling down to Mableton so there is now almost no beach. As there is no beach waves are able to attack the cliffs there unimpeded.

Also, hard engineering techniques are nearly always ugly and very expensive not only to construct but also to maintain. A sea wall costs £3000 per metre to construct. The Netherlands, for example, has implemented many hard engineering techniques (such as the Zuider Zee Dam) which costs them £300 million a year in maintenance (all of which comes from taxes).

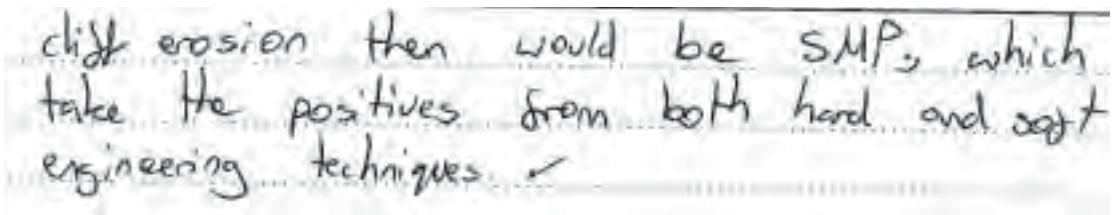
Soft engineering involves using natural processes and landforms as a coastal erosion defence. Examples of soft engineering include managed retreat ('do nothing' approach, let sea claim land) and managed advance. Managed advance techniques include beach nourishment (dumping beach material on beach to increase width) and construction of saltmarshes. Soft engineering techniques do not give immediate results (except with beach nourishment) so it often gets worse before it gets

better. However, soft engineering techniques do require very little maintenance and do not cost much to implement.

The Cuckmere Haven is an area on the coast of southern England (Sussex) about to undergo a soft management plan. ~~(There is currently a sea)~~ The local ~~(government)~~ council will implement managed retreat <sup>of</sup> the Cuckmere Haven area. This will cause the whole area to change. However, there has been some local opposition. A sea wall which protects some coastguard cottages will be removed, which will put them at risk of being lost to the sea, the coastal road will be at a greater risk of flooding and there will be many years of mud until the area eventually becomes a saltmarsh.

Both soft and hard engineering techniques have their problems when it comes to preventing cliff erosion. However, Shoreline Management Plans (SMPs) are a modern form of management which use both hard and soft engineering techniques - best of both worlds.

Hard and soft engineering both have their positives and negatives. Hard engineering gives immediate protection to valuable land (e.g. sea wall in front of ~~England~~ Easington Gas station in East Yorkshire) and reassurance to locals, but they are often expensive and cause problems with erosion further down the coast. Whereas soft engineering is cheap and low maintenance but erosion has to occur ~~(to start with for)~~ them to work. The preferred option to preventing



cliff erosion then would be SMP, which take the positives from both hard and soft engineering techniques ✓

### Examiner comment – Distinction

This is a well-organised, pithy, concise argument. It focuses on the issues of hard and soft engineering with reference to specific examples like Holderness with its rapidly receding cliff line. The points made are aptly supported by some statistical information, which is useful. A map of Holderness might have illustrated the starvation of material further south and illuminated the precise section of coastline chosen at Cuckhaven. Although there might have been more about stakeholder and interest groups to assist the evaluation, it is a balanced account with a strong conclusion just attracting a Distinction level mark.

## Example candidate response – Merit

5. Coastlines are dynamic landforms that adapt and change with regards to the influence of the sea. There are many different factors that ~~make~~ determine how resistant cliffs are to erosion. One very significant factor is rock types. The sea attacks weaker rocks like clay far faster than harder, more resistant rocks. This is how bays initially form; the weaker rock recedes faster, leaving more resistant bands of rock making up the headlands of the bay.

British coastlines are said to be receding, on average, by 1.3 metres a year. However, this estimate may be considered misleading as some cliffs may slump due to undercutting at the cliff foot by the sea, and thus recede many metres back due to one slumping event and then not again for another 3 years. The problems of cliff recession are mainly that it poses threat to business, homes and agriculture. As a result of this, DEFRA (in charge of coastal defences), works with many British coastal areas to aid hard or soft engineering plans.

An example of a soft engineering technique is

"managed retreat" or "managed realignment". This involves essentially 'admitting defeat' and allowing the sea to consume the coastline at its own pace, moving any human factors (e.g. houses) to areas at less risk. Abbotts Hall Farm adopted this policy following a devastating storm surge in 1953 which killed around 300 people. On top of this, thousands of homes were destroyed, and many hotels closed, causing negative effects on the local economy.

Abbotts Hall Farm has embraced the fact that, with managed retreat (the softest of the soft engineering approaches), marshlands will arise as the sea is allowed to flood. The current coastal hard defence is the sea wall which proved to be of little help in dissipating wave energy during the events of 1953. They are choosing to leave the sea wall as it is and make no improvements to the coastal defence.

The benefits of the managed retreat option in Abbotts Hall Farm is that the ~~the~~ salt marshes will operate as a dynamic ecosystem home to many different plant and wildlife species. On top of this, it will behave as a buffer zone and dissipate wave energy, so behaving as a soft form of coastal

engineering.

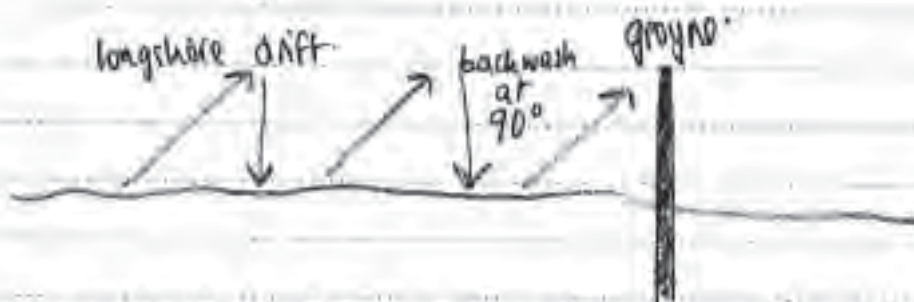
However, in 50 years it is estimated that 6 villages will disappear due to cliff recession, destroying around an estimated 600 homes. Sea level rise due to global warming, and thus the eustatic change/rise in sea level as a result of melting glaciers and thermal expansion (for every increase in global temperature by  $1^{\circ}\text{C}$ , the sea expands/rises by 0.8 metres) mean that the likelihood of cliff erosion becoming worse is high. The sea is said to absorb 50% of global warming. It could be argued that protection/action against global warming behaves as an indirect strategy to protect our world's coastlines. Islands like Tuvalu may become completely inundated, and 2% (7 million people) of Egypt may be drowning by eustatic sea level rise.

The prospect of the loss of 600 homes near Abbott's Hall Farm poses potentially huge costs to the government who are required to provide compensation for those who must relocate. As seen in the building of the Three Gorges Dam in China where 100,000 people had to be relocated due to the flood risk, many did not, and still don't have employment in



their new towns. Therefore, managed retreat in Abbott's Hall could result in negative social and economic consequences. On top of this, the spending of the government on those who must relocate from their unsalable houses, may lead to a lack of government spending in other areas that are of equal or higher importance such as the education sector.

An example of a coastal zone to implement hard defenses is Sea Palling in Norfolk. Like, Abbott's Hall, this area also experienced the storm surges of 1953, and this motivated them into protecting their coastlines. 7 lives were lost due to this event. Sea Palling have decided to build a sea wall and groynes. The sea wall acts as a resistant barrier, protection of the cliff - and bears most of the wave energy. The groynes attempt to prevent the loss of beach material (which acts as a buffer zone) through long-shore drift.



longshore drift is the movement of swash at the

angle at which the waves approached, and the movement of backwash at right angles to the beach. In Britain, the direction of longshore drift tends to be easterly, and many bays build ~~back~~ wooden groynes. They can be expensive to implement but they have been proven to be largely successful. They are not as expensive as sea walls which, in some cases, can cost \$1000 a metre! However, some argue that groynes and sea walls detract from the pleasure of going to the beach due to their unsightliness. This could detract tourists and negatively impact the local economy. Swanage Bay saw a decline in tourists after building groynes but then rebranded itself as a tourist destination by offering a selection of water sports.

In Sea Palling, beach replenishment has also taken place. This is incredibly expensive and involves placing artificial beach sediment on the shore to help dissipate wave energy and thus reduce cliff erosion. This is arguably a soft coastal defence as it doesn't involve the implementation of extremely hard measures. Sea Palling have also used draining through the cliffs to decrease saturation and thus the likelihood of cliff slumping.

Other soft engineering strategies include planting sediment on cliffs, not only to reduce the rate of subaerial erosion (e.g. rain eroding cliffs as opposed to the sea), but also to increase the rate of ~~transpiration~~ evapotranspiration in removing water from the cliffs.

Overall, it seems that soft engineering approaches involve working with the natural and ever-changing dynamic equilibrium and interrelationship between the sea and land. With the prospect of future sea level rise, managed retreat may not be the wisest option. However, hard defences like groynes have been argued to increase the rates of erosion in other coastal areas nearby as sediment is blocked. It seems that hard defences are best at 'preventing' cliff erosion and soft defences are best at allowing continued cliff erosion, and embracing it while reducing the negative impacts that may consequently arise in association with it.

### Examiner comment – Merit

This answer starts promisingly with reference to cliff erosion and stakeholders and the need for coastal protection. Unfortunately the candidate loses sight of the cliffs in the discussion of Abbots Hall Farm, although there is a clear understanding of the variety of hard and soft engineering strategies adopted in the UK. This is an example of an answer which contains a sustained argument and an attempt to discuss the strategies in terms of preferences hence its merit and a mid-Level 3 mark. However it does lose sight of cliff erosion. It is a long answer with some sound physical geography within it and a strong conclusion which partly offsets the loss of focus on cliffs.

## Question 6

Why are some coastlines physically more vulnerable to erosion than others?

[25]

### Mark scheme

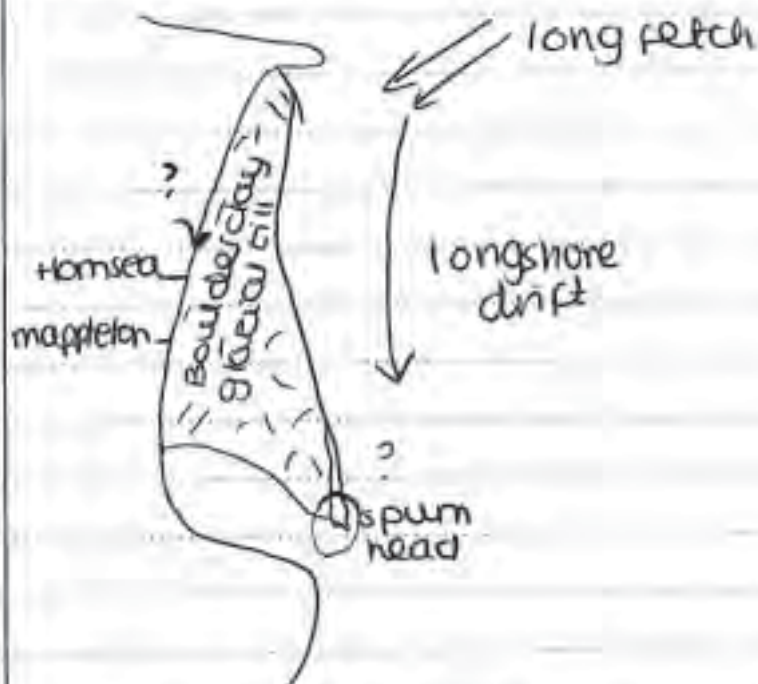
#### **Indicative content:**

There are a great many factors that determine the physical vulnerability of a coast to wave erosion. These features can be divided into – waves, physical properties of the cliff and climate. All of these factors will play an important role in determining just how easily a coastline will retreat. In this way the vulnerability of coastal systems depends on location so ideally examples should be used exemplify this. Candidates might take separate sections of the same coastline (e.g. differential rates of erosion on the Dorset coast) or they might compare completely different coastlines (e.g. NE USA with SW UK).

Lower level responses are unlikely to examine all the factors involved in affecting cliff vulnerability and answers may well be imbalanced, focusing more on the geology of a cliff, for example. Such responses are unlikely to be locationally specific and examples will lack detail. Higher level responses will offer detailed examples to exemplify the specifics of location. They are likely to give a more balanced account of the whole range of factors that can affect the vulnerability of a coastline.

## Example candidate response – Pass

- 6) Certain coastlines are more vulnerable to <sup>erosion and</sup> others due to a range of contributing factors. The structure and lithology of a particular coastline can make it more susceptible to accelerated rates of erosion. The type of waves effecting a coastal area, whether destructive or constructive also have a great influence on the amount, and rate of erosion of a coastline. Other physical factors such as climate and sediment composition of a beach can influence how vulnerable a particular coastline is to erosion.

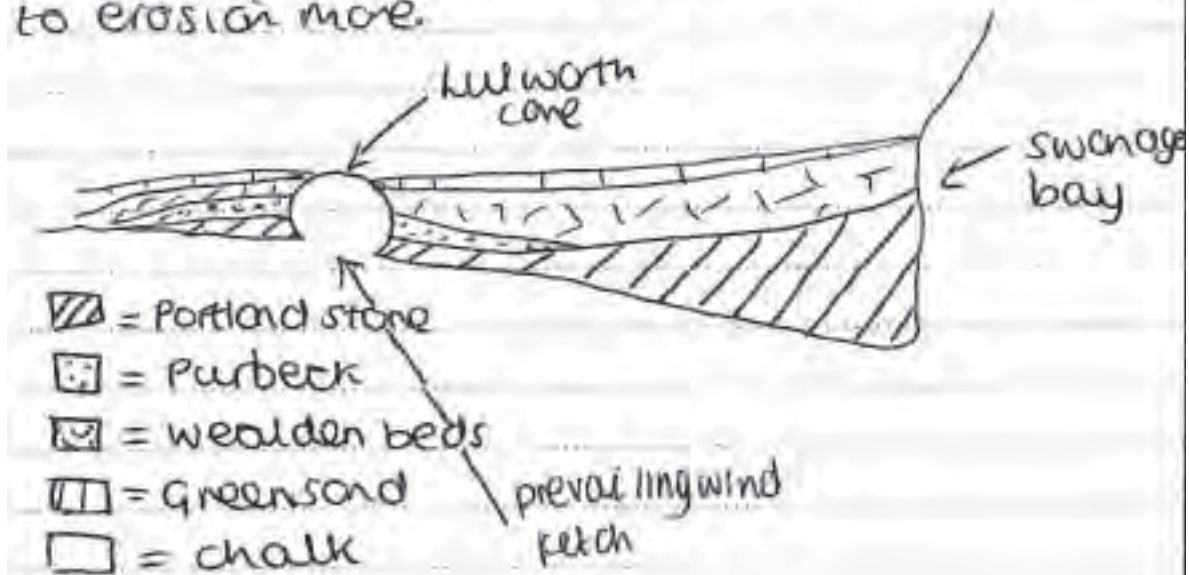


The coastline off the NE coast of Norfolk is composed of boulder clay and glacial sands, these sediment types

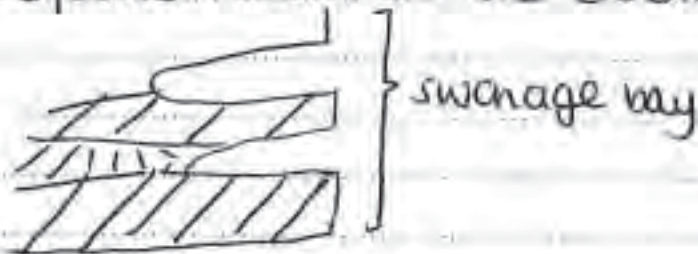
are prone to high levels of erosion as they are soft rocks and can easily be broken down by many wave processes such as abrasion (attrition) and hydraulic action. The glacial till and boulder clay that make up this coastline are highly susceptible to weathering processes, especially high levels of rainfall which can percolate through the ~~soil~~ making it weaker and heavier causing slumping. This coastline also experiences waves which have a long fetch, meaning that the waves that affect this coastline are high energy destructive waves. This part of the coastline is also highly exposed, so this combined with the high energy destructive waves that attack the cliff face means that ~~the~~ NE Norfolk coastline experiences rapid rates of erosion. Destructive waves have a relatively weak swash in comparison to their strong backwash so are erosional waves and remove material from the coastline rather than contributing to it.



The type of sediment the beach of a coastline is composed of can greatly determine the type of waves it will experience. Beaches that are composed of sand are largely affected by

constructive waves which have a stronger swash and weaker backwash making them depositional waves. ~~These~~ coastlines that experience constructive waves are far less vulnerable to erosion than those ~~beaches~~ that experience destructive waves. Beaches comprised of larger sediment such as pebbles have a steeper gradient and are more narrow than those made up of sand or shingle. These beaches are usually effected by high energy destructive waves as the sediment type is heavier. Coastlines which have beaches made of pebbles and larger sediment are more vulnerable to erosion as when abrasion removes beach sediment at the cliff face it is larger and harder? so will create more damage and contribute to erosion more.



The structure and lithology of the Dorset coastline shows how certain structures and rock types can make an area more vulnerable to erosion - Hurlworth Cove is a concordant stretch of coastline with the structure of its different rock types parallel to the coastline. The Portland rock either side of the cove is a very hard rock which absorbs large amounts of wave energy. At some point centuries ago a fault was widened within this hard rock which over time got eroded back in this area by accelerated ~~diffuse~~ erosion of the softer more susceptible rocks behind it, such as the wealden clay beds and greensand. As the gap in the Portland stone has become wider over time waves with a long fetch and high energy have been able to enter the cove and refract energy within it causing greater erosion. Swanage bay is a discordant stretch of coastline with its layers of rocks perpendicular to the coastline



-  = wealden beds
-  = portland stone



so all of the different rock types that make up this bay are exposed. As you can see from the diagram certain parts of the headland are more eroded than others. As the Portland stone is harder and more resistant to erosion, whereas the Wealden beds are softer and more vulnerable to erosion.

Coastlines of tropical islands are more susceptible to erosion than other less exposed coastlines. This is because waves generally have a larger fetch and the weather is hotter so waves have greater energy with which to erode. These stretches of coastline also ~~are~~ are generally made up of sand and shingle so the high energy destructive waves that affect the area, can erode more of the light beach material with their stronger ~~backwash~~ backwash.

Exposed coastlines are greatly more vulnerable to erosion than ~~protected~~ sheltered coastlines. This is because there is a longer fetch, so a longer distance the wave can travel and gain power in the form of energy to erode the coastline with. Exposed areas will be more susceptible to stronger winds and increased amounts of rainfall. The amount of rainfall a

coastline experiences can greatly increase its vulnerability, especially if the coastline has rocks with high permeability. The rainfall can then penetrate through the rock making it weaker and increased erosion. Coastlines made of chalk for example can be greatly eroded due to dissolving of rock, due to its porous nature.

In conclusion there are a wide variety of physical factors that make some coastlines more vulnerable to erosion than others. The amount of erosion on a certain coastline experiences is greatly to do with its structure lithology, location, climate and the waves it experiences.

### Examiner comment – Pass

This candidate response attracted a Level 2 Pass mark. It explores the correct factors which may make a coastline vulnerable to erosion and it is illustrated with maps but these do not really add insight because they are not annotated to link to the argument. For instance the Holderness coast is not very accurate in terms of physical geography. A cliff profile might have been more applicable and could have shown mass movement as well as marine erosion and the consequent recession. The section on the concordant and discordant coastline of the Jurassic coast shows a tendency to describe rather than to highlight the relative vulnerability to erosion. At the end of this long section there is no assessment. This answer is not without content but it is a 'broad' rather than an analytical, insightful answer. For instance, fetch is mentioned but there is no explanation of the role of the fetch in producing a particular wave type and its role in coastal erosion. Had such commentary been present then the analysis would have been much improved.

## Question 9

How and why does nutrient cycling differ between deciduous woodland and coniferous forest? [25]

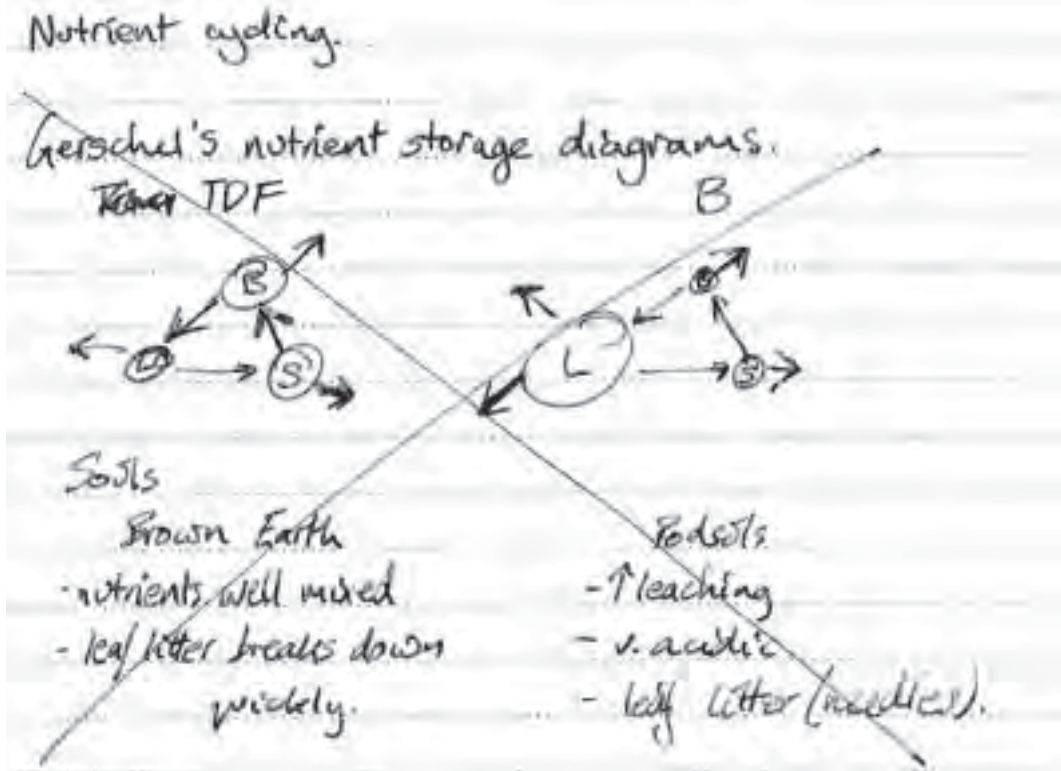
### Mark scheme

#### **Indicative content:**

The question is examining rates of transfer, storage and flow of nutrients. All stores and flows can be examined although it is not expected that candidates will tackle them in their entirety. It would seem particularly sensible to include diagrams in this answer. It is commonly shown that deciduous woodland has higher rates of nutrient circulation than coniferous woodland. Deciduous woodland has higher rates of uptake and decomposition. Deciduous trees tend to be far more demanding of nutrients than are coniferous species. Biomass store in deciduous wood is proportionally larger, principally due to the increased demand posed by leaves. Most explanations relate to climate and / or geology of bedrock.

Lower level responses are unlikely to provide balanced treatment of both ecosystems. They may well be inaccurate and a thorough knowledge of both stores and flows is unlikely to be forthcoming. Such responses will lack accurate comparative explanation. Higher level responses are likely to have a strong understanding of stores, flows and rates of transfer, successfully comparing both ecosystems and explaining them in relation to climate and geology.

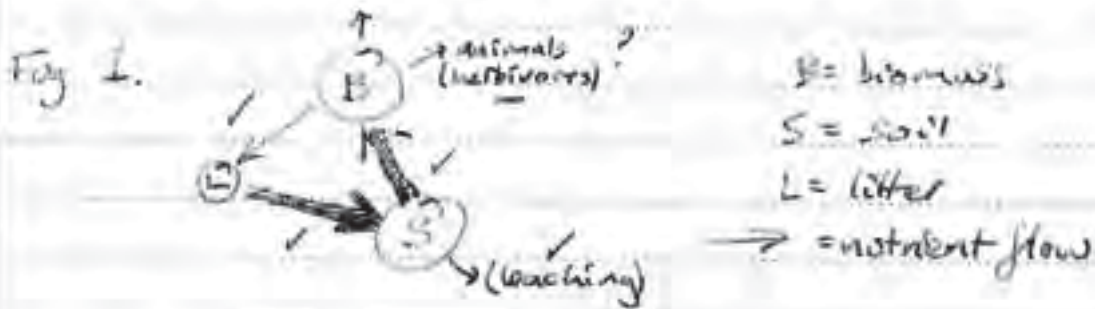
Example candidate response – Merit



Deciduous woodland and coniferous forest nutrient cycles vary greatly because of a number of factors, most importantly nutrient storage and soil structure. This is for a number of ~~climate~~ and ~~external~~ factors, such as temperature and vegetation type.

Deciduous woodland exists usually in a well-balanced, temperate environment, on brown earth soils and a high level of activity from fauna. ~~and for~~ Brown earth soils are important because they contain a reasonably balanced amount of mineral nutrients and plenty of water from precipitation. ~~They~~ This is good for both productivity and

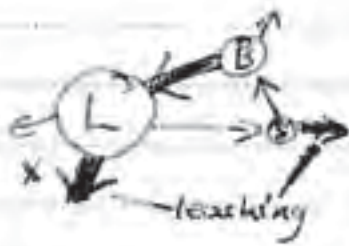
biodiversity. Brown earth soils are good for suitable for a wide variety of plants and are well mixed by earthworms (and other animals) activity, which prevents <sup>significant</sup> leaching and breaks down leaf litter ~~and~~ and other dead biomass a relatively quickly. This high level of activity is possible because of the mild climate, which is usually warm enough for bacteria and fungi to operate year round. This can be seen in the <sup>eggs diagram</sup> Commercial Nutrient ~~for deciduous / coniferous forest~~, on the other hand, ~~as none of~~ woodland <sup>(F31)</sup> in which the majority of nutrients are held in the plants themselves (i.e. in use) or in the soil, where it is easier to access them, as opposed to in the leaf litter, where they are waiting to be broken down and are therefore inaccessible.



Coniferous forests, on the ~~other~~ <sup>other</sup> hand, have low productivity, low temperatures and extremely acidic peat soil soils which are only capable of supporting coniferous trees because of their lack of nutrients. The cold temperatures mean

that the breakdown of dead biomass is limited because the bacteria and fungi are inhibited by extreme cold during winter months, as opposed to the year round cycle of coniferous woodland. Earthworms are not present (meaning there is little mixing) and there is extremely rapid and thorough leaching of minerals downwards through the soil horizons. This in turn forms an 'iron plate', below which there is an increase in nutrient levels, but it is difficult for plant roots to grow through. Furthermore, because of the slow rate of decomposition, the thick needle litter layer (which is waxy and difficult to break down <sup>at</sup> the best of these conditions.) This <sup>locks up</sup> much of the available nutrients <sup>(N, P, K)</sup> are locked up in the leaf litter. Add soon to this the fact that water (considered a nutrient) is <sup>in much of the world's coniferous forests,</sup> also locked up because for much of the year because precipitation falls as snow and therefore sits on top of the ground rather than supplying the root system, and the result is an extremely inhospitable environment for ~~any~~ most plants to live in. The resultant lack of biodiversity means that the coniferous-  
podsol relationship is self-sustaining, and difficult for other plants to adapt to.

Fig. 2.



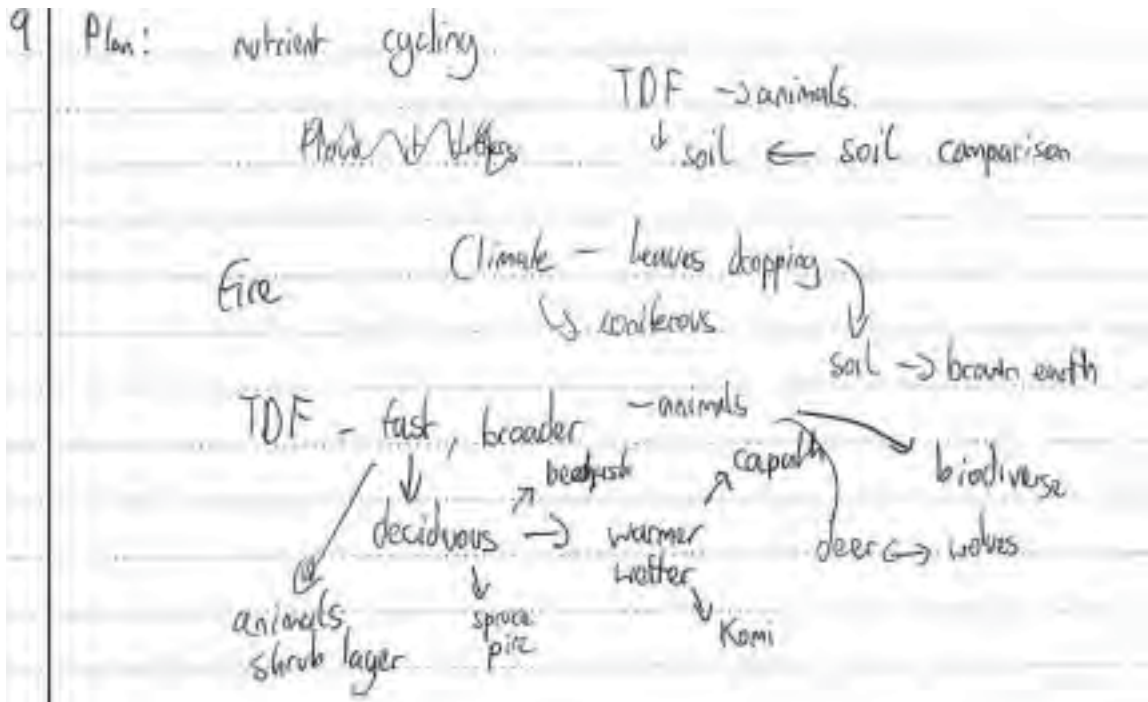
Germonochel's nutrient diagram for podsol/coniferous forests. Majority of nutrients are locked up/prevent in hard-to-decompose needle litter or below the iron palette.

Thus nutrient cycling differs between the two biomes for many reasons, many of which support each other, including ~~climate~~ ~~temper~~ climate (including temperature and the level of and type of precipitation) as well as soil type, productivity level and biodiversity. All of these contribute to the creation and ~~management~~ maintenance of each biome and its nutrient cycling.

### Examiner comment – Merit

This candidate response uses the nutrient cycles as the framework for the answer and it contains the appropriate terminology of flows stores and transfers. It considers each forest in turn but contains some comparative commentary within each section although perhaps this is not the most sophisticated of approaches. The coverage of the boreal forest is partial omitting mention of fallout, seasonality of the climate and growing season. There are few statistical facts about the climate to reinforce the argument. It also misses any response to the geology of an area. It is a workmanlike answer with sound knowledge on the whole, clearly appropriate and well-annotated diagrams which superficially meets the demands of the question.

Example candidate response – Pass



How and why does nutrient cycling differ between deciduous woodland and coniferous forest?

There is a <sup>large</sup> difference in the nutrient cycle ~~of~~ between deciduous woodland and coniferous forests. The nutrient cycle within deciduous woodland is much faster, more plentiful, and broader when compared with boreal forest. There are several reasons for this.

TDF (temperate deciduous woodland) has a ~~much warmer~~ very different climate. Rainfall is usually all year round and temperatures are higher. This results in a much longer hydrological and thermal growing season for TDF. Boreal forest is ~~not~~ although warm in the summer, is



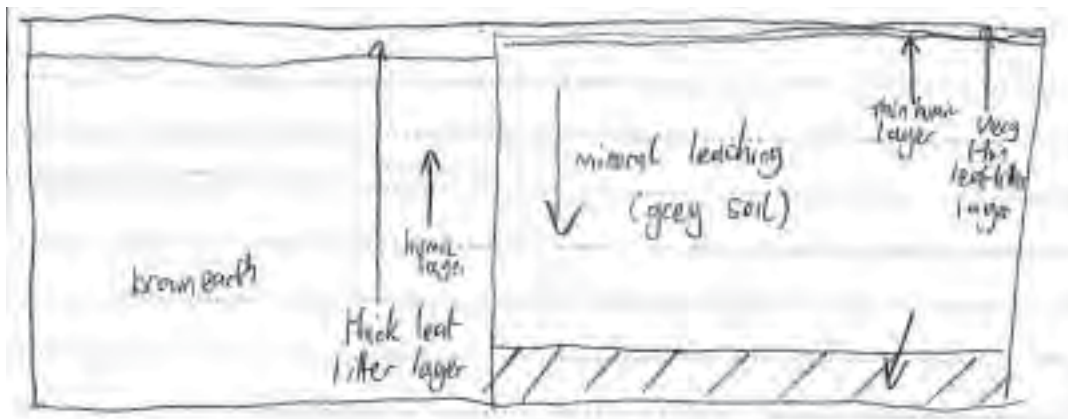
incredibly! ~~very~~ cold in the winter, and receives far less rain. Compare the Carpathian forests in Romania, to the Komi forest... in the Russian Ural. The Carpathian forests receives ~~an amount of rain of rain~~ at least 800mm of rain every year. The Komi forest receives less than 200mm a year, the majority of which is snow, and when which melts all at once in the Spring, not providing the trees a chance to absorb it gradually through its roots. There are also the temperatures in these two areas is also very different. The average temperature in the Komi forest during January is  $-10^{\circ}\text{C}$ , but the average temperature in the Carpathian forest in January is  $+4^{\circ}\text{C}$ .

As a result of this, there is a very large difference in the vegetation and animal life found there. In the Carpathian forest there is a much wider ~~in~~ variety of flora and fauna. Trees in the Carpathian are large deciduous Ash, Beech and Oak trees. These trees require large amounts of water for ~~grow~~ water and a temperate climate to grow. As there is one, they outcompete the any ~~considerable~~ saplings. These trees are very large and require more room between them. ~~They~~ As a result, over 25% of sunlight finds its way through the canopy. This means there is a very active herbaceous shrub layer. All of this ~~flora~~ provides shelter and food to many types of animals. Roe, Red, Sika and Muntjac Deer are all found in the Carpathian forest, as well as ~~many~~

38 different bird species. Rodents such as squirrels are very common, along with thousands of insect species. These species all live in the same community, cohabiting

Compared to the TDF, Boreal looks much more sparse. Boreal forest is primarily made up of coniferous trees like Spruces and Pines. These trees require far less water due to their spring waxy leaves. There is far less transpiration off these, and as a result they need less water. This monoculture tends to dominate vast areas. Only 2% of sunlight passes through the canopy, resulting in very little plantlife on the forest floor. There are very few animals living within Boreal forest, as there is a lack of nutrition and shelter.

As a result of these differences, the soils are very different. TDF has a thick humic layer, with 'Brown Earth' underneath. Due to the falling leaves of deciduous leaves and dead animals/animal excrement decompose quickly in the relative heat of TDF. Boreal on the other hand tends to be dominated by podzol type soils. These soils have a thin layer of very slowly decomposing spines, with a very thin humic soil. Under this is a very grey soil (Podzol is Russian for 'Ash-soil'). The melting snow leaches any minerals away, and leaves an iron pan at the bottom.



The As we can see, these two types of forest are very different. This affects their nutrient cycles. TDF has a much faster nutrient cycle due to its greater biodiversity, the much more fertile soil, and the deciduous nature of its trees. The massive amount of nutritional material cycles quickly, as e.g. animals eat plants, are then eaten by a predator which dies of disease and decomposes. Boreal forest on the other hand is much slower, with trees that are much more efficient in their shedding of material. The cycle is further slowed by a lack of secondary and tertiary consumers, and the cold which slows down the decomposition of dead plants. ~~Therefore~~ Any nutrients the Boreal environment had on are leached away, leaving an ecosystem with little diversity and a slow nutrient cycle.

### Examiner comment – Pass

The candidate has knowledge of the two types of forest but it lacks the framework of nutrient cycles. This answer lacks them which partly prevented the candidate from achieving more than a pass and a Level 2 mark. There is awareness of the differences being a response to climate and the comparative element is clear. However there tends to be a focus on structure of the ecosystem rather than the dynamics of the nutrient cycles, as it does not mention the terminology associated with nutrient cycling and transfers and flows like fallout, uptake and weathering which would be expected. Factors other than climate such as geology were expected but were lacking in this response. The conclusion although appropriate in some ways tends to highlight the speed of the cycling rather than its components.

## Question 10

Consider the assertion that the introduction of non-native species has been the most important factor in changing the nature of temperate ecosystems? [25]

### Mark scheme

#### **Indicative content:**

Non-native introduction has been an extremely important factor in generating change in temperate ecosystems and, in particular, the creation of plagioclimatic communities (e.g. conifer introduction to deciduous woodland and rhododendron addition to heathlands). This question is not restricted to floral introduction and there is scope for candidates to discuss the introduction of fauna and associated impact on the ecology of specific regions (e.g. grey squirrel). However, there are many other factors that have been as important, if not more so. The role of land clearance for agriculture and timber, coppicing and pollarding, recreational pressure, climate change and acidification have all had far reaching consequences on temperate ecosystems. In terms of changing the 'nature' of ecosystems this can be interpreted in terms of structure and form or processes at work.

Lower level responses are unlikely to discuss the range of different factors and will lack any clear evaluation of relative significance. Such responses will typically be poorly exemplified. Higher level responses will have a more evaluative stance, examining the relative significance of non-native introduction and are likely to be well exemplified as well as observing that the situation is highly place dependent.

## Example candidate response – Distinction

10) Temperate ecosystems occur mostly between 40-60° North and South of the equator and include temperate deciduous forest and heathland or grassland. Non-native, or alien, species is, as well as many other factors, a disturbance.

Alien species, when introduced can either be harmless, not survive, or they can damage an ecosystem. The grey squirrel is an example of a species that was introduced and has ~~been~~ almost wiped out the red squirrel from areas such as the New Forest in the UK. The Muntjac deer is another species that upon introduction has, through over grazing, has changed the nature of the ecosystem by restricting growth of saplings and shrubs. There are also alien species of plant that can be invasive. Such as Japanese Knotweed which can spread to cover vast areas of forest very quickly. Parrot's feather grows in ponds in the New Forest and it restricts all other growth in the pond by using all available space for itself. Rhododendron is particularly dangerous as it spreads quickly and acidifies soil which makes it uninhabitable for most temperate plants. Rhododendron has completely taken over whole valleys in South Wales and

Requires constant pressure to contain. All three of these species change the nature of the ecosystem by suppressing other species and as a result ~~severely~~ severely decrease the amount of biodiversity in an area. The ~~arrival~~ non-native animals change the ecosystem in a similar way except they more commonly force out other animals.

Fire, despite being an important factor in determining a boreal forest's nature, is a non-factor in changing the nature of temperate deciduous forest as ~~it~~ <sup>it simply</sup> doesn't burn. Temperate grassland however burns very easily and very fast and so ~~the~~ massive areas of land can be devastated very easily.

Wind is the opposite; ~~it~~ it does little in affecting grassland but it can be important for woodland. Wind rarely affects more than 100km<sup>2</sup> of forest at a time but it can knock down trees which creates a habitat in the fallen tree and also a canopy gap. A canopy gap can be important in changing the nature of the ecosystem because it allows light down to the understory. As a result new, younger plants and shrubs and trees can grow. This increases the biodiversity and also changes the age of the forest which is important in order to prevent a forest

from becoming geriatric the fallen trees, as mentioned, provide an important habitat for insects, small animals, fungi and other plants.

Nature animals can also change the nature of an ecosystem. Hans Van states that an area of temperate deciduous forest can become interspersed with areas of temperate savannah completely naturally by the effects of large herbivores. This contradicted Clements who thought full forest was the only natural climate - these large herbivores such as auroch, bison and cattle graze in a naturally opening in the woodland. They then increase the size of the clearing through grazing before moving on to another clearing. This creating a mosaic effect in the woodland and obviously is a large change in the structure of the ecosystem.

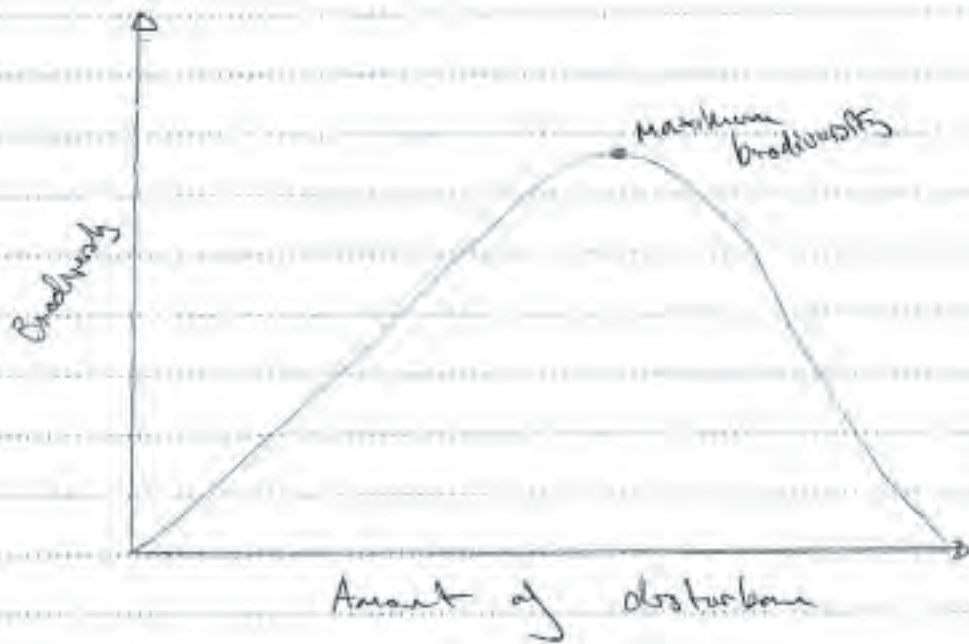
Diseases such as Dutch elm disease and sudden oak death can be quite dangerous in temperate deciduous forest and can cause the canopy gaps previously mentioned which is important. However incidence of the disease is low and there is very little disease like that in grasslands.

Human impacts on temperate ecosystems are vast through in 95% of the North

American prairies has been converted into agricultural land due to the ~~the~~ nutrient rich, very fertile soils there. A similar thing is happening in ~~the~~ Eastern Europe and Mongolia too. Humans also impact temperate deciduous forest too through logging, pollution and recreation. ~~Logging~~ Selective logging in Crabwood is carefully planned and is intended to meet the ~~needs~~ needs of demand for wood but also benefit the area by creating canopy gaps. Pollution can lead to acid rain but acid rain is rare in temperate ecosystems and is offset by the basic soil anyway. Better air and noise pollution are more of an issue? Fly tipping and poaching in the New Forest is being to strictly watched for to prevent it happening. The A1 was also built straight through the middle of the New Forest which causes heavy air and noise pollution. Recreational use of the ecosystems for walks and horse riding can also damage them.

The intermediate disturbance hypothesis posits that there is a certain level of disturbance that is very beneficial for the ecosystems and results in maximum biodiversity in that area. As is shown below.





This means that disturbance definitely changes the nature of the ecosystem but often for the better as well as for the worse. The change could be in the age of the flora or the variation of species.

In temperate grassland there are very few non-native species that would really change the ecosystem and so the most important factor is most likely fire. In temperate deciduous forest however, despite the large impacts of humans on the ecosystems, alien species could certainly be the most important factor in the changing nature of the ecosystem. If they aren't the greatest they are certainly one of them.

## Examiner comment – Distinction

This is a Distinction level answer because it considers a range of factors as well as the role of non-native species in changing the nature of temperate ecosystems. These are considered and explained in turn and theoretical ideas are integrated into the argument. For instance, the role of wind is seen to be instrumental in 'gap theory' and the candidate continues to develop the argument by suggesting that these gaps allow younger plants and shrubs to grow therefore increasing biodiversity. Disturbance theory is also discussed although possibly this theory could have been better integrated into the argument there is also a diagram to illustrate this theory. It is this type of extended explanation and argument that attracts the higher level marks because it demonstrates understanding and analytical skills. Quotations from research as appear in this essay also enable candidates to produce and sustain a discursive approach. In addition this answer demonstrates an awareness of up-to-date knowledge of current trends such as sudden oak death which is commendable. The conclusion is slightly cursory but nonetheless present.

## Question 11

Outline the distribution of the global climate zones and discuss how they might be classified. [25]

### Mark scheme

#### **Indicative content:**

The climatic zones listed in the specification are equatorial, semi-arid tropical, arid tropical, arid temperate, humid temperate, boreal and arctic. This list is not expected to be treated in its entirety, nor is it exhaustive. It is expected that candidates will tackle at least three different zones and that they will have a good understanding of both the distribution and characteristics. In terms of distribution, it is hoped that candidates will use detailed understanding and knowledge of the world to exemplify their writing, using specific continent and national examples as well as latitude and longitude, where appropriate. Classification is intentionally broad but it is hoped for a number of possible ideas, including statistical support (e.g. rainfall amounts). Precipitation, temperature and evapotranspiration rates would all be worthy of credit.

Lower level responses are unlikely to study a range of global climate zones and will likely focus on just one or two. Such climatic zones will be characterized in a simplistic fashion without a real understanding of the quantitative defining points. Higher level responses are likely to examine a range of zones with thorough understanding of where they are located (being appropriately evidenced) and a good idea of how their characteristics might be used by way of classification.

## Example candidate response – Merit

The changing nature of temperate ecosystems; the changing nature of an ecosystem can refer could refer to many of the characteristics of a temperate ecosystem. The soil type, the vegetation and the fauna are a few of the characteristics of an ecosystem which have been changing. One of the reasons they have been changing on a local scale is non-native species being introduced. A prime example of this is the Rhododendron in the UK which were brought in as an aesthetically pleasing plant and have spread across the country at an unprecedented rate. There are though on different scales many other factors which will effect the changing nature of temperate ecosystems. Examples of these other factors include disturbance, climate change and other anthropogenic factors.

Certainly in certain parts of England the introduction of invasive species has been the most defining factor. The aforementioned Rhododendron is the prime example. This plant was brought over from its native India and planted in many areas as an aesthetically pleasing plant, it has now spread over large areas and has engulfed the natural ecosystem. The plant spreads extremely quickly and will shade out any other plants because of its dense nature. This means it has a severe effect on the ecosystem. It is not just the flora that is effected but the fauna which may lose its primary food. This can have severe effects on the food chain. It's effect on local habitats is a serious threat to certain areas biodiversity as well. Many attempts have been made to stop the spread of Rhododendron but

It is a very resilient plant. The British Forestry Commission for example has been gathering volunteers to clear particular areas. Another example is Japanese knotweed which is a non-native species but once it takes hold of a particular area it will effect the food chain and damage the local habitat. In these two cases the effect on the changing ecosystem is on a very localised scale.

Part B is on a more regional/national scale. It will be other factors which will effect the changing nature of temperate ecosystems, the most important being human use of land. Every area of land now has a specific market value. It can be used for agriculture or for building. Since 1945 the UK has lost 80% of its heathlands due to human use. Also other areas such as steppes, grassland or being used for agriculture as the world's demand for food increases at such a fast rate. Felling and burning is also a serious factor when considering the changing nature of ecosystems. The cutting down of trees effects so many different animals' habitats that animal populations start to fall. This will have an effect on other vegetation and the whole ecosystem starts to fall away. The Cornish wildwood in the Scottish highlands has changed dramatically in the last 100 years and that has been due to increased grazing. Sheep now cover the whole area and that has completely changed the nature of the area. As the older trees die new ones cannot grow due to continuous trampling and grazing from the sheep. In 1998 the Cornish wildwood project was

Set up and they are trying to return the area back to ~~its~~ its original state. Interestingly they have used the introduction of non-native species to try and return the ecosystem and equilibrate the food chain. Obviously this is an extremely risky tactic and as we saw from the planting of a few *Rhododendron* can have disastrous consequences. The extirpation of wild herbivores has also had a profound effect on the ecosystems. Frans Vera came up with the theory that large herbivores were vital to ecosystems as they created a patchwork of grasslands, shrubland and trees. This created extremely diverse ecosystems. Although there is an abundance of deer there are too many. One can often see a browse line in forests when deer have eaten everything so as new old trees die new ones will not be able to grow.

Another major factor is climate change. Climate change leads to irregular weather patterns. Droughts in steppe areas is a serious problem as it can kill off 95% of all species. Although fire is an important part of steppe and creates plays a climaxes too many will destroy all habitats and therefore the ecosystems. Fire caused by lightning is an important disturbance as it creates dead wood which is a specific habitat for certain species. Stems create gaps as well which are important for biodiversity.

Then on a very localized scale, such as an area that has had *Rhododendron* planted in, non-native species will be the most important factor in the changing nature of ecosystems. In general on a wider scale

There are many ~~other~~ <sup>other</sup> factors, the most important being climate. Climate via the Kppen-geiger map will determine the ~~climate~~ <sup>biosphere</sup> and any change in climate will change that. Other abiotic factors on a regional scale such as agriculture, altitude or continentality [Goringsby's index] will be a factor in the changing nature of a temperate ecosystem.

### Examiner comment – Merit

This is a competent answer achieving a Merit. It is knowledgeable and shows some understanding but it lacks sustained explanation. So that the factors are discussed but their impact on the ecosystem are not explained in detail, unlike the previous answer. For instance, discussion of the rhododendron suggests that its introduction impacts on the food chain because some fauna use the plant as its primary source of food but it does not go on to say how and which fauna are involved. The use of language in this answer is not ideal as there are several generalised, unqualified comments such as 'many different animals' habitats', 'starts to fall away', 'changed dramatically', 'completely changed'. One strength is the treatment of scale but the conclusion is short, and not linked to the foregoing argument.

## Question 12

'Current climate trends are part of Earth's natural climate cycle and should not be seen as man-made'. To what extent do you agree with this point of view? [25]

### Mark scheme

#### Indicative content:

Current climate trends show a clear warming with 0.65 degree change over the past 100 years. Precipitation shows less of a clear trend with possible increases in the extremes of rainfall events as well as a distinct drying in the tropical latitudes. The extent to which they are not man made is no longer a real scientific debate but it is hoped that candidates will pick up on the controversy, especially that continuing to be lived out in the popular press. Certainly candidates who discuss some alternative theories, such as hotspot behaviour and orbital eccentricity would warrant credit. However, it is hoped that most candidates will discuss the rate of temperature change in a longer term context and will thus see climate change as outside the normal climatic cycles and inherently linked to man's activities. 'Trends' is important in this context as candidates may well mention the colder and warmer times typifying past regimes, without duly emphasising the importance of rate.

Lower level responses are unlikely to give a well supported argument. They may reach conclusions quickly and without due evidence or detail of discussion. Higher level answers are expected to lend detail to both sides of the discussion although these responses might well be highly biased to one side of the argument. The responses doesn't need to be balanced to be well rewarded, rather well argued and evidenced.

## Example candidate response – Distinction (D1)

12) It is clear to a great extent that this statement is ~~not~~ not true, and that man is indeed in the current climate trends are becoming more obvious. The sudden increase in global temperatures this century of  $0.74^{\circ}\text{C}$ , combined with sea level rise and some of the most dramatic El Niños and Monsoons, show that current climate trends should not be seen as being a natural cycle, and man is certainly involved. ✓  
 The current climate trends can be defined by the increases in global temperatures, rising sea levels and increased frequency of weather events, ~~which~~ which have certainly been exacerbated by man's use of fossil fuels, deforestation and pollution. ✓

Finally, man's industrialisation and subsequent increase in  $\text{CO}_2$  and fossil fuels is evidence of man's involvement. Carbon % in the atmosphere has increased from 190 ppm to 360 ppm over the last century and the level of methane has increased from 850 ppb to 1750 ppb, highlighting how the levels seen so high cannot be a result of the natural cycle. Man's use of fossil fuels through mining and the burning of CFCs has enhanced the greenhouse effect, and has definitely been responsible for the current climate patterns. ✓

Moreover, the dramatic end of the El Niño as well as the Monsoon, has demonstrated that due to increased population and urban activities, man has warmed up the Earth and is

Contributing to the increased frequency of Hurricanes, Monsoons, rains and El Niño events that have occurred over the last 20 years. Examples include the 1982/3 El Niño where mass increase in food fish lead to the warming of the atmosphere and subsequent exacerbation of the weakening of the trade winds in the Walker cell, and resulted in catastrophic flood events in Peru where 200 million people was also hit in Europe from the fishing industry, due to the warming of the cold ocean areas. Whilst it could be argued that events like the 1952 and the 2010 La Niña which hit Queensland, are examples of a natural cycle, there is a strong case for saying that the fact that the extreme events have all occurred recently due to increased temperatures and sea level changes, argues in favour of the man impact.

10 out of the 12 hottest Summers have occurred in the last 20 years in the UK and severe storms such as the ~~Harissa~~ Xynthia in the Atlantic storm, show that due to man, the weather patterns are becoming far more extreme. The fact that deforestation is ongoing in Brazil in areas such as the Amazon, and that CO2 levels are rising so fast show that man is at least responsible for greatly exacerbating the problem.





~~Global~~ Patents such as CO<sub>2</sub> and methane, resulted from industrial activities as well as deforestation, is causing the enhanced greenhouse effect and the warming of the atmosphere. It seems hard to agree that events like Hurricane Mitch in 2005, the 2010 Pakistan Monsoon and the 1997 El Niño are natural cycles, and the fact that increased population and the use of N.I.C.'s has linked with the increased and exacerbated rates of the climate, shows that man's involvement is more than clear. ✓

Man's involvement in mining, chemical works, and exploitation of carbon pellets, chemicals and fossils has led to an increase in global temperatures and sea level, that show a correlation. Whilst it is undoubtedly true, the UN agreed that man is not entirely to blame however, and that climate change, whilst being exacerbated by man may be a result of natural cycles to a certain part.

The Milankovitch Theory argues that the earth occasionally wobbles from its orbit, and as a result the climatic changes may be exacerbated by the fact. This theory could explain the global increases in temperature creating the problems we see today.

Moreover, the difference between the Monsoon in the 1960's and 1970's shows how natural cycles may be to blame. In 1960's when the monsoon was delayed, many areas such as the Punjab region as well as the Sahel suffered from drought and a fall in agriculture by 30%, and damaged soils. By contrast, the monsoon returned stage then in the 1970's and in Rajasthan, rice, wheat and Bajra production increased by

61, 121, and 721, respectively. The contrast between the two shows that atmospheric phenomena such as the Monsoon do have cyclical changes, and the strength of it fluctuates naturally. The unusual strong La Niña of 2010 and of 1997 may therefore be part of a natural cycle, and man may be making a slight difference but not much. It is also likely that the slight  $0.7^{\circ}\text{C}$  rise in sea temperatures created by man could exacerbate the weakening tendencies of an El Niño by that much, so the argument in favor of the statement that Earth's natural climate cycle is responsible. ~~Man is not responsible.~~

Many also agree that these events are indeed part of Earth's natural cycle and that natural cycles of sunspot activity, volcanic activity, and tectonic movement are responsible. There is no evidence to suggest that a particular period in the atmosphere is responsible, and that that records do not go back far enough to accurately predict the influence of man makes the question a problematic one.

It is clear that, in conclusion, that despite the Milankovitch cycles and the argument that the Earth's natural climate change is responsible, it is clear that this statement is not true, and that man definitely has an impact. The increased pollution,  $\text{CO}_2$  levels and deforestation associated with man, link with the increased strength and frequency of Hurricanes, El Niño and the Polar Front activity. Natural cycles definitely have a role to play as is shown with the ice age and the 1960s/70s Monsoon comparison, however man is definitely responsible for exacerbating the problem. The  $\text{CO}_2$  increases to 350 ppm

and the increased methane to 1750ppm, correlates with increased temperature and subsequent strength in climate patterns... The Earth's cycle does definitely create some of the problems seen, but it is true that to a greater extent, man-made problems enhancing the greenhouse effect and creating rising sea levels are definitely to blame. The winter of the past has increased El Niño and the monsoon has moved further North so climate was the phrase.

### Examiner comment – Distinction (D1)

This answer is characterised by impressive detailed reference to statistics to support the argument, a clear statement at the beginning of the stance to be taken and a clear interpretation of the question about natural and human causes of climate change. It is a balanced argument and has discussion of trends, all of which are demanded by the question so the content and understanding is excellent. There is a well-developed conclusion and although the diagram might have been a little clearer overall the answer recognises all the elements of the question and has a strong conclusion.

Example candidate response – Distinction

12

~~The view that climate change is natural and not man-made~~

correlation  $\neq$  cause

Plan  $\rightarrow$

- 1 Roman grapes & other historical
- 2 Lord Monckton - Uni. Illinois
- 3 Spectator debate
- 30000 signed (9K PhD)
- water vapour gas who gains from theory benefits if true?

no landforming H's  
global ice increase  
decreases

The view that climate change is entirely natural is a very controversial opinion, often met with disbelief and even hostility by staunch activists of the man-made theory. However, the fact that it is a natural phenomenon is a very strong argument;

Firstly, one of the major pieces of 'evidence' put forth by global warming enthusiasts is that greenhouse gas release (especially carbon dioxide) follows a similar upward trend to temperature. Whilst this is true, a simple correlation does not equate to cause. For example, the population of India & internet use in America follow a similar trend, it does not mean one caused the other. Another point that scientists point out is that these graphs (such as Al Gore's infamous 'Hockey stick' graph) that greenhouse emissions actually follow temperature, not the other way around, this could be as a result of a variety of factors that show

positive feedback mechanisms such as methane released from Arctic permafrost as a result of natural warming which increases methane (a greenhouse gas) in the atmosphere. Also the hockey stick increase (Figure 1) is negligible when comparing temperature from the ice age (Figure 2).

Figure 1

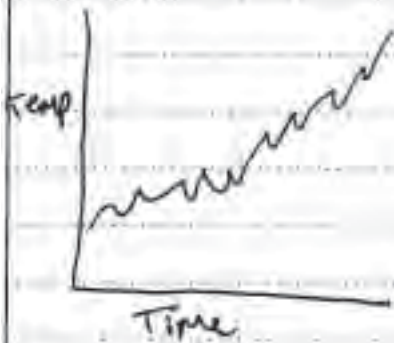
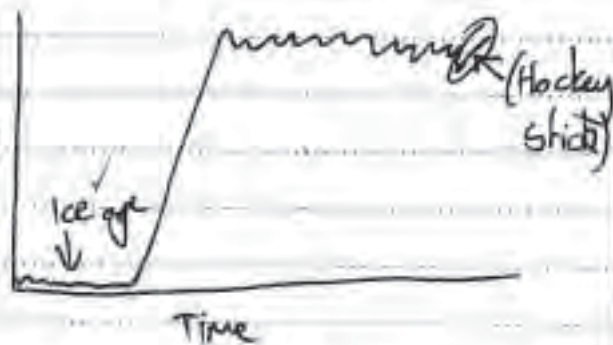


Figure 2



(Note, these are rough examples to show the general trend, not exact figures).

Therefore many scientists find it hard to believe that the slight increase (that is shown by a circle in figure 2) which follows the natural trend is ~~the~~ unnatural & caused by humans. In fact, during roman times (which was before factories pumped out CO<sub>2</sub>) grapes were grown in the UK as the temperature was so high! There is also an era known as the 'medieval warming period' when temperatures rose higher & faster than they do today, yet through no fault of humans.

Some of the science behind the theory of man-made climate change is also strange. We are

led to believe that our CO<sub>2</sub> emissions are causing temperature change. However, methane (CH<sub>4</sub>) is a much more potent greenhouse gas (10x more than CO<sub>2</sub>) and is released through cows & padi fields, yet carbon is also blamed more? Also, water vapour is by far the most abundant greenhouse gas (98-99%) but since it is mainly released naturally, CO<sub>2</sub> is instead blamed. CO<sub>2</sub> accounts for about 0.8% of greenhouse gases, then about half of that is released naturally (respiration). Therefore, cutting man-made CO<sub>2</sub> by 100% would reduce greenhouse gases by about 0.4%, therefore it is strange to blame that 0.4% for any major global warming and thus the warming must be natural.

One of the key climate change skeptics is Lord Monckton who made some very interesting points when interviewing a greenpeace member. Firstly, ice core samples from the university of illinois show that the current change in temperature is not unprecedented through time and definitely not ~~so~~ different from the general trend. The NOAA (National oceanic and atmospheric association) figures show that in the 15 years prior to 2009, land-reaching hurricanes had actually reduced, debunking another claim by global warming enthusiasts. Satellite imagery also ruins the claim that ice across the world is melting. Whilst this is true of the ~~or~~ Arctic, ~~the~~ global ice is actually increasing ~~as~~ there is more ice than just the Arctic.

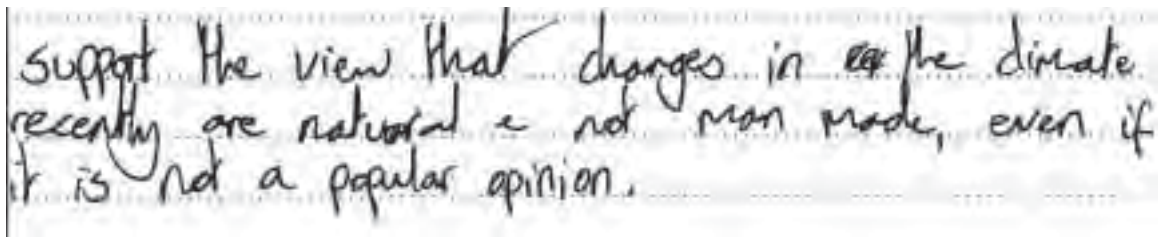
The fact that the man-made theory is widely supported is also ridiculous. 30000 scientists have signed a report that claims humans are

not to blame <sup>over</sup> 9000 of which had PhDs. During a debate in early 2011 ~~at~~ the royal geographical society entitled 'the concern ~~over~~ of global warming is over, time for a return to normality', over 450 of the audience supported this fact, whilst less than 100 believed it was man-made. From personal experience, climate change scepticism is not taught at ~~tertiary~~ school & will be considered incorrect if submitted. At A-level, students are told scepticism should not be written in an exam, as it is not the most popular theory.

It may be asked, 'who gains from claiming that it is man-made?' Since the hysteria over climate change began, many governments have used it to justify extra taxes (green taxes) whilst still keeping public support. Also, America is running out of oil & will soon have to rely on its enemies (Russia & the middle-East). Therefore, if they can convince their citizens to use greener energy, they will not need to pay Russia or the middle East for oil.

Firstly, the theory was called 'global warming' to blame heatwaves (e.g. France 2003 - black Monday) or global warming. Then it became 'climate change' as the temperature began to steady and fall to justify cold weather (e.g. UK snow in 09 & 10) as it is now 'climate change' & not specifically 'global WARMING'. When temperatures drop very soon (naturally) a new phrase (The big freeze?) will be implemented so it can be blamed on man and taxes can be justified.

Considering all the evidence



support the view that changes in the climate recently are natural & not man made, even if it is not a popular opinion.

### Examiner comment – Distinction

This candidate response demonstrates an unusual approach to this question because it takes a sceptical position and argues that climate has always changed over time (he cites some post glacial trends) and evidence from ice cores and NOAA to reinforce the argument. He also covers greenhouse gas emissions and argues that methane levels are partly responsible and these are natural. It is a controversial viewpoint but one in this case which has sufficient factual and statistical evidence to support what is a sustained point of view throughout and to justify a distinction level 4 mark. However it should be noted that there is reference to Al Gore's 'hockey stick' graph. In this case it is used effectively to make a point about relative changes in temperature but use of such theories should be fully understood and analysed for successful application in such a question. Wholesale incorporation of theories derived from visual material may not always be illuminating unless applied judiciously. The candidate offers a reservation about adopting a sceptical approach but should be reassured that when reinforced by evidence any viewpoint is acceptable and can achieve the higher marks.



## Example candidate response – Merit

12) Section B

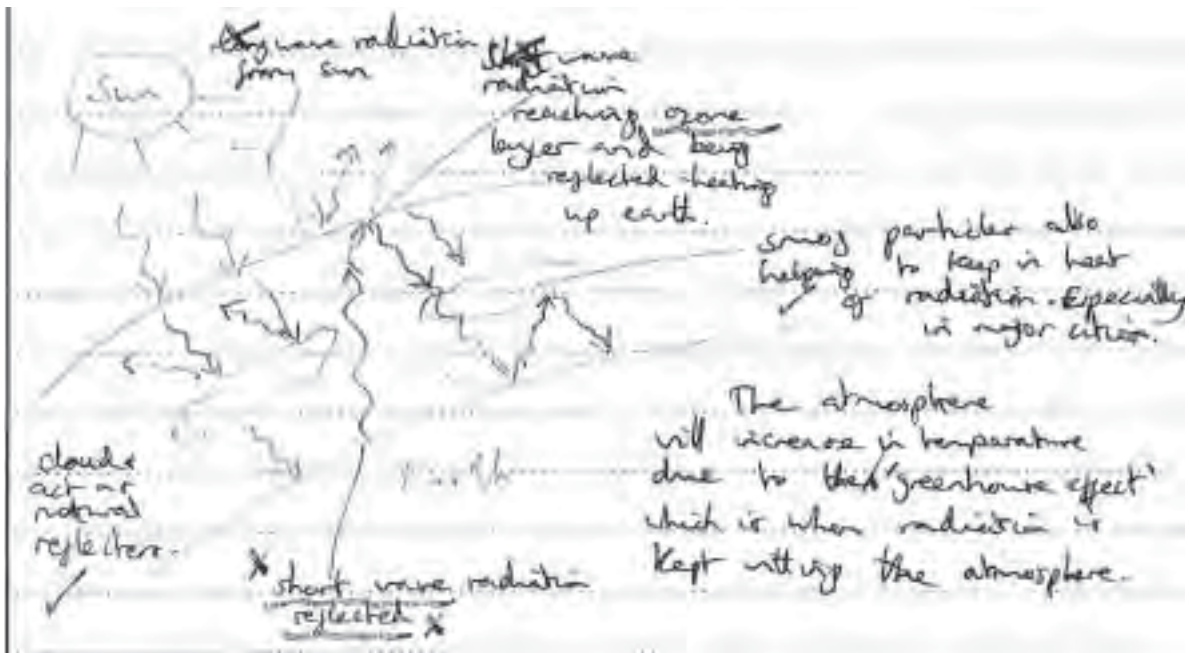
Plan: ice caps melting Energy budget

Natural = tree rings, ice layers, fossils, earth tilt  
 Vol. Temp. in Antarctica  $-0.5^{\circ}\text{C}$  @ 1911

Man = produce  $\text{CO}_2$ , water vapour  $\rightarrow$ , methane

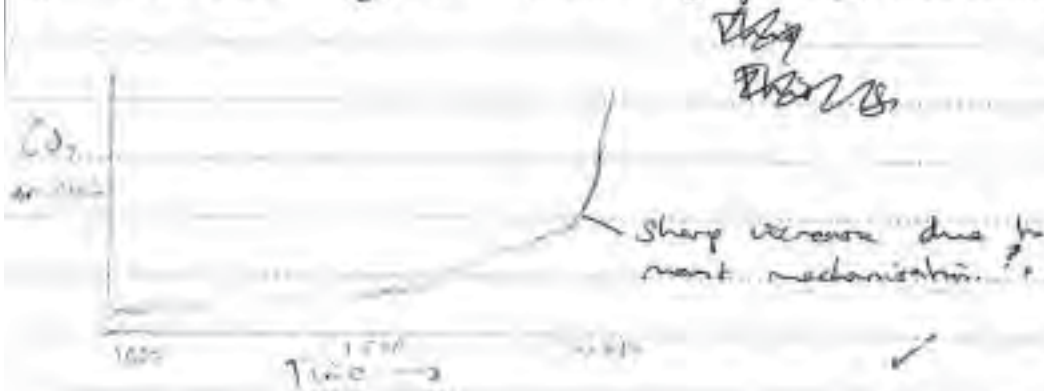
CO<sub>2</sub> levels unusual?

Over the past fifty years, global climate change has been a major talking issue of the world's community. World leaders have had conferences to try and act on the current trend of increasing carbon <sup>emission</sup> ~~emission~~, however, at the ~~1997~~ Copenhagen Summit in December 2009, ~~no~~ decision was securely accepted and this incompetence has reflected the world's actions. The man-made effects on the trend has not been fully proven due to the fact that the Earth's natural climate cycle does fluctuate enormously, ~~over~~ and has done over ~~the~~ millions of years. The ozone layer at the top of our atmosphere is vital in heating the globe and without it, the earth's average temperature would be  $-18^{\circ}\text{C}$ . The depletion of this layer and the thickening in areas ~~is~~ is unusual, which is why there is the view that global warming is due to man.



There is much evidence to show that the Earth's natural climate change is natural. Volcano Tambora in Indonesia erupted in 1815 and gave off millions of ~~gallons~~ tonnes of ash. This then spread over the top of the atmosphere and cooled the global temperature by  $0.5^{\circ}\text{C}$ . Furthermore, humans can measure previous global temperatures by looking at tree rings of old trees which show the growth - ~~was~~ thicker rings in warmer conditions. Furthermore, ice layers in glaciers show melting over time which can be measured. Also, by looking at natural features around the world, for example, in Norway, fjords have been cut by ancient glaciers before the time of significant human impact.

Due to the industrialisation and increase in our production methods, human consumption of 'Greenhouse gases' has significantly increased.



This ~~of~~ graph shows the steep increase of most Carbon dioxide emissions that is recent centuries. It is obvious that man is magnifying the rate of change for increased temperatures and carbon dioxide concentrations. Activities like ~~the~~ cattle farming, ~~the~~ petrol transport, fuel combustion, heavy industry and use of CFCs are all having direct effect on the ozone layer, recent increase in natural disasters <sup>frequency and</sup> is due to changes in air ~~and~~ sea currents, like El Niño in the Pacific Ocean, ~~that~~ it is hard to prove, but it must be due to human impact.

Overall, it is hard to prove that man-made activities are changing climate trends, but there is strong evidence for the cause. Only to a small extent do I agree with

the point of view that current climate trends are natural because of natural cycles ~~because~~ <sup>due to</sup> events like cyclones, hurricanes and droughts are becoming more frequent. Man ~~can~~ <sup>is</sup> ~~can~~ <sup>is</sup> altering these trends, and we need to ~~allow~~ <sup>change</sup> these trends for the future of the earth's well-being and for natural sustainability.

### Examiner comment – Merit

This answer demonstrates two fundamental mistakes that candidates often make in relation to global warming and climate change. The first is that the ozone layer does not make a significant impact on increasing atmospheric temperatures, although many, like this candidate, suggest that 'the depletion of this layer (ozone) and the thickening in areas is unnatural which is why there is the view that global warming is due to man'. So this assessment is predicated on incorrect information. Secondly, in attempting to account for the enhanced greenhouse effect the candidate annotates the relevant and integrated diagram (to be applauded) by suggesting that the earth reflects incoming short wave radiation. Only a small amount is reflected whereas the majority is re-radiated and this would have been the correct explanation here. There are glimmers of awareness of current climatic trends in references to El Niño but these are not developed. The answer focuses on the question and attempts a discursive approach but does not take the argument to its logical well developed conclusion.

## Example candidate response – Pass

12. The current climate trends are refers to ~~the~~ the increase in average temperature over the last one hundred years as well as the increase in average rainfall. The Earth's natural climate cycle refers to the change in long term weather patterns which occur from the earth's variation of its energy balance. It is said that the current climate trends are part of Earth's natural climate cycle but I ~~will~~ disagree and agree with their statement.

The greenhouse effect has much to do with the earth's climate as it determines the earth's surface temperature. The greenhouse effect is caused by greenhouse gases which include carbon dioxide ( $\text{CO}_2$ ) and methane ( $\text{CH}_4$ ) and when solar and thermal radiation is disrupted by these gases. The solar radiation is emitted by the sun and when it reaches the earth's atmosphere 10% is absorbed and the rest is reflected. The solar radiation which reaches the earth is then absorbed and emitted in the form of thermal radiation. This radiation then has 30% of the radiation to the then escapes through the atmosphere and 70% is absorbed by the greenhouse gases and re-emitted in all directions, half of which makes it through the atmosphere into space and half goes back to earth. This process has been magnified by man due to the disruption of the carbon cycle.

The disruption of the carbon cycle is due to the increase in carbon emissions. Carbon is found in everything on earth including plants, animals, rocks and water. The disruption of the carbon cycle is due to the

decrease in intake of carbon due to human process disrupting it. The main cause of carbon emissions is from the burning of fossil fuels including oil and coal. Before the industrial revolution the carbon levels were ~~260 parts per cubic~~ 260 parts per cubic and by the 1940's it was around 300. Today it is at 360 and in the next 100 years will be at 560. This is due to the industrialisation of the world. In order to try and reduce the levels of greenhouse gasses the Kyoto conference was held in 2005. It was agreed that countries had to reduce their emissions of CO<sub>2</sub> by in 1990 by 5.3% by 2012. EU countries were to do the same but by 8%. Iceland however was allowed to increase its emissions. So far it has been successful with countries like the UK and Sweden who are on target but countries such as the USA and Spain are not. The USA refuses to attempt the target which is a significant problem as currently they emit 25% of the world's CO<sub>2</sub>. There is also the problem that China has increased

its emissions by 50% since 1990 and that by 2030 it will meet the total emissions of the developed world. India is also to be a problem as its emissions have greatly increased and 60% are still without electricity and will end up emitting more CO<sub>2</sub> to enable everyone electricity and by 2050 it is said that green house gas emissions are to rise by 90%.

Global methane emissions are to be a huge problem as a major input leading to the worst climate trends. This is because global demand for meat is increasing at an alarming rate, 50% in the last 50 years. This causes an increase in the output of methane as livestock is a huge contributor to methane emissions.

There has been a decrease in intake of carbon in the carbon cycle which is man made. This is mainly due to deforestation. The world's forests are the second largest CO<sub>2</sub> consumer as they need it for photosynthesis. Without this large consumer of CO<sub>2</sub> and an increase in the output of carbon this is likely to have



huge impacts on the carbon cycle causing a surplus of carbon in the long run.

The oceans are the largest consumer of carbon on the earth. However, the current climate trends mean that there is an increase in sea level rise, a greater volume of water thus more  $\text{CO}_2$  can be absorbed. Some scientists claim that this is enough to be able to cope with the increase but some still argue this is not.

However, looking at the earth's natural climate cycle there was more  $\text{CO}_2$  in the atmosphere 650,000,000 years ago than there are today, 500,000 years before now. This was due to volcanic eruptions which are a huge output of carbon, heavily contributing to the greenhouse effect. And so this means that the current climate trends could very well be part of Earth's natural climate cycle and should not be seen as man made.

In conclusion, I disagree with the point of view that 'current climate

trends we part of Earth's natural climate cycle and should not be seen as man-made. I believe that the current climate trends have been a disruption of Earth's natural cycle due to the unbalanced level of carbon output at such a fast rate for the last 150 years and also because of the disruption to the Earth's natural intake of carbon in the case of plants being destroyed due to significant deforestation. Current climate trends should have occurred over a much greater period of time but have been man-made.

### Examiner comment – Pass

This candidate response was awarded a Level 2 Pass mark on the Generic Mark Scheme for it demonstrated some knowledge of the role of human activity but largely through the prism of the carbon cycle. There is mention of methane, but, other than that, greenhouse gases are not extensively covered. Neither are current climate trends which should be the focus of the question and there needs to be reference to temperature increases, the hottest decade perhaps and changes to storm patterns and El Niño for instance. There is a section on Kyoto which is not germane to the argument. There is some statistical information and an explanation of the greenhouse effect which is commendable. However there is no awareness of natural causes of climatic cycles which partly accounts for the lower mark.

## Paper 3 – Global Themes

Global Themes, is an options paper, where candidates study one Theme in Section A (Questions 1–6) and one Theme in Section B (Questions 7–12).

### Generic Mark Scheme

Level	Marks	Assessment criteria
5	22–25	<ul style="list-style-type: none"> <li>• Wide-ranging, detailed and accurate knowledge and clear, high order understanding of the subject content</li> <li>• Relevant, detailed and accurate exemplification used effectively</li> <li>• Logical and clear organisation; good English expression; full and accurate use of geographical terminology</li> <li>• Well annotated and executed sketch maps/diagrams integrated fully with the text</li> <li>• Fully focused on the specific demands of the question</li> <li>• Systematic analysis and a critical approach to evaluation; appropriate application of concepts and theories</li> <li>• Conclusion shows high level insight and is logical and well founded on evidence and argument</li> </ul>
4	18–21	<ul style="list-style-type: none"> <li>• Good knowledge and depth of understanding of the subject content</li> <li>• Appropriate and well developed exemplification</li> <li>• Logical organisation; sound English expression; appropriate use of geographical terminology</li> <li>• Clearly annotated sketch maps/diagrams well integrated with the text</li> <li>• Well focused on the demands of the question</li> <li>• Elements of systematic analysis and ability to evaluate; generally appropriate application of concepts and theories</li> <li>• Conclusion is sound and based on evidence and argument</li> </ul>
3	14–17	<ul style="list-style-type: none"> <li>• Sound knowledge and understanding of the subject content lacking depth in some areas</li> <li>• Appropriate but partial exemplification, may not be integrated with the text</li> <li>• Generally clear communication but lacking some organisation; English expression and use of geographical terminology are mostly accurate</li> <li>• Sketch maps/diagrams generally used effectively and appropriately</li> <li>• Specific demands of the question mostly met</li> <li>• Some ability to analyse and evaluate; limited application of concepts and theories</li> <li>• Conclusion is limited and has some links to the rest of the response</li> </ul>

<p><b>2</b></p>	<p><b>10–13</b></p>	<ul style="list-style-type: none"> <li>• Some knowledge and understanding of the subject content lacking depth and detail</li> <li>• Exemplification used may be limited or not fully appropriate</li> <li>• Limited organisation; English expression is basic with some accurate use of geographical terminology</li> <li>• Sketch maps/diagrams may have inaccuracies and limited relevance</li> <li>• Question is addressed broadly or partially</li> <li>• Analysis, evaluation and application of concepts and theories are limited and may be superficial</li> <li>• Conclusion is basic and may not be linked to the rest of the response</li> </ul>
<p><b>1</b></p>	<p><b>0–9</b></p>	<ul style="list-style-type: none"> <li>• A little knowledge and understanding of the subject content; response may also contain unconnected material</li> <li>• Exemplification, if used, is simple and poorly related to the text or may not be relevant</li> <li>• Lack of clarity and organisation; English expression is simple with inaccuracies; geographical terminology, if used, is basic or not understood</li> <li>• Sketch maps/diagrams are limited or poorly executed and may lack relevance</li> <li>• Question is understood weakly and may be addressed slightly</li> <li>• Superficial statements replace analysis and evaluation; application may be minimal or absent</li> <li>• Conclusion may be absent or simply asserted</li> </ul>

## Section A

### Question 1 – Migration and Urban Change

Consider the character and management of different types of international migration.

[25]

#### Mark scheme

##### **Indicative content:**

The theme of migration is set within a syllabus context of a classification; the typology being identified in terms of scale, direction, motivation, space and time. Candidates may use any examples of international migration (i.e. country to country moves, crossing national borders), such as major streams, refugee flows, economic migration and illegal movements. There may be detailed consideration of two types of migration (or examples of migratory streams) or wider coverage of more than two. Character may be interpreted broadly: responses may include descriptive and explanatory details of such characteristics as who the migrants are; the location of source(s) and destination(s); motivation; constraints and obstacles; and outcomes. Consideration of the element of management may elicit greater analysis and higher order treatment, as beyond what is done to manage such migration. Candidates may consider related issues both national (affecting a single country) and international. The syllabus identifies strategies both to encourage and to restrict international migration, listing immigration controls, international agreements and financial incentives. Clearly there is potential to consider refugee movements and the particular management challenges they present.

At lower levels, candidates may tend to describe the character of international migration more than truly consider it, and may lack attention to its management. At higher levels, diverse exemplar content is likely to be used to support well-developed and reasonably balanced considerations of international migration in both character and management which display a sense of contemporary realities.

Example candidate response – Distinction (D1)

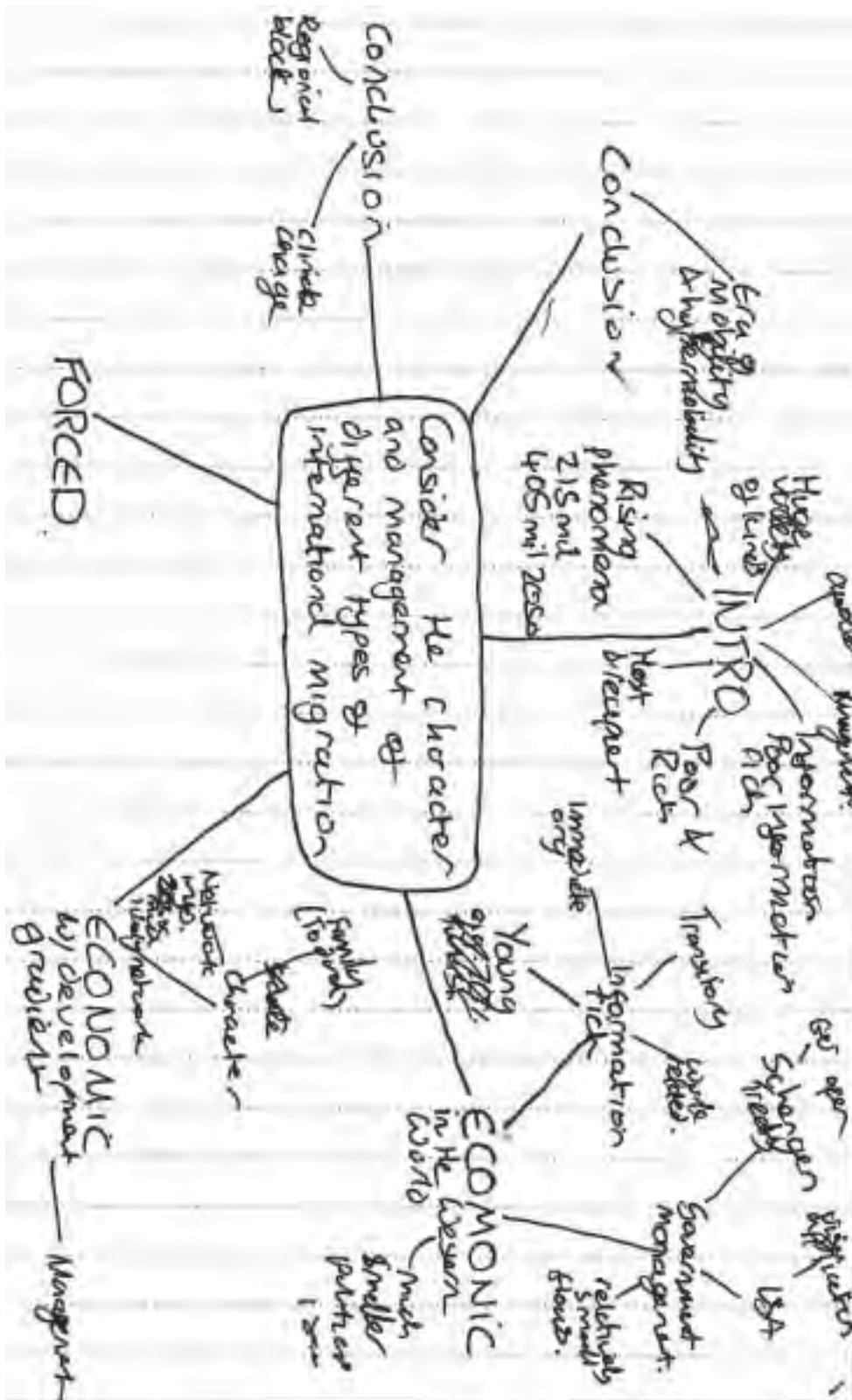
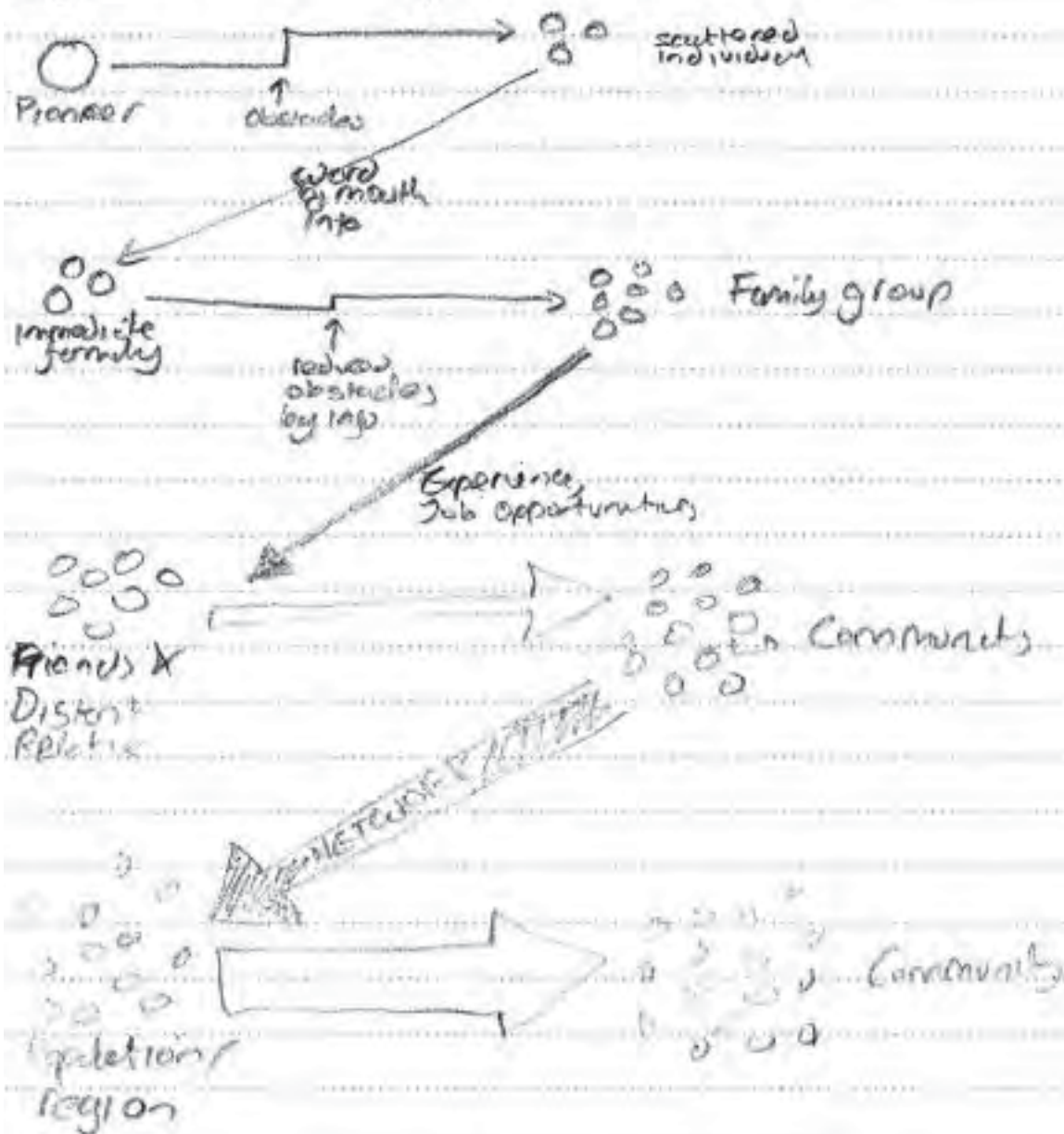


Fig 1: Chain Migration Model



### 1. Consider the character and management of different types of international migration.

International migration is a rising phenomena of the 21st century, a century already characterised by the hypermobility of people and information. Current estimates are that around 215 million people cross borders as migrants every year, and this is forecast to rise to 405 million by 2050. In this era of mobility, understanding the character and management of migration types is extremely important. There are a huge variety of types, undermining many of the traditional models of migration such as Stouffer or Lee in the 1940s. Including, information rich vs. information poor, size of economic gaps, forced vs. voluntary and pioneer migrants vs. established. This complexity of the pattern of migration makes any assessment of the character and management of different types of international migration complex.

One form of international migration is labour mobility or economic migration within the development world, such as Europe and USA. This migration is characterised by young, single, educated migrants, who are following careers or education, such as migrant flows from Japan and China for university in the United States. These migrations are often transitory or short stay, until work demands another career move. For example, Taiwan experienced a substantial human capital flight of engineers in the 1950s, only to find they returned with improving economic conditions in 1970s with heightened human capital. These short term migrations of human capital are enormously important for the globalised economy, yet are relatively small scale and less publicly visible. Hence the management of this type of migration is relatively relaxed. In the EU, the Schengen Treaty guarantees freedom of movement and work, meaning that EU citizens can migrate without government interference. The Accession of A8 has undoubtedly increased pressure on Schengen, as many countries including France and Germany chose to impose a "lag time" of 2 years controls. In the UK, the arrival of 1 million Poles became a significant political issue. The United States is comparatively stricter, with a visa process for working requiring information about length of stay and reason for visit. Both these management strategies take place in an information rich environment and the migration is small scale and comparatively unmanaged.

Economic migration becomes a more significant management issues when it is combined with a steeper economic gradient between source and host regions. This "economic gradient" can radically alter the characteristics of migration. Economic migration with a development gradient are characterised by very different characteristic, yet these are also controlled by the size of development gap. Economic migrants of this sort tend also to be young, relatively skilled (85% Haitian college graduates emigrate) and often families follow later, as in the Chain Migration Model model (see fig. 1). For example around 31% of a survey of Turkish Migrants to Germany in 1980s discovered they intended their families to follow at a later date. In addition these migrations can be longer stay, often intending to migrate permanently, such as Turkish migration to Germany. However this is not always the case, as economic gradients slacken so do migrant flows, and there can be a counter migration such predicts by Ravenstein's Laws 1885. Of the 1 million poles who migrated to the UK following 2004, only 500,000 remain following the 2008 - 09 economic downturn. Migrations are also characterized by a lower access to factual information and a greater reliance on networks, though this is a broad generalisation, tending to remain in cultural and linguistic groups, such as Turkish in North London. Polish migrants to the UK are around 25 times more likely to find a job through a "network" than other migrants. This illustrates the divide between pioneer migrants and those later on. In contrast to the "developed world" migrations, higher economic gradient migrants are more likely to accept a job below their skills level, almost an intermediate opportunity in jobs, as indicated by Polish Migrants to the UK, of whom 50% are working in a job below their qualifications. Similarly 50% of Haitians to the Canada are college educated, yet most work in construction or low paid services. Migrants in these migrations often send a much more home in remittances than the "developed world". Remittances constitute 40% of LIEs income, and Haitians send home around \$100 million p.a. Economic migration with a development gap is characterised with young, educated and mobile people making informed decisions, but in contrast they tend to take transitory economic



opportunities, be more permanent and rely more heavily on networks or family connections.

Management of large economic gradient migrations is a much greater issue. Flows of migrants are generally very high, for example 1,000,000 Poles migrate to the UK or 1,700,000 Turks to Germany during 1970s and 1980s. Management can often be a bigger issues in both host and source societies. In contrast to the "laissez faire" attitude to "developed world" migration, controls are much stricter based on enforcement and quotas. In the UK quotas are imposed on the number of economic migrants admitted every year. These large scale migrations are politically much more significant, often negatively perceived by host electorates, often based on prejudice. There is higher focus on border controls, such as the putative reintroduction of Italian border guards on the Alps contrasting to Schengen, and the clearing of Romanian informal settlement in Northern Italy. More controversially the USA attempts to limit Mexican Economic migration by border guards and attempts to construct a fence along the border. Management of large scale economic migration is often harsher in the host country, while the source country often struggles to cope with Human Capital Flight and economy dependency due to remittances. Most source countries have schemes aimed at retaining young people. In Turkey TUTIBAK agency is aimed at retaining Turkey's brightest graduates and discouraging them leaving abroad. However it would be fair to say that government have a limited ability to prevent the mobility of people in a globalised era.

Forced migrations characteristics and management are radically different to economic migration of either sort. Forced migration tends to wholesale, non age discriminatory and under informed in sharp contrast to either economic form. It is a flight to the nearest border aware from persecution or threat, meaning the "friction of distance" is much more important than to economic migrants. Physically geography tends to information this flight, though a perception of stability is important. Hence Uganda is a major of recipient of refugees from the great lakes region as 3 of 5 countries had border it are in conflict. However there are exception to the view of a panicked uninformed flight, following Idi Amin expulsion of Asian Ugandan in 1976, 18000 headed to Britain through colonial, familial and social ties. The characteristics of forced migration are even more confused them economics, but it can be considered as a less "defined" migration with a more wholesale nature.

Management of forced migration is often a political issue. In LEDCs borders are often extremely porous and migration flows occur without check or proper host management. Uganda has almost no border control, and actively pursues an open border policy though it has come under pressure in recent years. It has been unable to manage the consequences within Uganda effectively. UNHCR (United Nations High Commission for Refugees) attempts to set of camps for the migrants, but they are often close to conflict borders leading to raids and fear, have limited access to services and fail to integrate immigrants into society. The resultant 6% p.a. population growth is partly blamed by some for rising instability in the country, such as food and fuel riots. Uganda's relationship with migration is interesting, as migrants have often played an important political role. There were 3000 Rwanda Tutsi in the NPM army with swept Museveni to power in 1986. HICs management of refugees is based on testing their asylum seekers status. International law states that the country at which an asylum seeker presents themselves has the duty of care, with put immense strain on boarderline countries. This can lead to conflict. Recently there has been multiple diplomatic conflicts between Italy and France over the duty of care for Libyan and other refugees from the Arab Spring, calling into question the viability of Schengen. In some instances, humanitarian response can be impressive. Following the mass migration from Haiti following the 2010 Earthquake, "Humanitarian Parole" was granted to illegal and legal immigrants. Management of forced migration is difficult and fraught with morale and political difficulties, meaning that strategies vary widely on a case by case basis. Where the crisis is immediate and newsworthy it is often successful, stinging governments into action, where not the process is more complex.

In conclusion, migration displays a bewildering variety of different forms. These require radically different forms of management. As a rule economic migrations tend to be more specific, dealing with particular groups and demographics. These migrations are defined by economic factors. By contrast, forced migrations are wholesale, exhibiting more confused patterns. Despite this there are plenty of examples where neither case is applicable. There is no standard international migrant. The management of migration is immensely difficult, complex and often unsuccessful. Yet management is set to become increasingly important due to two trends.

Tourism can also develop unequally spatially due to market lead factors. In the public sectors, some countries encourage mass tourism while other discourage it. Britain operates Visit Britain, set up in 2003, in order to encourage more visitors. By contrast (Bhutan) strictly controls the number of visitors. This pattern is also borne out in service provision. This is borne out in service provision, as Bhutan has refused to allow foreign tour operators or companies a niche to avoid cultural homogenisation. In sharp contrast to Britain, Spain, Kenya or the Caribbean approach, where around 60% hotels are foreign owned. This brand recognition encourages the majority of tourists to these areas, rather than the allocentricism of Bhutan, leading to spatial variety. Some countries actively encourage spatial inequality in tourism development, in order to limit the negative externalities to a small areas. In Belize (zoning) is at the height of the Tourism and Environment Ministry's strategy. Enclave tourism is encouraged on the coast, such as Placencia, where 114 hotels have been constructed with an expectation to rise by 4 times. The government has investment substantially in extra water (it uses 3 times as much as local villages) and electricity (15 - 7 times as much). By contrast governments have encouraged a much smaller scale tourist industry in the interior rainforest, where the Toledo Ecotourism Association caters for just 7 - 10 people in its lodges. At the international level, government intervention is also important.

Private companies also encourage a spatial uneven pattern in order to focus investment in a few areas for maximum service provision. Economies of scale enable tourism companies to minimise their fixed expenditure on capital intensive projects such as infrastructure, while they can maximise spending on attractive activities. Urban areas are therefore attractive as tourist destinations as the infrastructure is largely in place, shown by the rise in marketing for package deals to European Centre such as Rome for as little as £40. This focus on resorts and enclaves is borne out in substantial advertising campaigns which tend to advertise a specific destination. Private Tourism Companies tend also to focus on providing events within a comparatively small areas.

There is also a temporal dimension to the temporal unevenness (Butler's Model) (see fig. 2), suggests that tourist destination rise and fall according to a relatively predictable pattern. Spatial patterns change, but the rise of new destinations, tends to weaken the attraction of old ones. Traditional British seaside holiday camps, from the 1940s and 1950s at Skegness fall into sharp decline with the advent of foreign destinations. There is a social dimension to tourism, making tourism in some cultures an expression of class. More commonly, new tourism opportunities within the expanding pleasure periphery are well marked and exciting to the consumer, leading to the decline of old destination and the rise of new, meaning that spatial inequality is necessarily maintained.

In (conclusion) tourism exhibits spatial variations due to a variety of factors including physical, economic, social, supply lead, demand lead and time. This leads to the remarkable inequality of tourism at all scale, including a global scale inequality, a national scale inequality right down to the specific zonation that occurs within a city. The inequality is inherent in the nature of tourist destinations, their interrelation and the passage of time, it is extremely unlikely to even out. Once tourism is perceived as an economic activity like any other this is perhaps not so surprising. Uneven development in tourism is inherent in the nature of tourism itself, this uneven is unlikely to change. The most important factor in this spatial variation is the interrelation between the desires of the consumer, the provision of the private sector and the attitude of local government in tourist developments.

### Examiner comment – Distinction (D1)

This is an exceptional response of D1 quality to which full marks were deservedly awarded. It is distinguished by an arresting start and a strong conclusion, each of which attests to the complexity of international migration and demonstrates high order conceptual understanding of the subject area in terms of both character and management. The writing is highly evaluative and the candidate deploys a variety of examples from countries at different levels of development very effectively as evidence. The incidence of typos does not detract from the essay's rigour or level of overall achievement, which is outstanding.

## Example candidate response – Merit

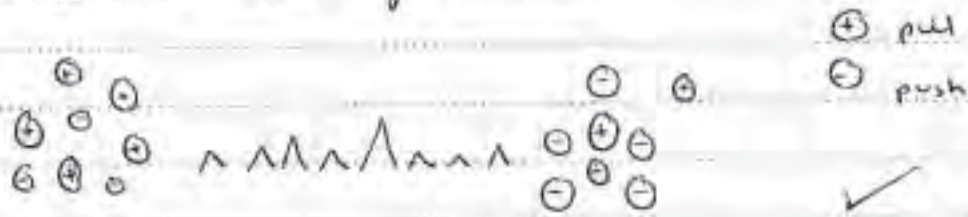
Migration is undertaken for a number of reasons and considerations, time, scale, cost and opportunity. There are three primary patterns of migration: stopped migration - as seen in the movement of Turks to Egypt and finally into Germany - Temporary migration, as seen in the ~~self~~ "brain-drain" from Haiti to the US, California and LA in particular. Or indeed the immigration of Polish migrants to the UK. ~~Finally~~ Lastly, permanent migration demonstrated by Dutch settlers in Pennsylvania.

(Todorov's) model ~~essentially~~ essentially describes the attraction of bright lights and the big city. The alluring pull of, often times, developed urban areas as perceived by those less fortunate living, as they perceive, in less glamorous circumstances. This model applies to the mass Indian ~~the~~ migration to the EU and, in particular, the UK. The Guardian quoted the statistic "British born non-whites have become a minority in England". This mass influx of foreign immigrants is a large contributing factor towards this. In this case, the terms "searchers", "sunkers", "stayers" come into play - often pilot members of a family migrate ~~to~~ after the working father - assess the opportunities and make base ~~and~~ then the rest of the family join.

(Zipf's Gravity Decay model) suggests that the longer the distance needed to be travelled, the more migrants will fall along the wayside. The scale of this model can be demonstrated by chart, forced migration - like Indoneis refugees fleeing into Chad and Egypt - contrasting ~~against~~ against great, historic migrations which rambled through numerous countries, very much stopped, and few people reached their initially intended destination.

(Stephan / suggested, that the number of people who reached their destination was inversely proportional to the number of intervening opportunities. For example, many Haitians migrate towards the USA in search of a stable state and an income. However, opportunities arrive from many places, like the Dominican Republic - a far more prosperous country than its neighbour in Hispaniola - or in Mexico.

Lee suggested a compilation of push and pull factors with intervening obstacles.



Essentially, more pull factors - job opportunity, lack of persecution, climate - than push factors - cramped, stuffy? economy, dictatorship, poor ROI - encourages a person to migrate alongside the number and magnitude of intervening obstacles.

The A2 and A8 migrations saw a mass influx of citizens of ~~the~~ E. Europe migrating to W. Europe. Allowed by the Four Freedoms Act, most affluent countries should have opened their borders but found it as welcomingly as the UK. This was a modern migration, characterised by a search for opportunity and increased income. More

The brain-drain of Haiti is utterly different - whilst migrants did leave in search of money to send back as remittances, many families fled to escape the brutal dictatorships of Baby and Papa Doc Duvalier, Bertrand Aristide and the truly difficult circumstances in general.

In (conclusion,) it becomes clear that migration is undertaken for a multitude of reasons.

## Examiner comment – Merit

The essay displays qualities of more than one level in the Generic Mark Scheme (GMS). For example, organisation is logical and expression sound (Level 4); knowledge and understanding are sound (Level 3); yet the conclusion is basic, consisting of one simple idea expressed in a single sentence (Level 2). To achieve a higher mark, two possible areas for improvement are identified. One is the greater development of the aspect of the management of international migration in the question, to which little attention was given. The other is the need to provide a fuller supported conclusion, given that the seventh descriptor in the GMS relates specifically to how an essay concludes.

## Example candidate response – Pass

1

International migration is the movement of migrants around the world. There are different types of migrants and they require different types of management to control them.

The first type of migration is (refugees) trying to seek asylum from war. This has happened on many occasions, for example the Libyans during the NATO coalition against Colonel Gaddafi have been granted asylum in Italy to protect them from the effects of war. This type of migration ~~was~~ is (not permanent) and only occurs when innocents are in the middle of conflict. The management of this type of migration is to allow them asylum but make sure they leave when their home is safe.

Another form of migration is when fleeing from racial tensions that exist within a country. In the case for the Ugandan Asians who were forced to leave Uganda by their

leader, many of them were granted citizenship in the UK as a permanent move, rather than in order to manage the influx of migrants the countries like the UK must set a cap on how many are allowed and use the border agency to find those trying to come through illegally.

Another form of international migration is economic migration. Sometimes when countries are in need of labour they find workers from other countries such as the Turkish migrants that immigrated to Germany (West) after World War Two. Other economic migrants include Mexicans to the USA, mainly Florida and the Polish to the UK. Most countries will have a cap, or a list of jobs needed to fill up in order to manage migration and make sure the country only gains the skills it requires. Polish people will migrate to the UK in order to find a better job and provide for the family back at home. Most economic migration happens from an LEDC to an MEDC, as the migrant is in search of higher pay, however this is not always the case.

Migrants from the UK will often migrate to the USA, Canada, and Australia in search of jobs due to the higher pay, better quality of life and the small population of

Canada and Australia mean there should be less competition for jobs. The management between countries varies. Canada will allow the skilled labour of UK migrants however the Australian border agency is much stricter and will only allow what it needs and anyone with any criminal record is denied.

Australia is also tough when allowing environmental refugees join the country as they will not allow the people of Tuvalu to migrate despite the fact that the climate change is slowly causing sea levels to rise which will eventually ~~put~~ submerge Tuvalu under the Pacific Ocean. The Australians are the closest country that should provide some form of asylum but they do not.

Another form of migration is for pleasure. Many of the elderly UK population complain about the weather so they choose to migrate to ~~warmer~~ warmer countries like Spain, Southern France and other Mediterranean countries.

↳ The Commonwealth Immigration Acts in the UK is an example of using legislation in order to control immigration, by denying a quarter of the world to migrate to the UK, which in 2011 would have meant that 1.2 billion Indians would have access to the UK.



## Examiner comment – Pass

The attributes of this essay are found largely in the Level 2 descriptors of the GMS, however the lack of a conclusion, (Level 1), restricts the outcome. The essay is simply structured and has some qualities of a ‘developed list’ with a number of paragraphs beginning “Another form of migration ...”. The character of international migration is largely limited to type of movement and country of destination. The examples used would benefit from deeper and more detailed treatment (e.g. date, scale, nature of flows, place). Attention given to the question’s element of management of international migration relates mainly to entry controls and this could be widened and developed for further credit. One key omission is the integration of concepts and theories about migration and, therefore, of the analysis which such content stimulates.

## Question 2 – Migration and Urban Change

Assess the effectiveness of attempts to manage the consequences of urbanisation.

[25]

### Mark scheme

#### **Indicative content:**

Urbanisation is appropriately defined as the process of concentration of population into urban settlements, from rural ones. Whilst it includes rural-urban migration, it relates to the increase in the overall proportion of population residing in urban areas. The syllabus lists a number of consequences and impacts and the following management initiatives:

- Housing improvements: site and service schemes, upgrading
- Infrastructural improvements: water and sanitation, transport accessibility
- Social improvements: education and health
- Economic improvements: providing work opportunities, self-help schemes
- Environmental protection

The contemporary context in countries at lower levels of development may be taken, so may the experience of highly urbanised countries at higher levels of development, both currently and historically, for example in the 19th century.

The wording of the question requires the effectiveness of the management of at least two consequences to be assessed. Effectiveness may be seen in terms of cost/benefit, outcomes, unforeseen problems, winners/losers, delivery of objectives, amelioration of quality of life, etc. In so large and potentially diverse a subject area, comprehensive responses are not required; there may be focused responses with detailed support from two attempts or initiatives in one urbanised area, such as Nairobi or London, and broader treatments, perhaps thematic, drawing on more diverse examples in less depth.

At lower levels, the approach may be more descriptive of attempts than evaluative. At higher levels, skills of examination will be displayed in the organisation and development of the response, with some structuring of observations, for example in terms of relative effectiveness or varying outcomes for different stakeholders or locations.

## Example candidate response – Distinction

Assess the effectiveness of attempts to manage the consequences of urbanisation.

There are ~~very~~ <sup>many</sup> different consequences of urbanisation at different levels of development. These consequences range from high pollution levels, to shanty towns and declining inequality. These consequences can be found all over the world in London, Sao Paulo, Lima and Curitiba.

One of the consequences of ~~lot of~~ <sup>lot of</sup> people coming to the city is once to the lack of available housing ~~for~~ <sup>for</sup> the migrants, especially for the very poor migrants who come to the city looking for work. In the 1970s, these homeless ~~people~~ <sup>migrants</sup> started (shanty towns) ~~the~~ (in Brazil called favelas) which are free to live in and have no amenities whatsoever! no clean water, no electricity, no sanitation. In Sao Paulo, there is a major problem with slums, and various schemes have been implemented to improve the slum <sup>or</sup> remove them ~~to~~ all together.

The first scheme was a municipal scheme called the (Uzupia housing project) which involved evacuating the slums built during them and then building high rise flats for the residents who were residing in temporary ~~low~~ barrack like accommodations. However, ~~this~~ <sup>this</sup> scheme was not a success for two ~~many~~ <sup>two</sup> reasons: the people didn't want this new type of accommodation as it came with nothing (the flats were shells with only a toilet) and they cost \$86 a month which is

600 million for some of the residents. This <sup>European</sup> ~~European~~ scheme failed as the people's own desires were not taken into consideration.

Another scheme however did work; this ~~was~~ one a 'bottom-up'. It was started by a German missionary, (Uta Craemer,) who started up a community centre with originally 2 helpers and putting on ~~a~~ <sup>cracker</sup> classes. Now she has more than 40 helpers and there is now a clinic, cracker, bakery. Also projects are done each year to improve sanitation or provide electricity. This scheme has been such a success due to the fact that Uta Craemer was with the people improving things from the bottom which would benefit everyone rather than a few.

Another ~~consequence~~ consequence of urbanisation is air pollution from the increase in car numbers and the large amount of unregulated factories that spring up. This happened in Cairo where the lead levels in the atmosphere were 4 times the World Health Organisation's level of 500 ppm. IQ had also dropped 4 points and babies were being born deformed by the pollutants in the mother's bloodstream. It got to such a bad level that the World Bank told the Egyptian government that aid would be cancelled if the problem wasn't sorted. In answer to this, in 1996, the Cairo Air Improvement project was launched with 26 monitoring stations in areas of high pollution could be eradicated.

Also, to reduce the number of cars on the road, a subway was built which is 4.7 km long. This scheme was very effective as everyone benefited, even the back-room factories who could become legal.

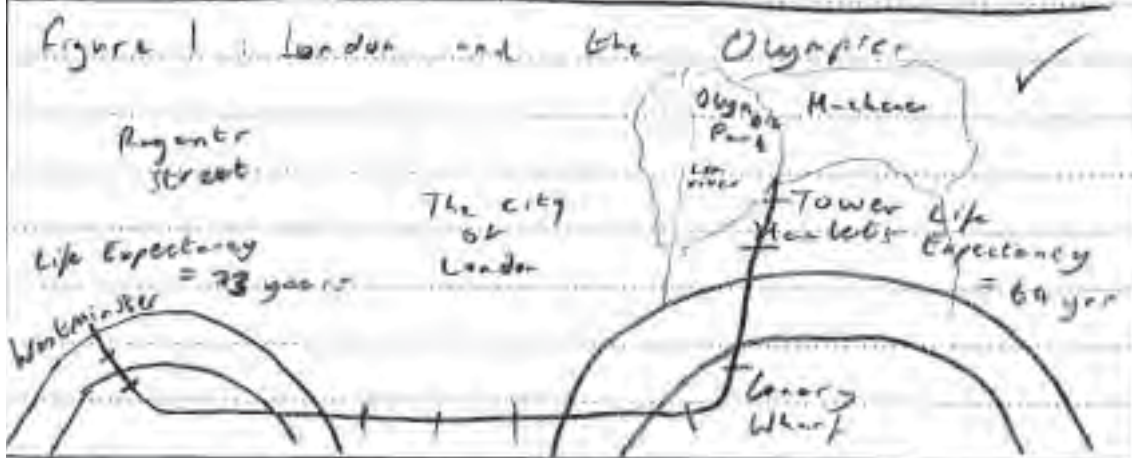
Another place ~~was~~ that ~~the~~ had this issue was Curitiba in Brazil. They solved the problem by ~~the~~ building a bus system that could carry 2 million people a day ( $\frac{2}{3}$  of Curitiba's population). The city's mayor also realized that pedestrianised shopping areas were better for the people and so stop all the arguments he had to do it in 48 hours. He actually did it in ~~the~~ 72 hours and very few complaints were raised and that area is almost a pollution-free zone.

Pollution and slum forming are typically consequences at lower levels of development. At higher MEDCs, the city gets so large that the older sections are not being rejuvenated ~~but they are being rejuvenated~~ and so the worst slums to diminish in quantity.

One such area is the East End of London; which is the borough of Tower Hamlets and Hackney. These areas merged into the rejuvenation of London Docklands in 1972 and so diminished even further. Currently, for every stop into the East end of London on the Jubilee line, life expectancy decreases by a year. <sup>as shown in figure 11</sup> That means there's a difference of ~ year living in Westminster and living in Hackney. To improve the housing, the UK government got the Olympic

and promised to rejuvenate East London during the process. They promised 9000 affordable homes along with one of the ~~oldest~~ <sup>oldest</sup> facilities after the games were over. However, it is predicted that the homes being built (originally in the athlete village) might not end up or being home to East-Enders. To make the accommodation ~~acceptable~~ <sup>acceptable</sup> to athletes, it must be high quality and the poorer locals will be priced out of their high quality by richer people from elsewhere. With the promise of the government in doubt, it is unlikely that the scheme will really be as effective as it sounds. ✓

In (conclusion,) I believe that in LEDCs, a scheme must benefit the majority of people who are in care and in the public mind. ~~How~~ However in MEDCs, the scheme must be prevented from being exploited by the rich ~~and~~ so the poorer people are not deprived. ~~As~~ Despite all this, I believe that the key way to manage the urbanisation is to improve rural areas so people have to reason to go to the city i.e. not in error! ✓



## Examiner comment – Distinction

The introductory paragraph sets the scene firmly in different parts of the world and at different levels of development. The latter is an element which the candidate returns to towards the end. The essay is clearly structured and develops by taking a consequence of urbanisation, outlining one or more management responses and offering some assessment of the effectiveness of the attempt(s). The level of detail offered indicates good knowledge of the attempts and a facility with selecting, directing and applying information to the specific needs of this question. This high-achieving response would be improved by a more analytical approach; fuller assessment and 'a critical approach to evaluation' (Level 5); and tighter vocabulary and expression, both in terms of the construction of the narrative and geographical terminology.



and Africa with rapid urbanisation there is already signs that it will be uncontrollable.

There have been numerous (attempts) to manage the rapid increase in urbanisation for the past 80 years. Both LIC's and HIC's have tried to limit or try and accommodate urbanisation. However, this is not always the case as in China more urban areas are being built.

LIC's have worked incredibly hard to try and manage the vast influx of people into urban areas. These have been either accommodative schemes or negative schemes. Accommodative schemes acknowledge the fact that urbanisation will occur and try to limit the damage either through renovation or regeneration of areas. Negative schemes however are when areas such as slums are demolished to stop urban sprawl. For in the (Hainan province) China almost 300 000 people lived in slums. However there were massive regenerations with slums being converted to apartments. This has been successful as already more have gained jobs within the area. A similar thing has occurred in Venezuela where there have been new schemes to bring in new houses instead of the slums for people to live in. However, in Mumbai a negative approach was undertaken as slums were demolished to stop urban sprawl. This has been met with widespread discontent and resentment.

HIC's have been seen to take other approaches. It could be argued that recent attempts from before have actually turned into today's problems. Both in France and UK there has been the building of tower blocks in a process known as (verticalisation). These have quickly become sink estates for single parents, ethnic minorities and retired people. Already there have been major problems with safety



due to the influx crime in the area and the look and segregation of local people in the area. An example of this was Les Bains in Paris where due to the massive redevelopment of the city centres most poor were left to live in apartments in the slums. Here they have been segregated and live in poor ubiquitous housing - Poverty is double in the area than anywhere in Paris as well as crime has doubled. People have been unable to fight themselves out of poverty.

Another management strategy was the idea of new towns and garden cities in the suburbs of the urban area. This was to encourage suburban growth as these new cities such as Letchworth, and Milton Keynes were built to help people move out of overcrowded areas and into these new cities where it was green and environmentally sustainable. However these cities are holding thousands, they look disaster and some are still segregated.

(Brownfield regeneration) has been the latest way of regenerating and managing urban areas. These urban brownfield sites will be created to help move jobs and affordable housing to be available as well as improving the local areas. London Docklands is a very good example of this as in 1981 a company was set up to regenerate the area. This included the area using 400 million of public spending and 6.3bn pounds. It created 100,000 jobs. However, it succeeded in regenerating the area but the local people there are still poor but have been moved elsewhere.

Recently gentrification to prevent ghettoisation owing has been used. This when the local area is rejuvenated and is cleaned up. This has happened on large scales in the UK in London. These are however not universally

popular with all locals and can often lead to a growth in social tensions. Urbanisation

It can be argued that urbanisation will stop and continue urbanisation ~~and~~ and growth in urban suburban areas will be result. This will be due to cheap land and push factors away from urban areas.

We can draw that a lot has been done to try and prevent urban sprawl and the consequences but not all have been successful. It is very hard to strike the correct balance with everyone and often most schemes only improve some areas and worsen others. All management schemes have been <sup>on large projects</sup> ~~beneficial~~ ~~also~~ in some aspects while very few have been completely beneficial.

### Examiner comment – Merit

This essay, whilst generally 'urban' in character, and analytical in approach, lacks a tight focus on the question set. For example, in the introduction the candidate writes about urbanisation without defining it. The essay moves on to content about urban "problems" which is only partly relevant. It is slow to reach the 'attempts to manage the consequences of urbanisation' of the question. After that, new towns and garden cities are dealt with together in one paragraph with their effectiveness summarised in a single sentence of assessment. In the conclusion the candidate mistakenly writes "to try and prevent urban sprawl", which is not the actual question. The essay would be improved by tighter planning; a narrower field, allowing greater depth; and by the provision of appropriate exemplar detail. For example, the example of verticalisation (tower blocks) is given simply as "in France and the UK".

## Question 3 – Trade, Debt and Aid

To what extent do you agree that global capital transfers decrease global disparities?

[25]

### Mark scheme

#### Indicative content:

The syllabus term global capital transfers covers trade, foreign direct investment (FDI) and aid. Global patterns of each of these three elements are a key part of the Specified content. Although the concept of global disparities is not expressly mentioned in the syllabus, here it provides candidates with the filter for assessment in a broad and overarching question. It allows for the expression of evidence-based judgements and an appreciation of change over time. No particular stance is anticipated, however, and more than one interpretation may be taken, for example, that of classical economics, or of supranational bodies, such as the WTO. Although the question is expressly global, it may be considered in its impacts at other scales additionally, for example, as global transfers of countries affect a world region or an individual country.

The assessment is likely to show elements of agreement and disagreement and provide evidence to substantiate the position taken, acknowledging spatial scale and timescale. In so broad an area, diversity may be recognised, for example observing the effects of inward FDI and the emergence of NICs in the new world order; and what may be termed the 'negative' consequences of aid in countries at the lowest levels of development.

At lower levels, candidates may write quite generally and tend to explain, or state a position, rather than assess. The approach taken may be quite narrow in the type of transfer(s) considered or exemplar content. At higher levels, candidates will display a global perspective and provide an assessment which is supported, dynamic and contemporary.

## Example candidate response – Distinction

(Global trade) seeks to take products from areas of production to areas of demand. It would seem therefore that global transfers would decrease disparities. Since industrialisation, the cargo revolution and improved transport between countries, globalisation has affected most ~~but~~ people across the world. In the past, not all trade, however, has ~~increased~~ decreased global disparities. Colonialist colonial powers exploited their colonies, and in many cases actually increased global disparities. The triangular trade occurred between the Americas, Europe and Africa during colonial times. This exploited less powerful countries, using political leverage and bribes. This led to the "development of the underdeveloped," where more powerful HICs ~~not~~ would, and still do, exploit those who are underdeveloped. ~~for this~~ This means that they are unable to grow economically, therefore increasing global disparities.

The number of people suffering

from hunger, is one billion, one sixth of the population. As this number continues to rise, it is clear that trade may be making the development gap bigger.)

The (more modern trade system) led to globalisation; the increasing, interconnectedness of the world. In 1949, the GATT was set up, which ~~was~~ was set up, and replaced by the WTO in 1996. This ~~promoted~~ This new ~~the~~ organisation promoted fair trade and encouraged that ~~the~~ unfair tariffs should be removed. The "global shift" describes the movement of industry ~~of~~ from HICs to LICs. This process is controlled by TNCs) and also relates to the "global power shift," which ~~refers~~ refers to the transfer of power from the government to TNCs. ~~The~~ Economist Noreena Hertz named this the "silent takeover," which has resulted in a "disengagement from politics." This suggests that there is something ominous about this power shift as it ~~suggests~~ suggests that the TNCs, who some would say are (only concerned with making money), are controlling the world. # docs mean that the

governments are relatively powerless in matters of (trade), which leaves countries very vulnerable. This ~~is~~ vulnerability may increase global disparities because those who are less powerful, LICs, are more likely to be exploited.

In 2008, (the credit crunch) ~~is~~ affected the whole market. The collapse of Greece, followed by Ireland, Spain and Portugal, showed that even HICs are not invincible. At the same time, the decline affected LICs, possibly in more damaging ways. It meant that there was less investment and aid given to LICs, which further increased global disparities. The vulnerability of countries in such an interconnected market is clear. As one country falls, so does another. In HICs, the standard of living may decrease, and maybe incomes will decrease. In LICs, however, the effects are more severe. People die of famine or of easily curable diseases. This further reduces the development of LICs, further increasing global disparities.

Trade, however, can reduce global

disparities. In 1996, Vietnam created an industrial zone. ~~By~~ By 2004, this had resulted in 135 cumulative projects and an increased export income from nothing to \$32 billion. This rapidly increased the inhabitants' quality of life, providing jobs and increasing the government's expenditure on healthcare and on education. This reduces global disparities.

Some trade, however, is under protectionism. Trade blocs impose ~~high~~ trade tariffs and unfair charges on LICs, which ~~results in widening~~ (widens the development gap). Free trade on the other hand increases competitiveness, efficiency and reduces waste. This enables LICs to freely trade with ~~the~~ other countries enabling it to gain foreign exchange, which can be used to develop. Free trade can, however, <sup>make it</sup> ~~be~~ difficult for LICs to gain a fair price. Trade ~~is~~ can be exploitative in this way as ~~the~~ producers are paid less than they deserve.

If trade is managed effectively, it can decrease global disparities dramatically. Fair trade organisations, such as the Blue Skies

Organic Association, in Kenya provides farmers with a fair price for their goods. This enables these farmers, growing bananas, to afford food and education for their children, ~~to~~ thus in the long term promoting development. In ~~the~~ the UK, over 4000 ~~free~~ fair trade products are licenced for sale. These products dramatically improve the livelihoods of the producers.

Although ~~the~~ free trade is generally viewed as good, in 1989, the collapse of the International Coffee Agreement meant that ~~the~~ producers became poorer. 25 million families are involved in growing coffee and those in Kenya were particularly affected by the drop in prices.

The president of Rwanda, an ILC, Paul Kagame stated that China's investment, in Africa is "what we need." Kagame said that he wished that the western world would "invest in Africa instead of handing out aid." This suggests that global capital transfers in trade benefit some of the poorest nations, more than aid, which encourages dependency. Since 1950, China has



invested in many African countries. ~~Since~~  
 In the 1990s, however this interest  
 was renewed. Many Chinese TNCs  
 have moved to Africa where labour  
 is cheaper. ~~In some ways~~ TNCs  
 can, however, increase global  
 disparities. The exploitation of  
 the country means that China  
 gains more from its investment  
 than Africa. ~~In~~ In Zambia,  
 China invests in the copper mining.  
 At the Chinese Chambishi Copper  
 mine, safety for the workers is  
 disregarded and income is as low  
 as £53 a month. In 2007, the Christian  
 Aid reported that two miners were  
 shot dead by Chinese security  
 guards for protesting about  
 wages. Also in ~~2005~~ 2005, 51  
 miners were killed in a subsidiary  
 plant explosion. The safety standards  
 of these mines ~~would~~ would not  
 be accepted in the EU and suggest  
 a violation of human rights. Despite  
 this, China's trade has aided  
 the development of some countries.  
 China recently paid \$2.3 billion for a  
 45% share in an offshore oil block  
 in Nigeria. This money provides  
 Nigeria with money to develop

its healthcare and education system and hopefully in the long term reduce global disparities. The investment of TNCs can, however, increase dependency and if global downturns occur, like in 2008, it is the poorest that will be hit first.

(Overall,) trade if managed correctly can decrease disparities by providing foreign exchange for LICs. TNC investment is valued a lot by LICs, and while ~~it~~ it does increase dependency, it also ~~gives~~ gives the LICs a chance at developing. While Chinese TNCs have exploited some countries, they have also provided others with the money needed to begin stable development. ~~As the~~ The west must be careful of hypocrisy as China are using many African countries as ~~ways~~ a means to develop, rather like we used the NICs to develop.

## Examiner comment – Distinction

A developed response of unusual length in the 45 minutes available for writing an essay. It benefits from time taken in planning and maintains the focus well. It is notable for the variety and level of detail of the examples taken, for the up-to-date nature of much of the content and for the way in which examples and analysis are integrated. The interpretation of global disparities is appropriate and including safety standards as one type is creative. Disparities could be explored further creditably, for example in terms of the theory of divergence and convergence over time. The principal limitation of the response is that, from the opening sentence to the conclusion, 'global capital transfers' seem to be interpreted as global trade, although the writing includes material on aid and FDI. A definition of the term at the start would both convince the examiner that it is fully understood and help to sharpen the essay further.

## Question 4 – Trade, Debt and Aid

Examine the reasons for global patterns of foreign direct investment (FDI).

[25]

### Mark scheme

#### Indicative content:

Candidates need to establish what the global patterns of FDI are, to a greater or lesser extent, in order to then examine them effectively. Global patterns may be interpreted in a number of ways including spatially, temporally, inward/outward FDI, and involving different donors and recipients. The syllabus identifies “reasons” in two broad areas:

- the benefits for both recipient and donor;
- the role of TNCs and global financial institutions, such as the World Bank and the IMF.

However, candidates may develop other material or to approach this content in a different manner, for example through considering different motives, such as market penetration, the risk factors which deter FDI or features which attract it. One potentially fruitful area is the effects of the global economic downturn: UNCTAD reported that the financial crisis provoked a decrease in FDI of more than 20% between 2007 and 2008, after four years of growth, but that the decreases were not uniform spatially.

Candidates are free to organise and support their responses as they choose. It would be possible, after a global introduction to focus on one location, such as China in terms of inward and outward FDI and global position, or to take a broader and less detailed approach throughout, structuring the response reason by reason, rather than by example.

At lower levels, content may tend towards the narrative with explanation embedded and examination limited. Patterns may be impressionistic or generalised and global perspective weak. At higher levels, skills in weighing and judgement are likely to be observed, in an appropriately global context, perhaps with similarity and diversity recognised and evidenced.

## Example candidate response – Distinction

Global patterns of FDI vary due to multiple factors including incentives that are provided by governments to attract FDI varying as well as the resources that different countries have to offer differing. The influence of trade blocs and neo-colonialism can also partially explain the reasons for global patterns of FDI.

Incentives to invest in a country such as China are great. After China's open door policy in 1979, China's share of world trade quadrupled. This was due in part to the lack of trade unions in the country allowing high productivity of workers. In addition, the cost of labour within China is 4% ~~lower than~~ ~~in the~~ of total ~~labour cost~~ manufacturing cost in comparison to much higher levels of the EU and USA. Therefore, this explains high global patterns of FDI into China.

The impact of neo-colonial-like "exploitation" of countries that are

Resource rich' can also explain global patterns of FDI to a certain extent. For example, China invested \$1 billion (US) into Angola in the form of aid in exchange for the provision of 20,000 barrels of oil a day. It could be therefore be said that if the country is resource-rich it can be exploited by countries that directly invest partially, explaining why some countries receive more FDI than others.

The greatest proportion of trade and FDI occurs inter-regionally. This could be between trade blocs such as the EU; 70% of all global FDI occurs between EU member countries. This may be due to the fact that countries within trade blocs do not have to pay import tariffs on goods and are not affected by protectionism. That concept also extends to old colonial countries. For example, bananas from the Windward Islands are given preference in Britain to those from America. As a consequence, it may be said that FDI occurs ~~within~~ between countries where there will be a mutual benefit for those countries involved and there is no loss of 'profit' in the form of duties or tariffs associated with attempting to export or import goods that originate in different trade blocs. An additional factor that

may be a reason for the global patterns of FDI.
   
 is the infrastructure within the country FDI is
   
 going to be invested into. For example, Singapore
   
~~electronics~~ factory is located in ~~the~~ Dongguan
   
 which is in the Guangdong Province of China.
   
 When the factory first opened only 5-10%
   
 of the inputs were sourced locally. Now
   
 50-70% of parts are sourced locally. This
   
 signifies a ~~significant~~ significant
   
 improvement in the efficiency of the supply
   
 chain in China. Additionally, investment in
   
 the infrastructure of the country is significant.
   
 If a country's infrastructure is ~~not~~
~~poor~~ ~~poor~~ is poor it is unlikely
   
 to gain significant FDI as transport links
   
 will not be developed and the education
   
 of the population potentially poor leading
   
 to inefficiency of the workforce (~~potentially~~).
   
 For example, in China investment in
   
 education is 2.6% of total GDP and
   
 high speed rail links have been developed.
   
 This could be said to have contributed to
   
 high rates of FDI into China allowing
   
 China in turn to put FDI into African
   
 countries.

Global patterns of FDI can also be
   
 determined by economic events. During 2008
   
 FDI decreased by 15% with countries
   
 removing ~~money~~ money from developing
   
 economies due to the economic crash.

In conclusion, global FDI is effected by <sup>among</sup> ~~other~~ <sup>factor</sup> incentives to invest, neo-colonialism and trade blocs. These factors create global patterns of incoming and outgoing FDI, ~~from~~ predominantly from MEDCs to MEDCs, with a small proportion going from MEDCs to LDCs. This is highlighted by the fact that Africa only receive 3% of total global FDI. The most significant impact on global patterns of FDI could be said to be trade blocs such as the EU membership of

### Examiner comment – Distinction

The essay has a succinct and well-directed introduction which identifies four reasons for global patterns of FDI straightaway. It impresses by its global perspective, the sense of pattern that it conveys and the deployment of detailed, contemporary, examples at different scales. The candidate identifies a clear economic rationale for FDI based on multiple economic influences and mentions political reasons also. Response quality could have been enhanced by higher level attention to pattern, theoretical content and the integration of a sketch map or sketch diagram of FDI flows. Possible areas for analysis of pattern include inward FDI compared with outward FDI or observed gaps (i.e. factors that repel such investment).



## Example candidate response – Merit

FDI (Foreign Direct Investment) is TNC's (Trans-national corporations) in Foreign countries. The Headquarters are usually in MEDC's countries and the factories or workforce in LEDC's. The main area over the past 60 years to be invested in, is Asia as they seem to have what FDI needs and therefore are determining the <sup>global</sup> patterns of FDI. FDI has improved several countries economies and as a result Asian countries, e.g. China has developed quickly and are now leaders in the developing world.

We first saw FDI take place in the Asian Tiger, countries, which are Singapore, Taiwan, South Korea and Hong Kong.

These countries are also referred to as NIC's - (Newly Industrialised countries) meaning they have industrialised in the past 50 years.

These countries all had the same things in common that led the FDI to this area, therefore defining the <sup>global</sup> pattern. Firstly, they had an educated ~~work force~~ <sup>work force</sup> across all the countries. This is extremely helpful as it means that the workers are able to operate machinery easily and need little training, therefore less money spent by the TNC. They also have a workforce that are willing to work cheaply, far below the minimum wage of the UK. Again meaning the TNC, for example, Wal-Mart, don't have to pay too much money for their workers.

Another extremely attractive part is that these countries all had a basic infrastructure, so roads, bridges, ports and airports. This means that the TNC's have to spend little money on improving the infrastructure so the product can be moved. Something that makes Africa a unattractive place

to invest in as it has little to no infrastructure, so a lot of money would have to be spent. As well as this ~~something particular to~~ Singapore, ~~it~~ is the channel to all trading in Asia and Australasia, meaning the ~~FDI~~ TNC's can make a lot of money ~~just~~ and don't have to pay to have it moved that far. Again they are saving money. And also the countries invested in may have some resources that can be used, however their greatest <sup>resource</sup> being their people.

All of these factors has meant that a lot of money has been made in these countries by TNC's from FDI. And it is because of these reasons that these countries have developed and that the global pattern shows FDI to be concentrated in this area.

As time went on we saw that a lot of FDI moved to China. ~~This is~~ It is due to China's history that they are now the most powerful country for FDI with 23.5 billion dollars invested in them.

In 1950's Mao Zedong

came to power in China and started to make it a communist country. He started many schemes to improve China's economy but most of them failed, so ~~he~~ when he died another ruler stepped in and took his original ideas of making targets but cleverly put them into practice so that now China is so wealthy. In 1981 he made it that ~~9~~ 9 years of ~~educated~~ education was compulsory dropping the illiteracy rate from 80% to 5% (a educated workforce means FDI). He also opened up China to investment after and carefully watched the progression. He created a good infrastructure after some FDI began to come in the 1980s ~~the~~ spending around 2.6 billion improving railways and roads. He also made SEZ's (Special Economic Zones) along the coast of China like Shenzhen. Shenzhen was a small fishing village collection, but once it was labelled with SEZ, FDI investment meant it became the 27<sup>th</sup> largest city in the world by 2006 and went from a population of around

20,000 to 8.6 million. So here we start to see how FDI become more attracted to China, as they had SEZ's, and educated workforce and a good infrastructure.

As it began to develop in 1980's this makes China an RIC - Recently Industrialised Country, amongst China in this category are ~~India~~<sup>India</sup>, Brazil & Russia. So we can see now by the 1980's that the pattern of FDI had moved North from South-East Asia away from countries like Taiwan.

So it is clear that there are main factors to attracting FDI investment. More and more countries now are trying to develop and improve their economies by the help of FDI. The CIVETS - Cambodia, Indonesia, Vietnam, Egypt, Turkey and South Africa are all beginning to create a more educated workforce and improve their infrastructure. Especially as countries like Egypt and Turkey have a lot to offer to the textiles industry ~~and~~ and Vietnam

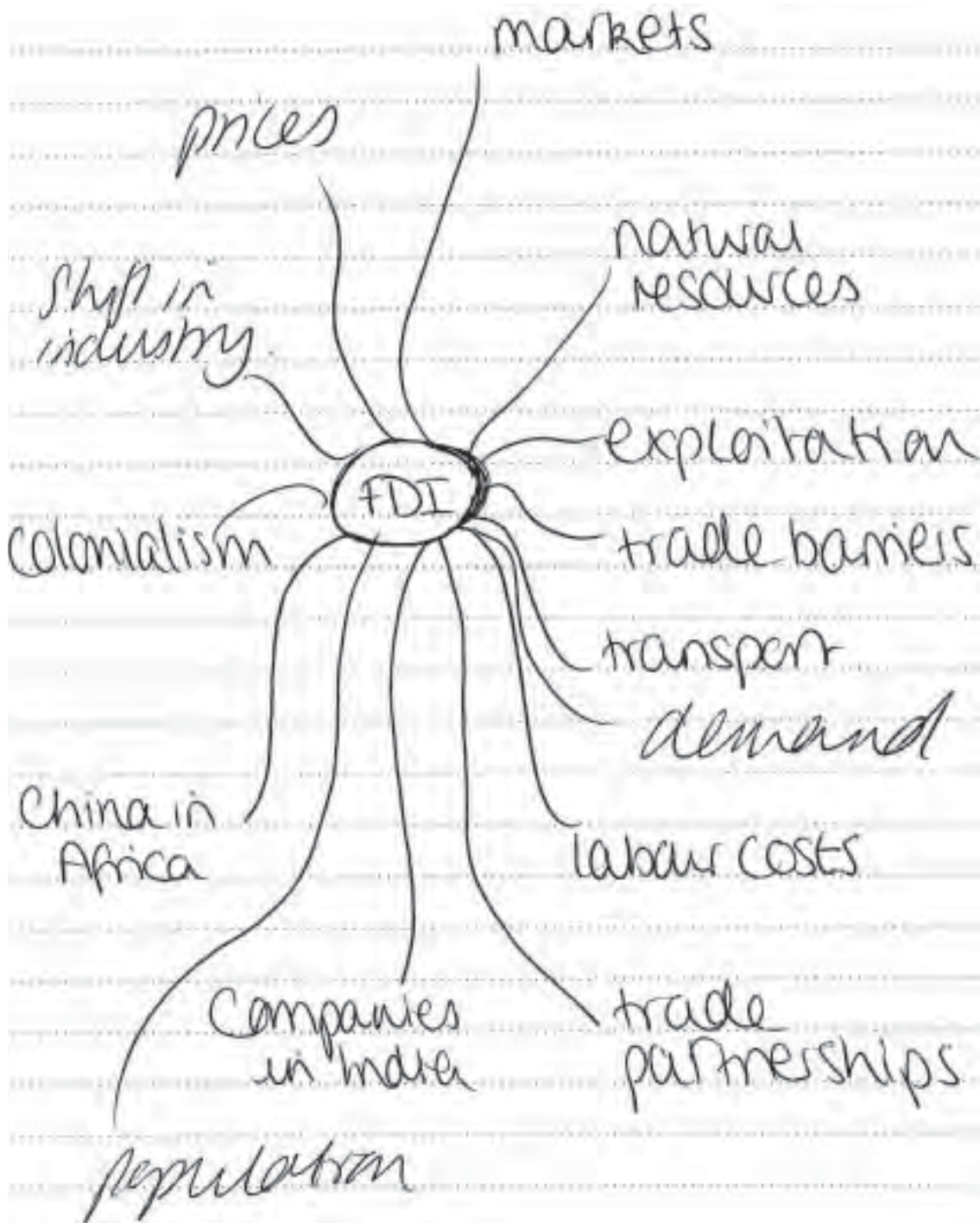
and Cambodia have cheap labour and are starting to bring out more educated labourers so ~~there~~ it would be no surprise in the future that these countries are the future FDI chosen countries.

So, to conclude looking at the global pattern of FDI we can see that it has mainly been concentrated in Asia mainly both in the past and likely in the future. And (it was simple) why these countries were selected because they had educated workforce cheap labour and an infrastructure, the (three key things) that are important for FDI investment. In the next 20-30 years we are likely going to see development in the CIVETS, however even though CIVETS involves 2 African countries, ~~that~~ it likely to be a while until we see the global ~~to~~ pattern of FDI shift into the African countries.

### Examiner comment – Merit

The answer does well to start with a definition of FDI, however it is inadequate in that it seems to confuse it with TNCs. There is clear attention to 'global patterns' but in a limited and not fully robust way. The Asian Tigers are covered in quite general terms at the level of named countries. More detail is given about China, but not all of it is relevant to the 'reasons' of the question. It is good to see the CIVETS included. The conclusion about Asia is not justifiable and whilst the identification of key reasons is valid, the simplicity suggested is unreal in terms of contemporary complexity and the uneven development of the world economy. Answer quality could be further improved by tighter expression and by avoiding sweeping statements, for example about Africa having "little to no infrastructure".

Example candidate response – Pass



Foreign direct investment is where high-income countries or more economically developed countries invest in less economically developed or low income countries. This investment can be in the form of loans, infrastructure and the setting up of businesses. However, the ~~pattern in the~~ global pattern in foreign direct is beginning to change. But what are the reasons for the patterns in foreign direct investment and what are the reasons for the changes?

China invests huge amounts of money in various regions in Africa. The reasoning behind some of the foreign direct investment is to create a trade partnership. If the Chinese invest in infrastructure in Africa and can produce products there, they can sell their product to the local markets.

Another reason for foreign ~~the~~ direct investment into ~~poor~~ poor countries is to use their resources. The Chinese ~~invest in~~ invest in Sudan, an oil producing country. Oil is one of the major factors involved in world trade



as everything in the business world uses oil in one way or another directly or indirectly. By China investing in these regions, ~~the~~ providing them with the infrastructure they need to help them develop, the Chinese can gain by forming a partnership sending oil to China. Over 90% of China's oil supply comes from Africa and it is a result of foreign direct investment into Africa.

Another reason for foreign direct investment is for the exploitation of labour. Low income and less developed countries have a large workforce which can be exploited for cheap labour allowing ~~countries~~ more economically developed countries to produce their products in poorer countries where the labour is cheaper, increasing their profit margin. This happens with a lot of technological products which produce things like circuit boards in India.

Foreign direct investment ~~can~~ patterns are also due to globalization. Globalisation ~~is~~ has had a massive impact on world trade as ~~it affects~~

products can be easily transported all over the world and prices are variable because of the global market.

Another reason for patterns in ~~global~~ foreign direct investment is due to the changing pattern of world trade ~~change~~. Rich countries used to invest in poor countries as labour costs were ~~lower~~ lower increasing profit margins, however, this is changing as the poorer countries are becoming more economically developed and are investing in other poor countries to increase their profit margins.

By investing in other countries, this can reduce the transport costs of products to markets, also increasing their profit margins.

(Overall, foreign direct investment allows poorer countries to develop as well as develop a trade partnership with other countries. Foreign direct investment is due to labour costs being cheaper in poorer countries which benefits the investing country, but also benefits the invested country as it can provide jobs for their workers which can help to alleviate poverty. The changes in

global patterns of foreign direct investment is due to the changing patterns in world trade from the shift from the manufacturing industry to the tertiary and quaternary sectors. ~~The~~ Other reasons include globalisation, world ~~and~~ prices, distribution and trade barriers. There has also been a shift in which type of country invests in a type of country. ~~to~~ There are many reasons for the global patterns of foreign direct investment.

### Examiner comment – Pass

This is a broad, valid, appreciation of global patterns of FDI and the reasons for them. It remains general apart from some mention being made of China in Africa, with one reference to Sudan. The candidate demonstrates awareness of the profit motive for investment and of a number of contributory reasons, but these are expressed loosely and generically. The conclusion consists of a recapitulation of the points made. To move into higher levels of reward the main needs are for a greater sense of what the global patterns of FDI are, for appropriate and detailed exemplification which is integrated with the rest of the text, and for enhanced analysis of these to replace the broad statements which lack support.

## Question 7 – Energy and Mineral Resources

Assess the progress made towards sustainable energy production.

[25]

### Mark scheme

#### **Indicative content:**

An understanding of sustainable management is one of the Pre-U distinctives of Studying Geography (page 5). Whilst there is no single universally acknowledged definition of sustainable development, the Brundtland Commission definition may be taken, as development which “meets the needs of the present without compromising the ability of future generations to meet their own needs.” Candidates may break this down into its different dimensions: environmentally sustainable, economically sustainable, socially sustainable and politically sustainable.

Candidates may develop any approach to this large topic area that they choose. It is likely that attention will be directed towards the replacement of non-renewable energy resources, which are depleting and pollutive, with renewable sources of energy and the attendant issues. The distinctive contribution and position of nuclear power may be considered within the UK and/or internationally. Progress may be assessed using different criteria and measures, for example, carbon emissions, cost/benefit or overall potential and by considering countries at different levels of development.

At lower levels responses may be conceptually loose and somewhat narrative, tending to report or explain what is happening technologically in the energy sector. At higher levels, sustainability will be the clear focus of an evidence-based assessment.

## Example candidate response – Merit

Sustainable energy production is important for future generations as current energy solutions are finite & are claimed to damage the environment.

Currently, the world relies heavily on non-renewable energy sources (coal, oil, gas) and this cannot continue as they will obviously run out. Many alternatives have been considered, with none of them really looking likely to replace fossil fuels on a big enough scale any time soon.

Wind power is currently produced using huge turbines, these are made ~~with~~ in factories using oil, coal & gas and then transported to their remote location (ruining the land for all the local NIMBAs) in big gas-guzzling trucks. ~~They~~ They then begin to spin, killing birds and disrupting their migration patterns. Ironically, they also must be turned off in high winds so their energy production is sporadically intermittent & seasonal. Therefore wind power is not the most sustainable, plausible or even possible replacement for fossil fuels.

Solar panels are not as bad yet still have hypocrisies throughout their use. The glass & metal used to make them are made using fossil fuels so they can't even be made once coal, oil & gas reserves are used up! Like wind power, solar is also currently intermittent so not a viable solution as of yet to replace fossil fuels.

Hydroelectric power is another renewable

energy source with countless flaws. Firstly, it involves building a ~~great~~ big dam and as a result causing sediment & even sewage build up behind it which can kill fish and even cause eutrophication\* if the sediment is organic. See figure 1;



Figure 1

#### \*Eutrophication-

Lots of algae grows on a river and shields the sun.

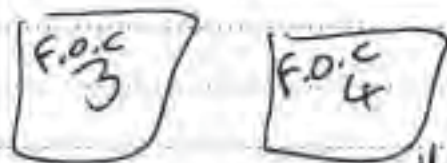
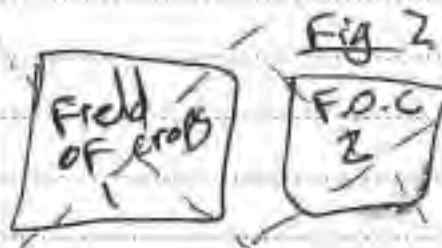
When the plants at the bottom die they're broken down by

anaerobically respiring decomposers who deoxygenate the river.  
\* = due to organic nutrients in sewage

A famous example is China's 3 gorges dam which drew criticisms as its presence flooded 16 cities & put 400m people at risk if it were to malfunction. HEP is also possible using gravitational potential energy, but this could never power the whole world though so again, this renewable source is far from environmentally friendly.

Biomass is probably the worst of all renewable sources. It involves burning plants but is carbon neutral because the carbon emitted by their burning is equalled by their carbon taken in by their photosynthetic growth. The two main problems are that, A, tropical rainforests are cut down to make way for 'fuel crops', this ultimately makes the process not carbon neutral anymore so tropical rainforests

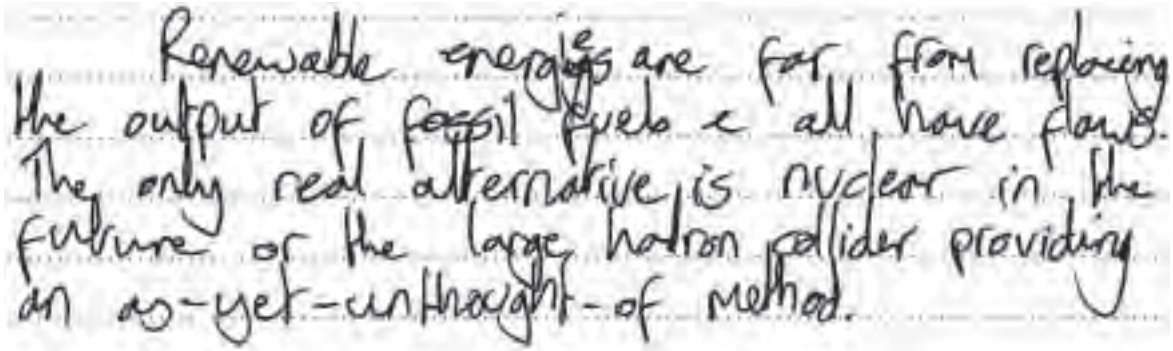
would take in more carbon than the fuel field.  
 B, \*land is being taken away from people who  
 \*fertile need it for food so people can drive  
 their cars (see Fig 2).



12 families relied on these 4 fields for their food. They'd have  $\frac{1}{3}$  of a field each (the bare minimum to survive for example) if fields 1 & 2 are taken for rich countries cars then the ~~rest~~ each family will only have  $\frac{1}{6}$  of a field, which may not be enough to survive.

Therefore ~~the~~ biofuels are not an ethical let alone viable replacement for fossil fuels.

Finally, nuclear may be the only possibility despite ~~the~~ being technically non-renewable (only certain amount of Uranium 235). Fission involves the ~~split~~ movement of electrons whilst fusion (not yet possible) fuses nuclei of other atoms. This is the only type of energy capable of replacing fossil fuels output but as it produces difficult to dispose of waste, may be considered unsustainable. Also, disasters like Chernobyl, Ukraine, & Fukushima (Japan) have not helped its cause. \*Vitrification may be a future solution to nuclear waste.



Renewable energies are far from replacing the output of fossil fuels & all have flaws. The only real alternative is nuclear in the future or the large hadron collider providing an as-yet-unthought-of method.

### Examiner comment – Merit

This is a sound, rather general, assessment of the progress made towards sustainable energy production. As a response it would benefit from the definition of the word 'sustainable' and of the concept of 'progress' in this context. It is structured source by source, one per paragraph, which is clear but which does not lend itself to higher level critical and comparative analysis as the sources are assessed separately. It is good to see the inclusion of some simple labelled diagrams. The essay could be improved either by the integration of specific located examples or, more ambitiously, by replacing the source-by-source approach with moving from an in-depth assessment of one detailed case to another. More work on the conclusion could lift it readily to a higher level as the candidate appears to have a good idea of the function of a conclusion.



## Example candidate response – Pass

The movement towards sustainable energy production is making (good progress.) Renewable energy has become ~~the~~ increasingly available with ~~the~~ recent technological advances.

The main renewable energy sources which are being used are solar power, wind power and hydroelectric power.

Solar power has become increasingly popular for domestic use as people will save a lot of money on their energy bill in the long run.

An increasing number of wind farms are also being built around the UK due to the availability of strong winds. The Horns Rev wind farm off the coast of Denmark has proved to be extremely successful, providing power for a third of the country's homes.

Hydroelectric power is another form of sustainable energy which is becoming increasingly popular. Dams are being built in order to get the energy and convert it into electricity to be used in homes. ~~the~~

Another form of renewable energy is geothermal. This is where heat from underground powers power stations to produce electricity. However, this has its (disadvantages.) The tectonic activity needs to allow for sufficient heat to be given. Therefore geothermal energy can only be used in very specific areas. Most areas which are good for geothermal

energy lie on very ~~active~~ active areas of plate tectonics. This therefore puts the power stations at risk from earthquakes.

A controversial area of sustainable energy production is the use of nuclear energy. Nuclear energy has a high energy output and is clean in the respect that it doesn't give off any greenhouse gases when processed, but there is a lot of negative feeling towards nuclear energy due to the media coverage of Chernobyl. This has put a lot of people off the use of nuclear energy, despite the fact that uranium is (very available.) However there is also the problem of radioactive waste being produced which can't be disposed of safely.

~~To ~~conclude~~ conclude, certain aspects of sustainable energy production~~

A point which contradicts the fact that progress is being made, is the fact that only the more developed countries have access to the technology needed for the use of renewable energy. The less developed countries are relying on traditional methods of energy production such as using fossil fuels and burning wood. This could hinder the progress of sustainable energy production because it isn't available everywhere around the world.

To conclude, there are certain aspects of

sustainable energy production where progress is being made, but this mainly involves the use of sustainable energy in MEDCs. Whereas some parts of the world are falling behind because they don't have access to the technology.

### Examiner comment – Pass

The candidate opens with the idea that “good progress” is being made towards sustainable energy production. The essay demonstrates this in a limited manner. Apart from reference to one named wind farm, the content is general and observations are broad, sometimes not located, and, at times, are unjustifiably sweeping. There is some knowledge and understanding of energy production shown without a clear conceptual foundation or much relationship to the real world. The conclusion offers an opinion which is hard to justify. The response would be improved by exploring the meaning of the word ‘sustainable’ and by the integration of varied examples which allow assessment to be specific and evidence-based, rather than quite so general.

## Question 9 – The Provision of Food

Evaluate the sustainability of different approaches to meeting the increasing global demand for food. [25]

### Mark scheme

#### **Indicative content:**

An understanding of sustainable management is one of the Pre-U distinctives of Studying Geography (page 5). Whilst there is no single universally acknowledged definition of sustainable development, the Brundtland Commission definition may be taken, as development which “meets the needs of the present without compromising the ability of future generations to meet their own needs”. Candidates may break this down into its different dimensions: environmentally sustainable, economically sustainable, socially sustainable and politically sustainable.

The syllabus gives global population increase and the mismatch between population distribution and food availability as the context. The phrase “different approaches” can be interpreted in a number of ways, as candidates choose, requiring two or more approaches to be considered. Within the Specified content there is potential to consider:

- intensification and extensification of agriculture;
- the Green Revolution;
- solutions from alternative and intermediate technology;
- replacing subsistence agriculture with commercial agriculture;
- land reform and changes in scale of production;
- fish farming;
- genetically modified (GM) crops;
- food miles.

Candidates may also develop material of their own and consider other initiatives.

At lower levels, candidates may tend to describe approaches and consider sustainability in a limited manner. At higher levels, more nuanced consideration will be given to food production within a 21st century context which is both real and well-informed.

## Example candidate response – Distinction

Sustainable is meeting the needs of the present whilst not comprising the needs of future generations.

Global population in 2010 was 6.8 billion and it is expected to increase to 9.1 billion by 2050, and with the number of undernourished surpassing 1 billion, up from 842 million in the 1990s - meeting the demand for the global population is a huge task!

So far, Ester Boserup's theory is correct which states that with increased population comes the increased ability to supply food which differs from Malthus' view who states the power of man is greater than the power of earth to provide subsistence for man; death from starvation and disease are natural ways of controlling population he states. However, with population set to increase by a further 3 billion in around 40 years as well with over 1 billion people undernourished, Malthus' theory may be proved right. Malthus however didn't take into account the idea that man can use science and technology to increase yields.

(Genetically modified) crops are

Seen as a sustainable approach to meeting global demand. Crops can be modified to be drought resistant or ~~drought~~<sup>salt</sup> tolerant means crops can be grown in formerly hospitable places. Also, a staple food like rice in the Philippines does not contain adequate amounts of vitamins and minerals, so it rice could be modified to contain more vitamins and to be more nutritional, it has ~~to be~~ the potential to ~~the~~ alleviate mal nourishment problems in the Philippines. However, various environmentalists are against the use of GM crops as they see them as unethical and that tampering with a plants genes shouldn't be allowed.

Traditional farming uses around 5,000 litres of (water) to grow just 1kg of rice. With the world population set to grow to around 9.5 bn in the next 50 years, this would require 10,000 km<sup>2</sup> of (irrigated) land, which is 4,400 km<sup>2</sup> more than the current 8,800 km<sup>2</sup> already available. For some countries facing shortages, this is not an option a sustainability?

Between 1945-1973, Britain needed to become self reliant on the production of food. Our food production was

cut off by German U-boats in WWII.  
 We imported vast quantities of beef  
 from Argentina and cereals from US.  
 We could not compete with the size  
 of their farms. This led to the  
 Agricultural Act of 1947 and then  
 in 1973, Britain joined the European  
 Economic Community and instantly benefited  
 from the Common Agricultural Policy  
 which gave out grants for capital  
 grants, gave guaranteed prices, subsidized  
 exports and placed tariffs on imports.  
 CAP was not sustainable. Capital  
 grants encouraged mechanisation which  
 led to the destruction of hedgerows  
 and ditches and therefore loss of wildlife.  
~~Subsidies in 1950~~ It also reduced  
 rural employment which was 700,000  
 in 1950 and 250,000 in 1995 - turning  
 rural food producers into urban food  
 consumers as there was population  
 migration. Subsidies on fertilizers  
 also encouraged intensification and therefore  
 water pollution leads to eutrophication  
 as nitrate fertilizer runs off into ponds.  
 The Agricultural act of 1947 and  
 CAP did increase food supply as it was  
 intended but use of guaranteed price  
 and intervention buying, meant countries  
 produced huge surpluses - 'wine lakes' and

but to maintain. The EU decided to buy up the surplus to stop the price from falling and they sold it on to LDC's, ~~and~~ stilling their markets and putting some dairy farmers in Tanzania out of business.

CAP also encouraged agri-business and farm amalgamation. 80% of CAP spend went to 20% of the EU farms. CAP favored large land owners over small ones. Increasingly local farm managers were replaced with business managers who wanted to make the most out of CAP grants - and in the rush for quick profits by increasing production, more environmental damage was caused.

All of this led to the CAP reforms of 2005, <sup>to increase sustainability.</sup> led to the introduction of Environmental Stewardship which was based on the success of ESA's and Countryside Stewardship introduced earlier. It comprises of two levels. Entry level Stewardship where a farmer can apply and get paid for maintaining hedgerows, ponds, ditches, and higher level Stewardship up to £30 per hectare and higher level

Stewardship which is where farmers can apply for grants to help fix up



farm buildings. The Single Payment Scheme was also introduced to reduce the surplus. It tried to remove the £ link production and subsidies whereby farmers would be paid for a certain amount of CAP and would not be paid for an excess it makes.

Aquaculture plays a huge part in food production with rivers, demand for fish, but it uses two finite resources land and ~~sea~~ water, resources already in short supply. <sup>eg</sup> one in three fish is a product of aquaculture. In Bangladesh, they have diverted water away from irrigating their rice paddies for use in aquaculture - which has lowered the water table there. Also, because there are so many fish farms in Bangladesh, it is hard to see what conditions are like. In some farms, they put 8-10 bottles of Endosulfan, a pesticide banned by over 80 countries including the EU.

(Overall,) Sustainable attempts at trying to match food supply with population growth include GM crops, water conservation, aquaculture. CAP was set up to enhance self-sufficiency and protect EU farmers from abroad but it was not sustainable as the intensification

mechanisation led to severe environmental damage and needed reform. GM crops and high yields variety, the backbone of the Green Revolution which lifted millions out of poverty, has unethical arguments and agriculture uses up 2 reserves already in short supply. Sustainable intensification should be the way forward. Water is a finite resource and with traditional methods using too much, it is becoming unsustainable.

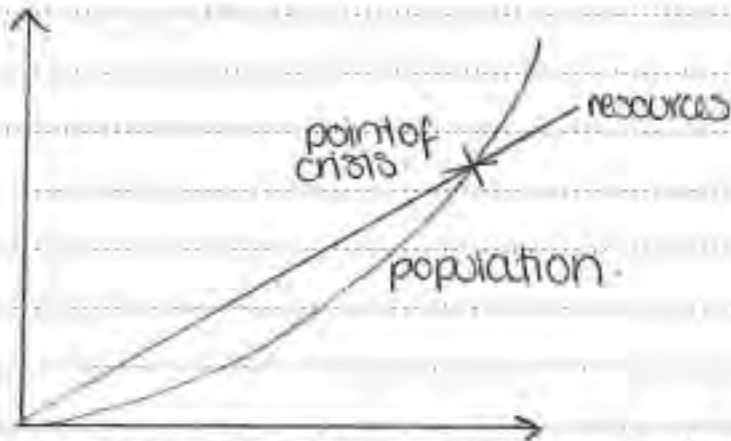
### Examiner comment – Distinction

This essay is distinguished in a number of ways: it begins, commendably, with a definition of the term sustainable derived from Brundtland and by outlining the nature of 'increasing global demand'. It integrates the theories of Boserup and Malthus (without diagrams) and offers a global perspective on the topic by drawing on different approaches and a range of examples in some detail. It provides a good overview of the subject area but could go further in the evaluation made of the approaches. Sustainability has different dimensions (e.g. environmental, social, economic) which could usefully be teased out. In addition, higher order evaluation, in addition to offering an assessment, draws out values, whether explicit or implicit and offers a critique beyond that which is seen here.

## Example candidate response – Merit

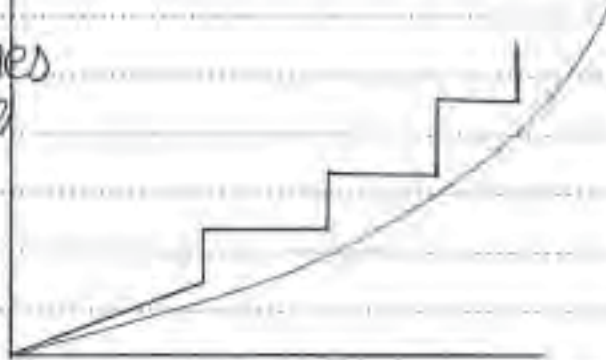
to define sustainability can be closely related to Malthusian and Anti-Malthusian theories on the sustainability of resources against growing population.

Thomas Malthus believed that one day 'Point of Crisis' will be met.



He said that one day with the ever increasing population it will outgrow resources, i.e. the 'point of crisis'. In ~~counter-argument~~ counter-argument to this, Esther Boserup came up with the Anti-Malthusian theory that food production will keep growing and humans will create and discover new technologies so that population and resources won't ever reach that 'point of crisis'.

These 'new technologies' and ~~theories~~ <sup>production</sup> that are different approaches can be shown in relation to this question.



In the increasing global demand for food (approaches) such as GM crops, organic farming and battery cows, hens and pigs are some of many that have been created in order to meet the global demand for food.

(Organic Farming) is an alternative to most food production. It implies that no fertilisers or chemicals have been used to ~~help~~ aid the growth of the product. Animals are free-range which more simply means they are left to run around in fields instead of being kept inside warehouses. The sustainability of organic farming is simply that ~~even~~ it is a much healthier option of food that can be offered to consumers. There are no worries of running out of chemicals or fertilisers when farming, as it is all left to nature. The only ~~dis~~ disadvantage to its sustainability is that, ~~potentially~~ because, organic ~~farm~~ produce is more expensive than standard produce, there is a chance that ~~market~~ ~~the~~ demand could decrease due to economic problems such as the recession which had a knock-on effect on people's shopping bills by 50. However, organic produce is increasing in sales due to the 'healthier option', advertising on T.V. and the exploitation of factories that ~~are~~ have battery chickens compared to the free range chickens organic supply.

(GIM crops) has been purely based on the technology improvement within MNC's, which have transferred this information over to companies and producers in LDC's, such as Ecuador.

Ecuador bananas have ~~become~~ <sup>received a huge</sup> increase in demand - GIM crops were discovered in Ecuador when the disease of black Sigatoka took over vast amounts of banana crops. Up to 75% of a specific banana crop died to this disease. It was discovered that a gene within ~~the~~ rice was able to fight against this disease. This was discovered in order to find an alternative to using chemicals and fertilisers which in a country like Ecuador where the banana trade is 85% of their GDP, they needed to find a cheaper alternative.

The benefits and sustainability of using GIM crops is the increased amount of produce that is created. Vast amounts are able to be produced in shorter time and by using less chemicals and fertilisers.

~~However~~ ~~Governments~~ ~~a~~ ~~further~~ ~~point~~ ~~to~~ ~~make~~ ~~about~~ ~~GIM~~ ~~crops~~. The development in GIM crops has led to an increase in GIM beef in Argentina, as well as Soya Beans.

The last example of ~~sustainability~~ an approach is battery cows in Norfolk. A factory has been propositioned to go ahead

for the creation of the second largest milking factory. 40,000 cows will be permanently hooked up to machines and milking equipment to ~~be~~ be milked ~~up~~ 3 times a day as opposed to once or twice. The beds and pens that they will stand on will be made with sand instead of grass. ~~It is~~ one aspect of sustainability of this is that the 'slurry' created by the cows which is the waste will be used to generate the machines that milk the cows. However in objection to this animal rights representatives have objected to the project as well as local residents, with comments such as 'that it isn't a natural way to rear animals'. The increase in traffic from the lorries and milk carriers that will deliver it within 48 hours to be bottled and delivered on.

Even though this approach isn't ~~even~~ environmentally ~~feasible~~ viable and obvious objections have been made there is a clear sustainability about this approach as well as the fact that it is producing such a vast quantity and is available in such little time, it seems a acceptable approach in meeting the increasing global demands for food.

In conclusion, from the three examples given to show just a few of many different approaches, it is fair to say that firstly the anti-malthusian theory proved to

be more valid than Thomas Malthus' Theory as the world is trying to deal with the ever increasing population and therefore the demand for food needs to be met sustainably. It is acceptable to say that with reason any alternative that will add and aid the food demand is in some way sustainable.

### Examiner comment – Merit

The essay begins with the work of Malthus and Boserup. It uses diagrams and integrates them with the text, but they are not fully labelled. The opening phrase 'To define sustainability' does not actually yield a definition. The candidate takes, in turn, three approaches – GM crops, organic farming and battery production – and locates these creditably in countries at different levels of development. The response displays characteristics of different Levels in the GMS. The main ways to enhance its quality would be a more robust approach to the concept of sustainability (see, for example, the final sentence); and, on that basis, stronger analysis and fuller evaluation. Expression and use of language could also be firmer.

## Question 11 – Tourism Spaces

Assess the success of attempts to make tourism more sustainable.

[25]

### Mark scheme

#### **Indicative content:**

An understanding of sustainable management is one of the Pre-U distinctives of Studying Geography (page 5). Whilst there is no single universally acknowledged definition of sustainable development, the Brundtland Commission definition may be taken, as development which “meets the needs of the present without compromising the ability of future generations to meet their own needs.” Candidates may break this down into its different dimensions: environmentally sustainable, economically sustainable, socio-culturally sustainable and politically sustainable.

Different approaches to the relative lack of sustainability in many approaches to tourism may be taken: for example, using the Butler life cycle model, the nature of the holiday product or the acknowledged instability of the sector. There may also be coverage of the impacts of tourism, both positive and negative, on environments, economies, societies and cultures, as a background to the attempts.

The syllabus identifies two main types of attempts to make tourism more sustainable:

- management strategies at different scales;
- sustainable tourism and ecotourism initiatives.

The assessment of success may be pursued in terms of the absence of damaging impacts, the recovery of quality, the maintenance of equilibrium and the addition of positive impacts through tourism, e.g. the empowerment of indigenous people or the a shift from seasonal to year-round employment as markets are diversified.

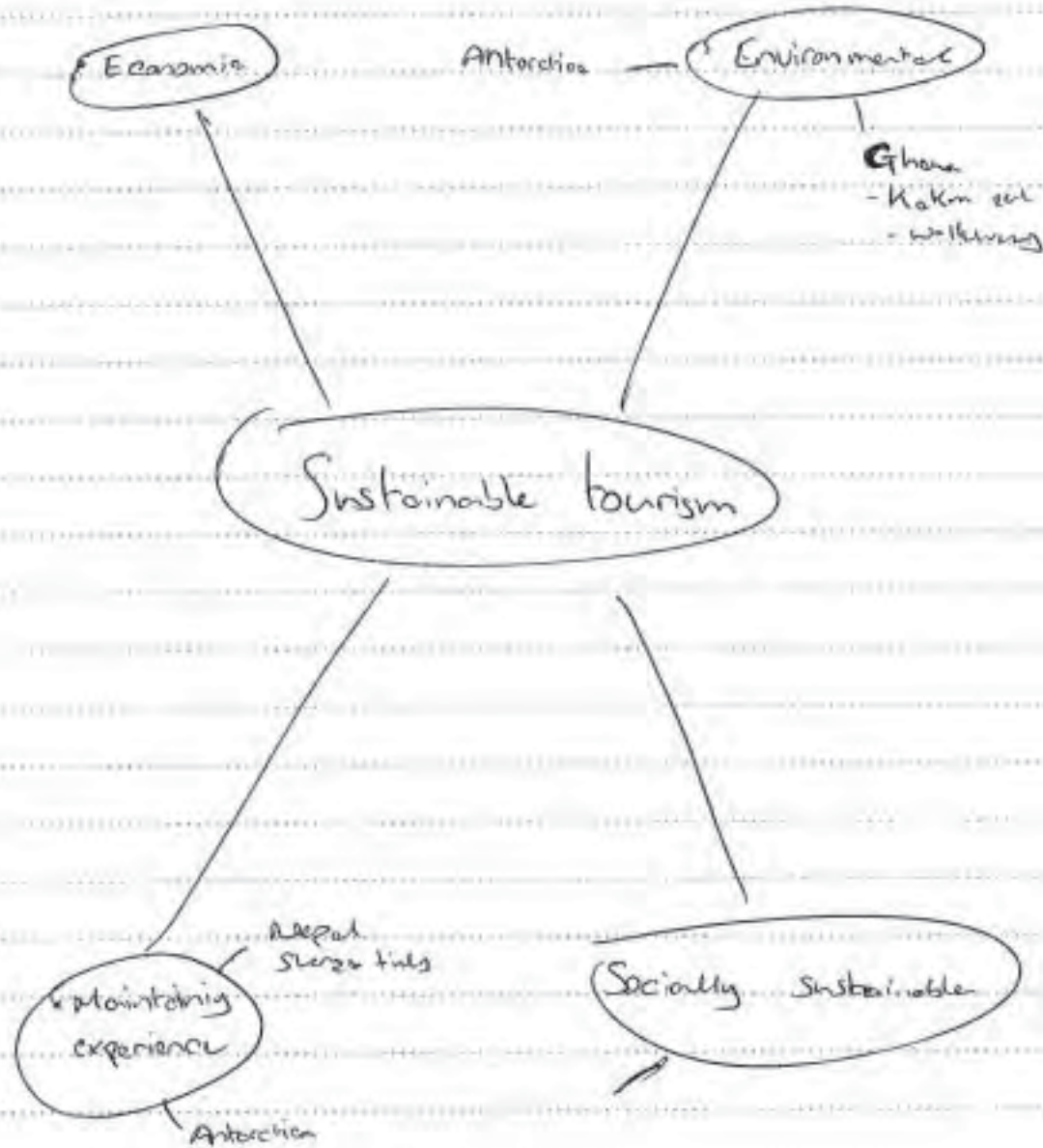
At lower levels, candidates may describe and explain changes in tourism without assessing their success in more than a limited manner. Conceptual grasp of sustainability may be slight. At higher levels, sustainability will be the clear focus, and skills demonstrated in weighing and judging evidence in different dimensions.



Example candidate response – Distinction

Assess the attempts to make tourism more sustainable:

• Definition



• Ambergis Coyle  
- 'Ecolabel'

Before examining the success of attempts to make tourism more sustainable, let us ~~define~~ define sustainability. Sustainability is the ability to meet the needs of the current generation, whilst not compromising the ability of future generations to meet their needs. In tourism there are four sectors which need to be considered. Firstly, one must ensure it is economically sustainable, secondly that it is environmentally sustainable as it develops, thirdly that it remains socially sustainable and finally that the tourist experience improves or stays the same through development of the tourist area.

The main way in which tourism is managed is by making it more environmentally stable. One attempt at improving environmental sustainability was in the Sekou Toure (Kakum) national park in Ghana. This park was granted \$4 million USD by the UN, and these funds were matched by NGOs and the Ghanaian government. They constructed a canopy walkway through the forest, so as to reduce the environmental pressure on the forest floor, and also keep people in environmentally friendly cabins. As an attempt to promote sustainability it has been incredibly successful. Another attempt in response to environmental pressure was the creation of the Lindblad plan in Antarctica. This limits the amount of people on cruise ships to 150. This was in response to the article firms responding badly to the presence of large numbers of people. As well as this, footfalls have demojis slow going by masses and visitors, and thus they ~~are~~ those special sites for looking smaller number of people. Again this scheme

was very successful and solved a problem.

Sustainable tourism schemes must be socially viable, and this has been particularly important in Nepal with the Sherpa people who guide and manage the tourism. In response to social and environmental problems, the government limited the number of visas they issued each year, thus managing the problems that were arising and making the industry more sustainable. There was high levels of inequality, as Sherpas or trekking porters became relatively wealthy compared to those who lived in traditional ~~methods~~ methods of herding and hunting. There were other social problems, as the men would leave villages to guide tourists for large parts of the year. This left women and children to grow food, taking children out of education and lowering the birth rate significantly. The obligations with the Sherpas carried out led to ~~the~~ high fatalities which caused further problems. Now however, the number of tourists has been limited, and the Sherpas have better lifestyles, and have invested in health, education and improved diets.

Sustainable tourism must be economically viable. This is one of the most important factors. Without money, resorts + areas cannot ensure that good environmental and social conditions are kept. A good example of economically sustainable tourism is in Belize, with the howler monkey reserve. Tourists pay large sums of money to visit the reserve, which spends the money on conservation, hence enhancing the tourist experience, and instead the reserve has seen

on huge population ~~with~~ rise in water monkey. Another approach Belize used is to ~~combine~~ <sup>integrate</sup> an integrated approach... to tourism, whereby ~~mass~~ tourism and ecotourism are used together to make the tourism more sustainable. They do this by creating large ~~mass~~ tourist resorts along the beaches, and other ~~having~~ <sup>having</sup> smaller inland to ecotourist resorts, such as ancient ~~Mayan~~ <sup>Mayan</sup> temples, and forest reserves...

However Belize also suffers from a false 'ecotourist' label in part. The resort Ambergris Cay was such a label, but it is not ecotourist in any way. The island is crammed with hotels, causing damage to the local mangrove swamps, and also to the water, as there is a lot of pollution. Local people are forced out due to high house prices, and lack of employment, and all income goes to foreign companies. S.K. of tourism worldwide claims to be ecotourism which is a form of sustainable tourism, however many of these attempts at sustainable tourism are an absolute sham, and have not been successful at all.

Finally tourist resorts must try to maintain the experience for tourists, or it won't be sustainable. Successful attempts include that in Antarctica, whereby tour operators also use a little of education to enhance the experience for the tourists, and in Nepal, where the local Sherpas have set up campaigns to help the maintainers. For instance the base camp of Everest is littered with 500 oxygen cylinders, which will now be cleaned up, to enhance the tourist experience.

In (Conclusion) many of the attempts to make tourism more

been very successful, as they've resorts tend not to follow the Butler model into stagnation and decline, but remain constant due to their sustainability. The main problem with sustainable tourism is that it appeals mainly to altruistic tourists, who have plenty of disposable income. The main issue facing sustainable tourism is making it economically viable for the ethnocentric mass tourist, whilst maintaining sustainability...

### Examiner comment – Distinction

The essay plan and the opening paragraph indicate this work's strong conceptual foundation in terms of sustainability as applied to tourism. It has a clear structure (environmental, social and economic sustainability) and works from example to example offering an assessment of each one. Some of these examples could have received more in-depth treatment. The section on eco-labelling shows insight and is of particular interest. To further improve a good quality piece of writing it would help to consider attempts regarding other forms of tourism more widely, such as mass tourism, and attempts to address its lack of sustainability, rather than only the parts of the sector that are promoted as sustainable tourism. The integration and application of relevant conceptual and theoretical content, beyond that which is found, such as that of carrying capacity or Doxey's Irridex, would also enhance the writing and be highly creditable.

## Example candidate response – Merit

Assess the success of attempts to make tourism more sustainable.

Plan:

- Kenya
- Zimbabwe Campfire
- Nepal
- media.

People today want tourism to be sustainable and benefit the local communities. Different places try to implement this in different ways.

In (Zimbabwe) from 1900 anti hunting laws were introduced which led to a major increase in the population of wild animals like elephants. Tourism in Zimbabwe wants to see wild animals and wild plains. However the number of wild animals now are having a detrimental influence on the locals - elephants destroy crops and buildings and can even kill people.

Operation (CAMPFIRE) was set up to sort out the problem. The Campaign and Management programme for indigenous resources meant that if you went to go and shoot an animal for example an elephant then you can. It will cost you \$12000 but you can. The money from this scheme goes straight to locals and has helped to set up 6 primary schools and 3 hospitals. It has also allowed the purchase of electric fences to keep elephants and other wild animals away from crops, increasing local yield of the area by around 30%. The decrease in the number of wild animals by the ~~shooters~~ tourists has also lowered the number of illegal poachers and helped to create six national parks. This has however meant that some tribes have lost access to their land and had to be relocated. CAMPFIRE made tourism in Zimbabwe more sustainable and helps the local community with vital income.

In (Kenya) mass tourism is the main type of tourism, with many people paying for package tours of the area and the people. This means that much of the money gets locked away to other companies and less than 10% gets to the local community. The way that Kenya has tried to combat the issue is by promoting (eco tourism).

where more money goes straight to the locals  
(although still only 20-30%)

The larger hotels ~~and~~ tried to use more local products, and advertise more directly to tourists, so that tourists payed directly to the hotel rather than through a middle man package deal.

This still doesn't tackle the issue that many workers work for long hours in hotels with little or no payment, then go home and live in wooden shacks. This issue has tried to be tackled to become more sustainable by making deals with workers, but this ~~prevents~~ only occurs with outside involvement.

The Butler model shows how tourist destinations grow:



Many tourist destinations try to rejuvenate by moving to sustainable, ecotourism as it is now seen as much more fashionable, however this is not always true as sometimes it is just a name to attract tourists



misguided tourists.

(Nepal) has tried to make tourism more sustainable by making tourists bring their own horses for camping, and learn about the area to stop littering and giving money to beggars.

On average a tourist uses 5-10 times more fuel wood per day than a local, which is very unsustainable. Through education and stricter rules the tourists who go trekking in Nepal have a lower impact - the point of sustainable tourism.

Many ~~places~~ tourist destinations around the world are now trying to be more sustainable - as it's better for the environment ~~and~~ and the locals themselves, but also because it's fashionable at the moment - people want to be seen as green.

Many attempts to become more sustainable have been great successes, ~~like~~ like operation CAMPFIRE in Zimbabwe, however other schemes are much more about the image of sustainability rather than the actually being sustainable.

### Examiner comment – Merit

The response is focused on ecotourism and, like the other response to this question, does not consider other forms of tourism and their attempts to become more sustainable. It lacks a definition of the key term, although it does show understanding of the concept by considering local communities, money and the environment in turn. The candidate has sound knowledge and understanding of the material presented and shows some ability to analyse, although the assessment could go much further. The inclusion of the diagram of Butler's life cycle model is a valid idea, but could be better used as it is only linked to the idea of rejuvenation. The conclusion offered could be developed further; it is limited in making a simple contrast which does not do full justice to the material covered.

## Question 12 – Tourism Spaces

Consider why the development of tourism is spatially uneven.

[25]

### Mark scheme

#### **Indicative content:**

Logically it would be surprising if the development of tourism was even spatially, even in tourism spaces of limited areal extent such as small islands. The question here invites candidates to construct an explanation of why this is so, based on their understanding of the nature of the product and global tourism patterns. This may be at a number of scales: world, world region, country, tourist coast, individual resort.

The syllabus identifies a number of elements which may be pertinent:

- the core-periphery model;
- the development of enclaves;
- the Butler life cycle model/the decline of tourist areas over time.

To this candidates may add their own observations for example, the attractiveness of different environments, proximity to areas of demand, legislative frameworks, cultural proximity or distance, accessibility, fashion, promotion, political stability/instability, etc.

At lower levels, candidates may tend to describe spatial unevenness and offer broad and generalised explanations, maybe focusing on a small number of characteristics. At higher levels the scope, complexity and dynamism of tourism as a sector will be evident, and the consideration developed in a more integrated manner, combining factors in several dimensions (economic, social, environmental, political).

## Example candidate response – Pass

The development of tourism is spatially uneven as there are more tourists in one area than in others. This is due to many different factors including location, transportation and communication. The increase in tourism due to people having paid holidays and more money to spend, the tourism has increased dramatically all around the world and is a big economy booster for LEDCs such as Kenya who have been destructed by civil war for many years.

Tourism is spatially uneven all over the world, some areas having huge dense numbers of tourists and others left sparse and unvisited. Different holiday destinations usually come around when people visit a beautiful location, in which not many people have heard about and word spreads and this location then becomes infested with mass tourism, therefore ruining the exact reason why people came in the first place, this cycle repeats its self all through out the world.

With this boom in people wanting to travel and invest in holidays around the world. After the second world war when people who fought around the world experience the new places in which they had fought in. This also lead people to believing in their is more to working and Blackpool, there is for more to experience.

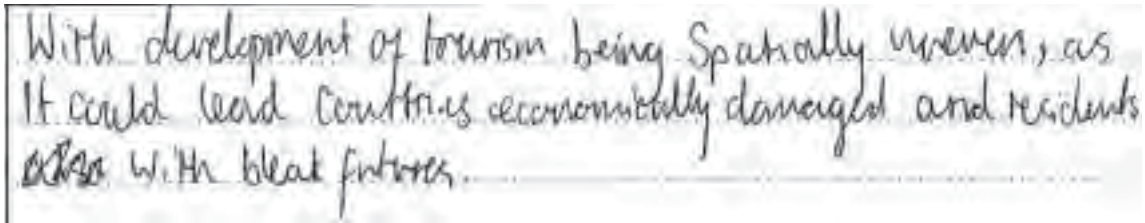
Package holidays were introduced, these are holidays where (by you) pay an upfront fee of money and get everything from plane tickets, hotels, food, beach packages. The problem with package holidays is that it causes spatial unevenness. The people who provide the package holidays also provide their own hotels and different forms of transport systems. Therefore the thousands of people in Britain who buy package holiday will all be placed in one area. ~~This could be a positive feature~~ The development of a package holiday to ~~many~~ many people is a good thing as they are worried to experience different cultures, they prefer ~~and gain more~~ more enjoyment of the big hotels of mass tourists. This could be devastating for the environment in some places.

The development of spatial unevenness can also be seen in (cruise tourism) as well. Two of the great tourist destinations are St Lucia and Barbados. The cruise lines are so big, that they can only dock in certain areas causing large problems.

for St Lucia. St Lucia is a small island which doesn't have many residents. Its agricultural business is huge, but there's also a lot of money to be earned for St Lucia in the tourism industry. The fact that these cruise liners deposit their waste into the seas, with oil leakage, also. Some of the nature in which people would visit such as the coral reefs are being damaged by these huge cruise liners. Also the fact that the country is so small it can't recycle so environmentally the development of tourism being spatially uneven can ~~bring about effects~~ here disturbing effects on small islands such as St Lucia are being damaged, due to the induced high concentration of tourism in areas. This could also effectively ruin St Lucia's agricultural business.

Tourism is a huge investment to many countries especially those who are LDC's such as (Africa) with their treasure reserves and the mahimara tribes. People only go to locations which they know will be worth while they ~~don't~~ want to be safe and experience different package holidays. The spatial unevenness will lead countries into decline as their environments will be ruined.

~~Next~~ In (conclusion) the development of tourism is spatially uneven and this is due to a number of different reasons including air ports being in certain locations, companies having mass holiday compounds and hotels, also geological reasons such as space to dock cruise ships or for ~~long~~ distances are too far for us ship. There is a huge problem



With development of tourism being Spatially uneven, as  
It could lead countries economically damaged and residents  
~~also~~ with bleak futures.

### Examiner comment – Pass

The question is answered broadly and in a descriptive way. It does not have the expected content of concepts or theories and overlooks, in the case of tourism, the potential to include models. The question is interpreted in a simple manner to mean more tourists in one area than in another. At times this simplicity becomes unrobust, for example in the content about package tourism from Britain. At other times the response becomes irrelevant to the question set, for example in writing about St Lucia. A clearer focus on the aspect of 'development' and on what the spatial unevenness is that results, would improve this essay. So too would an approach which is more analytical and the disciplined application of the criterion of pertinence to the inclusion of content.

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## Paper 4 – Research Topic

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### Section A: Microclimates

#### Question 1

Study Figs 1 and 2, which show information about night time temperatures in a large city and the surrounding rural area in the UK in March 2009.

- (a) Giving evidence from Fig. 2, state the range of temperature between the city centre and the surrounding rural area. [2]
- (b) Using both Fig. 1 and Fig. 2, describe the form of the city's urban heat island. [4]
- (c) Study Figs 3A, 3B and 3C which show the city of New York, USA.

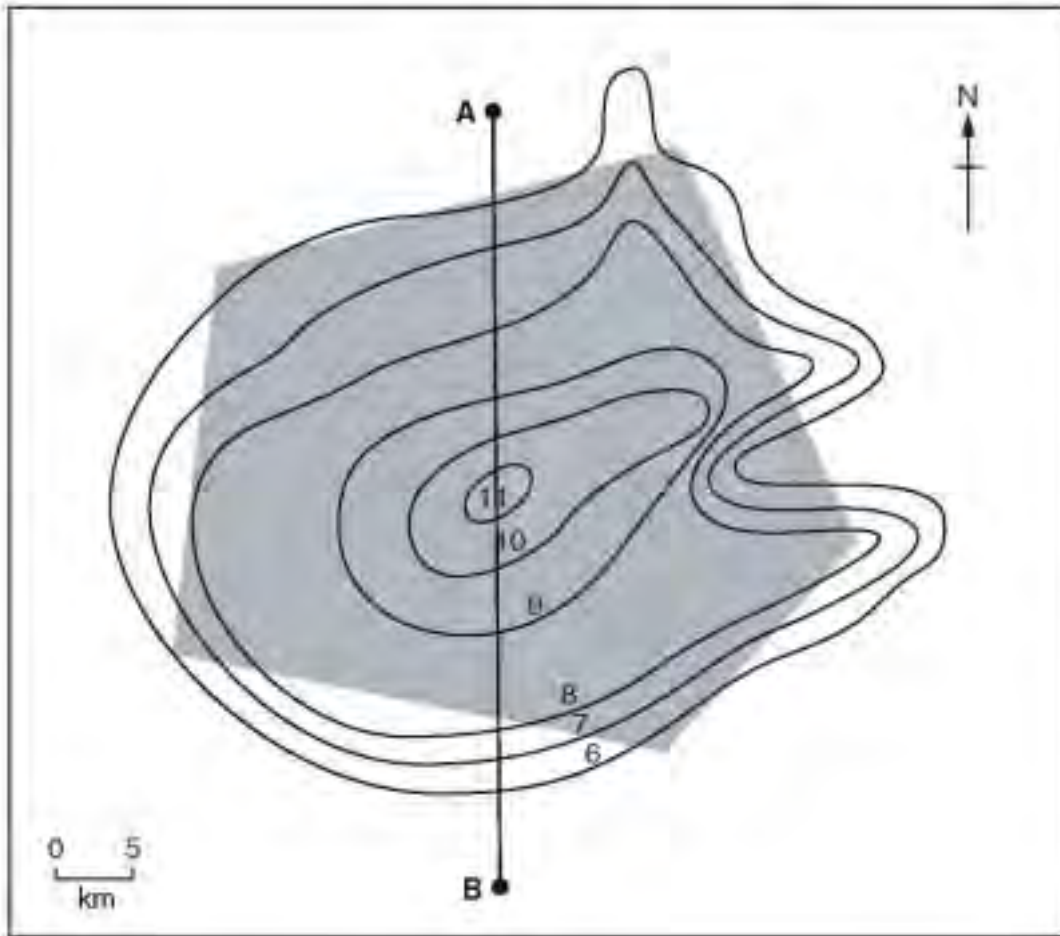
Fig. 3A shows temperature information. Fig. 3B shows vegetation density. Fig. 3C names the boroughs within New York.

Using both Fig. 3A and Fig. 3B, to what extent is there a relationship between temperature and vegetation cover in New York? [6]

- (d) Evaluate the usefulness and the limitations of Fig. 3A and Fig. 3B to those who study urban heat islands. [8]

Fig. 1 for Question 1

Mean night time temperatures in a large city and the surrounding rural area in the UK, March 2009



Key

-  built-up area
-  isotherms (°C)



Fig. 2 for Question 1

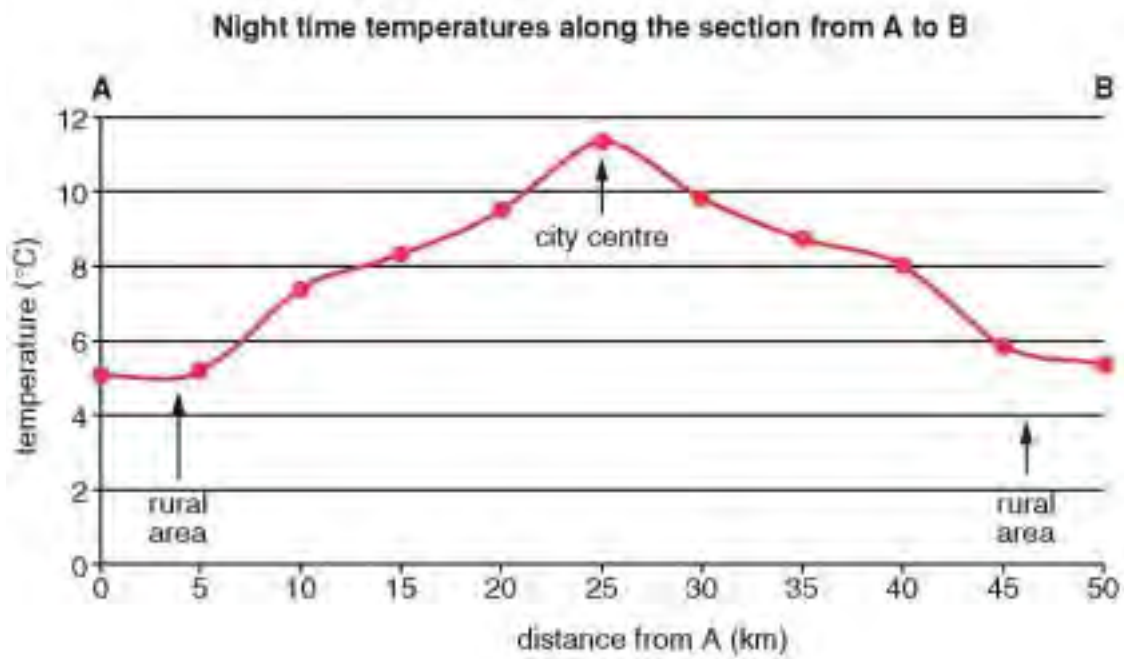


Fig. 3B for Question 1

New York density of vegetation



Fig. 3A for Question 1

New York temperatures

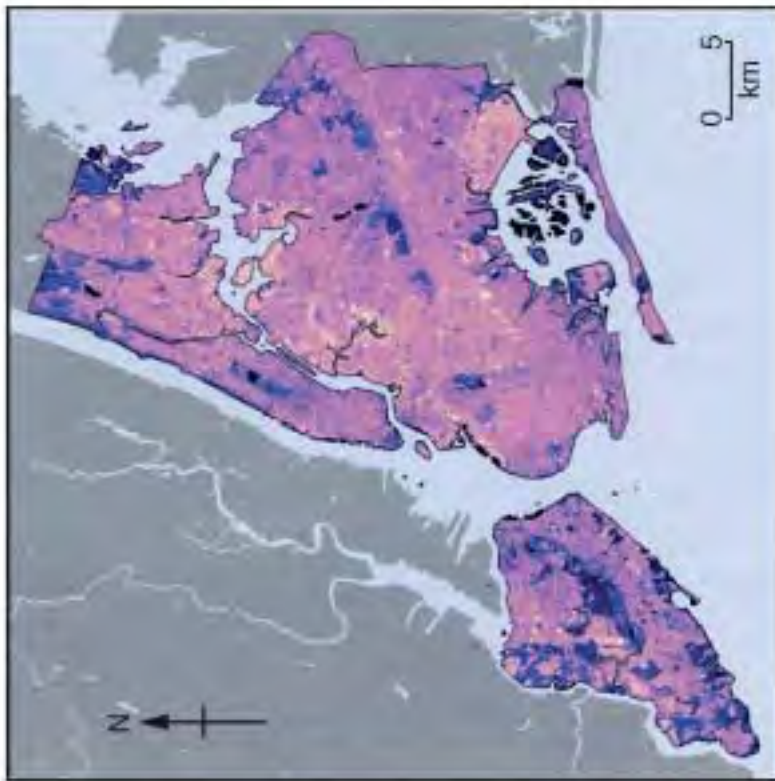


Fig. 3C for Question 1

The boroughs of New York city



## Mark scheme

**(a)**  $11 \text{ (or } 11.5) - 5 = 6 \text{ (or } 6.5) \text{ } ^\circ\text{C}$   
2 mks for stating the range alone [2]

**(b)** Suggest up to 3 marks for a description of the plan view  
1/3 or 2/2 or 3/1  
Reserve 1 mark for reference to the 3rd dimension e.g. dome [4]

**(c)** The overall impression is of a strong relationship – expect candidates to draw this out with some valid support from the 2 satellite photographs.

L3 (5–6 marks)

Clear and detailed assessment of the relationship.

Extensive and accurate data support.

L2 (3–4 marks)

Some assessment of the relationship.

Provides data support at the top end of this level.

L1 (0–2 marks)

Little attempt to address the relationship; simple description.

Data support inaccurate or lacking. [6]

**(d)** Urban heat islands develop best under particular meteorological conditions and during certain seasons and at particular times of day. The intensity of the heat island also depends on the interplay between these physical factors along with a number of human controlled factors including building density, building materials and land use.

The resources show the form of the urban heat islands but shed little light on the role of the factors mentioned.

L3 (6–8 marks)

Clear and detailed evaluation of the usefulness and limitations of the resources. The resources are well used to support the points made. A clear understanding of other information which would be of use.

L2 (3–5 marks)

Some analysis of the usefulness and limitations of the resources, which may be unbalanced. Provides support for some observations. At the top end there may be a limited awareness of other information which might be useful.

L1 (0–2 marks)

Little understanding of the usefulness of the resources; perhaps simple description. Support is inaccurate or lacking. [8]

## Example candidate response – Distinction

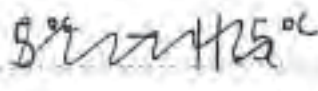
- I.) a) In urban areas, as shown in Figure 2, the temperature ranges from  $11^{\circ}\text{C}$  in the city centre to around  $5^{\circ}\text{C}$  in surrounding rural areas during the night. The range of temperatures at night in this city is therefore around  $6^{\circ}\text{C}$ .
- b) It is possible to see that temperatures at night are highest in the city centre. In Figure 3, the area covered by the isotherms increases between  $5^{\circ}$  and  $9^{\circ}\text{C}$  as the city outskirts are reached. However, the isotherms are relatively thin in the outermost districts, showing that the urban heat island has little of an effect on the outskirts. In Figure 2, there are two stages on the graph where the gradient is steeper, showing a ~~rapid~~ greater temperature change over the given distance. This occurs between  $9$  and  $11^{\circ}\text{C}$  and also between  $6$  and  $8^{\circ}\text{C}$ .
- c) There is a very strong correlation between the density of vegetation and the temperatures. Where the vegetation is dense, the temperature decreases to 'warm', and where the vegetation is sparse, the temperature is 'hot'. There is a particularly strong correlation on Staten Island, where the cooler areas (classified as warm) are in the same areas of denser vegetation. The warmest areas in parts of Queens and Brooklyn are also covered with the sparsest vegetation. One rather obvious point with a lot of vegetation is the central park in Manhattan, which also has a cooler temperature than surrounding areas.

d) The figures do show a good correlation between vegetation density and urban temperature. However, several improvements could be made here. If the keys included raw temperature data in °C rather than the rather vague terms, 'warm' and 'hot'. This gives no idea of how nested the temperature differences are. Similarly, the vegetation density key could be improved, maybe giving a number of large plants per 100 m<sup>2</sup> or % ground cover by vegetation. If someone was studying urban heat islands, they might be interested in studying some of the factors which affect urban microclimates. These might include pollution levels, precipitation rates, or wind speeds in the city. New York might not be the most appropriate city to study, as there are a number of other microclimates at play here. For instance, New York is surrounded by large bodies of water on all sides, and there can have a major effect on temperature and vegetation cover. It could also help if an idea of altitude was included. Temperature varies with altitude, and without this knowledge there can be no certainty that all variables are being measured. Another fairly major problem with the graphs is that it gives no idea of time or seasonality. Firstly, ~~was~~ <sup>how</sup> the data for the two figures collected at the same time? Secondly, ~~was~~ <sup>was</sup> the vegetation ~~density~~ density data collected in summer or winter? Since all deciduous trees lose their leaves in winter, this can profoundly affect the microclimate, as the leaves are absorbing less light energy, and thus not as much absorption is occurring, leading to a cooling effect. However, the figures do give a vague idea of a relationship between temperature range and density of vegetation, there are just a number of other things that could have been considered or taken into account.

## Examiner comment – Distinction

Part (a) gains full credit. In part (b) there are some relevant descriptive points, but an overall description of the form of the urban heat island is lacking. The candidate makes reference to the strength of the relationship between the two variables in part (c), but needed to go on to identify areas where the relationship does not hold in order to make a convincing assessment. In part (d) the candidate shows a clear understanding of the limitations of the resources and other information which may be of use. It is well written and well supported. One weakness is that the usefulness of the resources is addressed in a superficial fashion.

## Example candidate response – Merit

- 1 a)  The temperature ranges between 5°C and 11.5°C.
- b) The centre of the city, 25 km away from point A was the warmest part, at 11.5°C. As distance from the centre increased, temperature decreased, with the coolest area furthest from the city centre, which was at 5°C as shown by fig. 2. It can be seen in figure 1 that the isotherms on the northern side are wider than those on the southern side, and ~~the 10 km from A~~ the increase in temp in fig 2 was steeper between 0 and 25 km and <sup>25-50 km.</sup> relationship.
- c) At first, there appears to be a clear pattern between temperature, with the warm areas corresponding to the areas with dense vegetation, as can be seen in Staten Island. Here, the <sup>shape of</sup> band of dense vegetation in the centre matches almost exactly the area of warm temperature. Also in the south east of Queens, where there is sparse vegetation, the temperature is hot.
- However, in some parts, this pattern is not followed, for example, on the small islands in between Brooklyn and Queens, where the vegetation is, in general, sparse, but the temperature is only warm, instead of hot as the pattern would suggest. In the majority of cases, the as the vegetation cover increases, the temperature decreases, but there are some anomalies that should be considered.



d) When studying urban heat islands, figures 3A and 3B have some advantages and some limitations.

Firstly, ~~the~~ figure 3A clearly shows the range spread of temperature in the city. It would, however, be more useful if in the key it had actual temperatures, instead of 'warm' and 'hot', because this is somewhat misleading. Warm could be any number of temperatures and likewise for hot. When defining rural and urban parts of the city, figure 3B is quite useful because it shows where the temperature <sup>veg</sup> is dense, and the region could be considered rural, and where it is sparse, to define that area as urban. ~~However, it does not show land use of~~ However, neither of the figures show the use of land or the building density, which would both be useful, for defining urban and rural areas, and for explaining the temperature patterns. Because ~~the~~ the shape of New York city is not circular or regular, it is difficult to see a clear pattern anyway.

### Examiner comment – Merit

Part (a) gains full credit. In part (b) there are some relevant descriptive points, but an overall description of the form of the urban heat island is lacking. In part (c) the candidate provides some assessment of the relationship between the two variables and there is some useful reference to the resources. In part (d) the candidate starts well with discussion of the key to the temperatures in Fig. 3A. The suggestion to define urban and rural areas using vegetation density (Fig. 3B) is less convincing. At the end of the answer there is some knowledge of other information which might be useful, but the range of points discussed is quite narrow.

## Example candidate response – Pass

- 1 a) The night time temperature in the city centre is  $11.5^{\circ}\text{C}$  and the night time temperature in the rural area is  $5^{\circ}\text{C}$  therefore the range is  $11.5 - 5 = 6.5^{\circ}\text{C}$ . ✓
- b) It is an island shaped area of higher temperatures located above the city centre ~~at 4.5~~ between  $11^{\circ}\text{C}$  and  $11.5^{\circ}\text{C}$ . This temperature declines ~~at~~ the further away from the city centre until the urban rural fringe. Each isotherm is roughly 5km in diameter? until roughly ~~15~~ 15 km away from the city centre.
- c) According to the figures, the more dense the vegetation, the cooler the temperature ✓ relative to the sparse area? of vegetation where it is hotter. The sparse areas of vegetation are located in the more urbanised boroughs of New York such as Brooklyn. However Staten Island has the most dense vegetation because it is relatively less urbanised. However there are some vegetation cover ~~in~~ ~~Queens~~ on the east side of Queens because it is a suburban area so there ~~is~~ is likely more vegetation, such as in parks.

d) The figures are useful for the study of urban heat islands because it shows a nuclei surrounding Brooklyn which is very urbanised, therefore the temperature is higher. However they are limited because it doesn't show the vegetation density and temperature of the surrounding periphery area. In addition, the information is biased to New York, there may be other factors to consider in other urban areas around the world. Also, the information doesn't dictate a ~~time trend~~ <sup>change over time</sup>, they could have only been taken on a particularly hot day. The figures don't take into account factors such as wind speed or precipitation, which can also effect temperature.

### Examiner comment – Pass

Part (a) gains full credit, but in part (b) the candidate needed to describe the form of the urban heat island shown in the resources. In part (c) the candidate describes the link between temperature and vegetation shown on the resources but fails to give a judgement about the extent of the link. The candidate attempts explanations of the link for which there is no credit in this question. In part (d) there is some analysis of the limitations of the resources (written at a general level) but very little about the usefulness.

## Question 2

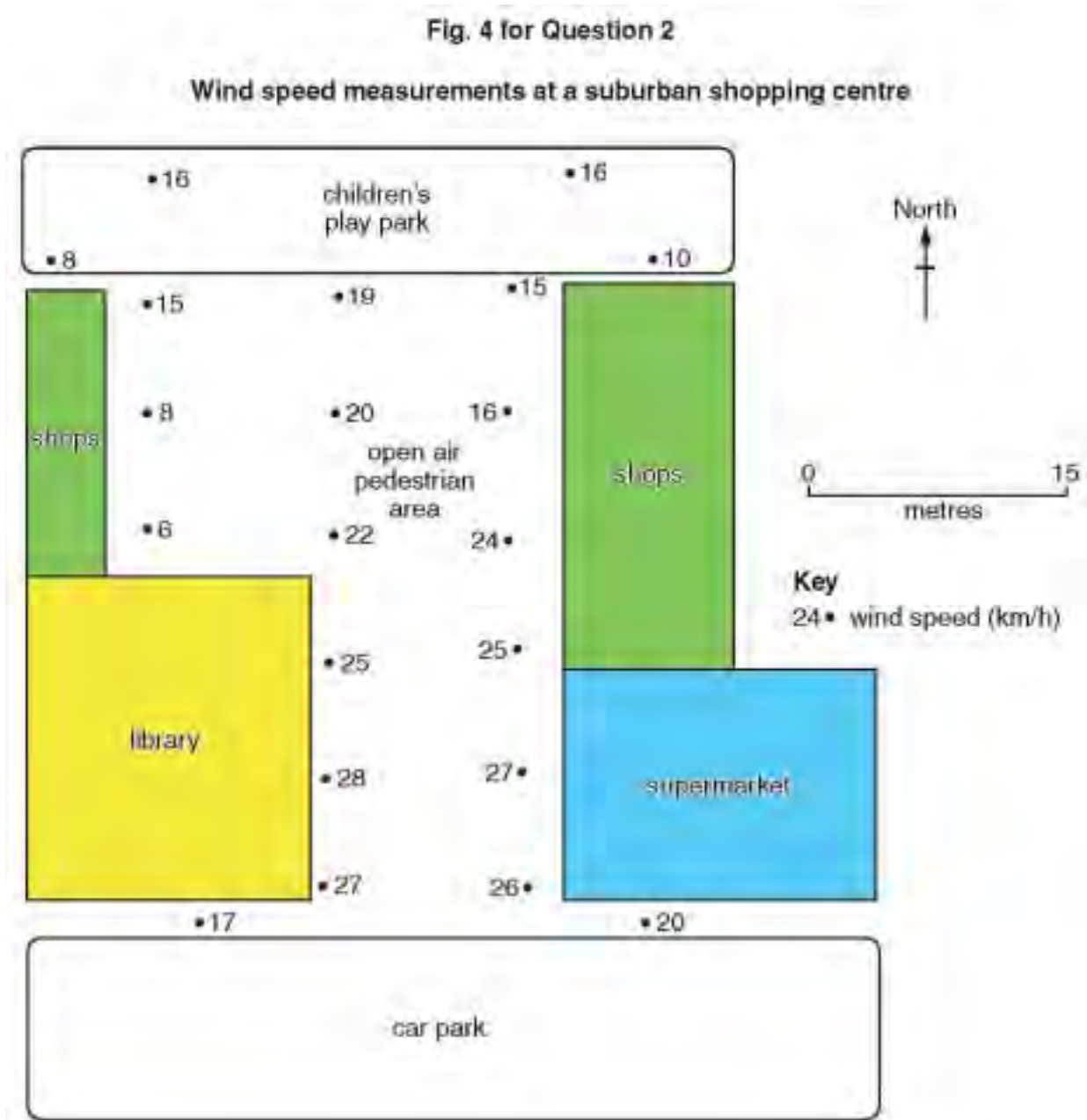
- (a) Study Fig. 4, which shows wind speed measurements collected at a suburban shopping centre. The measurements shown are the maximum wind speed at each point recorded over a 15 minute period.

Describe the pattern of wind speeds shown in Fig. 4.

[5]

- (b) From your wider study of microclimates, consider the extent to which urban areas make their own climates.

[10]



## Mark scheme

- (a)** Generally, wind speed increases where the gap between buildings is at its narrowest. There also appears to be a frictional effect near the walls. In addition, there are some anomalies to this general pattern.

L3 (4–5 marks)

Clear and detailed description of the pattern of wind speed shown. The anomalies are clearly identified. Data from the map is well used to support the points made.

L2 (2–3 marks)

A valid attempt to describe the pattern. Data is used to support the points made. Less importance placed on the anomalies.

L1 (0–1 marks)

Limited ability to interpret the map and identify a pattern, may simply describe. Use of data is inaccurate or lacking. [5]

- (b)** An opportunity here to explore the topic of microclimates in an urban setting. Good responses will focus on the 'extent to which' with some useful exemplar support.

L3 (8–10 marks)

Evaluation is to the fore with appropriate exemplar support. There is a sophisticated understanding of the range of processes involved. The answer is well founded on evidence.

L2 (5–7 marks)

Able to describe and offer some explanation. Sound knowledge and understanding, lacking depth in places. Conclusion limited. May well refer to processes only without addressing the evaluative part of the question. UHI only.

L1 (0–4 marks)

The approach is largely descriptive and piecemeal with little or no attempt to address the question. Superficial statements. Little exemplar support. [10]

## Example candidate response – Distinction

2.a) At its broadest scales, the map (Fig 4) suggests windspeeds were highest between the supermarket and library and then slower elsewhere. Windspeed increases from North to South as the open pedestrian area narrows until a peak of 28-27 km/h is recorded in the area between the supermarket and library.

The area between the western 'shops' and the library has the lowest windspeed ~~at~~ of between 8 and 6 km/h in that corner.

The open area Children's play park has lower speeds than between the narrow buildings and also has the greatest variation (between 8 km/h & 16 km/h) out of any area.

There appears to be no very obvious directional trend, except by the road tunnel, but windspeed is higher towards the east on the Figure by a slight margin.

2. b) The presence and nature of urban construction is a dominant factor in determining a microclimate characteristics. The UHI effect is caused by the use of dark building materials (the primary factor) and the radiation of unused energy (the secondary factor). The Dark materials such as concrete and tarcrete absorb a greater % of the electromagnetic spectrum than the green-pigment chlorophyll associated with rural areas. As such, more energy is then re-emitted as terrestrial long wave energy (or heat) than in rural areas.

The increased temperatures associated with urban areas because of the two aforementioned factors have subsequent effects. Rainfall increases by 48% to 116% in the downwind area of cities because of the creation of thermal plumes. Locally heated air rises - creating convective instability and, when cooled at altitude, condensing around hygroscopic nuclei to form clouds. The clouds then naturally cause increased rainfall in areas down leeward of the prevailing wind. This effect is enhanced by the abundance of particulate matter such as PM10s (non cultured soil & cities) created by construction and manufacturing in cities. This dust simply provides more nuclei for water to condense around.

Cities, most notably planned, grid-system cities, also create an Urban Canyon Effect. Chicago (the 'Windy City') contains the Magnificent Mile noted for this effect. High rise buildings and skyscrapers ~~form~~ funnel air into the straight channels creating atmospheric conditions most common in canyons. The wind along the Magnificent Mile is both ~~fast~~ (approximately) unidirectional and between 25% and 115% or faster than along streets parallel to the ~~the~~ adjacent Great Lake.

Although cities are dependant upon typical climate features such as latitude and continentality, Fira's average temperature is 18°C being coastal and Mediterranean while Bergen <sup>Denmark</sup> has recorded maxima of 52°C being continental and <sup>South</sup> south, they create significant microclimates affecting wind, precipitation and temperature.

### Examiner comment – Distinction

In part (a) there is a clear attempt to describe the pattern of wind speeds shown in Fig. 4 with some good support from the diagram. The use of compass directions adds to the quality of the answer.

In part (b) there is clear understanding of the processes involved – paragraphs 2 and 3 are especially impressive, combining exemplar material with some indication of the scale of the impact urban areas have on local climates. The answer could have been improved if the concluding paragraph addressed the judgement required by the question.



## Example candidate response – Merit

2

a) The wind speeds are highest in the area between the library and the supermarket, with the highest wind speed being ~~near~~ 28 km/h. The wind speed decreases as you move north into the wider open pedestrian area and towards the children's play park. The lowest wind speed is 6 km/h which is found by the western area of shops, just north of the library. Wind speeds are greater in built up, narrow areas, while they are weakest in more open areas with ~~the~~ buildings acting as wind breakers. In the built up narrow areas, the buildings form a canyon which can channel the air, which as shown, creates high wind speeds.

b) Urban areas have significantly different climates than the surrounding areas. This is, in a large part, due to the fact that urban areas are warmer, by as much as 5°C, than the surrounding countryside. The huge areas of concrete and tarmac roads have a high heat capacity and are able to absorb heat energy during the day and release it slowly at night. Night is where the greatest temperature difference can be ~~to~~ observed, with several degrees difference between urban and rural areas. The high temperatures also impact in the winter and spring time. Urban areas are far less likely to receive any significant amounts of snow and the chance of frost is much reduced. Flowers/Plants will ~~be~~ and flower earlier as a result of the higher temperatures. While urban areas are warmer than rural areas,

b) Thanks to a greater heat capacity and the fact that urban areas also generate their own heat from power stations and factories, they do not receive as much sunlight ~~and~~ as rural areas. Precipitation, in any form, fog and cloud cover are all more likely over urban areas. The heat generated by cities is transferred to the air, which in turn will rise. This rising of air creates areas of lower pressure of urban areas, and is the reason cloud cover and precipitation are more likely. Also, dust, which is generated in huge amounts in urban areas, can reflect/absorb a large quantity of insolation, ~~not~~ increasing the albedo of the urban area. ~~General~~

Generally, buildings act as windbreakers, so wind speeds should be lower in cities compared with rural areas, ~~to~~ however, dense high rise buildings, usually found in the CBD, create canyons that channel winds through them. In some areas of the city, wind speeds can be so high as to knock a person over and to cause high rise buildings to sway slightly.

To a large extent, urban areas do create their own climates, which can be significantly different from surrounding rural areas.

### Examiner comment – Merit

In part (a) there is a clear attempt to describe the pattern of wind speeds shown in Fig. 4. There is some limited data support from the diagram (only the maximum and minimum wind speeds are given). The use of compass directions adds to the quality of the answer.

Part (b) is well structured, starting with temperature and then going on to discuss precipitation and wind. The answer could have been improved by referring to actual examples. Also, the conclusion is limited, without really addressing the 'extent to which' required by the question.

## Example candidate response – Pass

2 a) The wind speed reaches an average of 20 km/h<sup>2</sup> in open spaces such as in the car park and the pedestrian area. However the speed increases between the two large buildings, the library and the supermarket; up to an average of 27 km<sup>2</sup>/h. When the wind reaches the open air pedestrian area, it appears to circulate anti-clockwise<sup>2</sup>; then ~~slowly~~ slowing down ~~in front of the~~ behind the library at 6 km/h. The wind speed is not as fast behind buildings as it is in front, but it is fastest while between two buildings, like a tunnel effect.

2b) Urban areas make their own climates largely due to the level of urbanisation of an area. For example the abundance of artificial materials such as tarmac, concrete and brick is very high in an urban area. This decreases surface of water and vegetation, which decreases the rate of evapotranspiration. However this does create condensation nuclei which increases the amount of cloud cover, which is up to 10% more than rural areas. Even though the city receives less sunshine, the cloud traps heat beneath it. In addition the colour of these materials cover a large surface area, for example tarmac which is black and is used for roofs and pavements. The colour black has a low albedo, therefore light and heat are not reflected, which increases the temperature of the ground. This in turn causes people to use more electrical appliances in order to cool themselves, like air conditioning and fans. To produce electricity, fossil fuels are burnt which releases greenhouse gases, which in turn increases the greenhouse effect which warms the earth. Also due to the large quantities of solid and gaseous impurities emitted by industries and factories, there is more dust in the city which also absorbs heat. Evidence suggests that the city centre can reach up to  $11^{\circ}\text{C}$  and decrease every  $100\text{km}^2$  from the centre.

### Examiner comment – Pass

Part (a) attempts to describe the pattern of wind speed, but support from the diagram is very general. It is better to quote actual figures from the resource rather than to estimate averages.

In part (b) a few relevant points are made which indicate a partial understanding. There appears to be no logical order to the discussion.

### Question 3

With reference to your own investigation of microclimates, evaluate the extent to which the use of secondary sources enhanced your investigation.

Begin by stating the question or hypothesis that you investigated.

[15]

### Mark scheme

Answers should be based firmly on their own investigations, quoting examples drawn from this.

Clearly, much depends on the investigation and the choice of data. Candidates should be aware of the limitations of their own primary data (e.g. spatial, temporal, scale) and the way in which secondary data complements their primary data and enhances and extends their investigation.

In terms of evaluation a range of responses is acceptable from 'to a large extent' to 'to a small extent' depending upon the investigation.

L4 (13–15 marks)

The candidate displays a high order understanding of the ways in which secondary sources enhanced (or otherwise) the investigation with good support. Evaluation to the fore.

L3 (10–12 marks)

Good understanding of the ways in which secondary sources enhanced (or otherwise) the investigation. The answer makes appropriate reference to the candidate's own investigation. Well focused on the question.

L2 (7–9 marks)

More focused on the candidate's own investigation. Describes the use of secondary sources, but only in a superficial fashion.

L1 (0–6 marks)

Discussion lacks detail. Perhaps descriptive only, with only piecemeal comments about secondary sources. Little reference to candidate's own investigation.

[15]

## Example candidate response – Merit

3. Evaluate the extent to which the use of secondary sources enhanced the investigation.

My hypothesis: That the south facing slope of Slapton Wood surrounding the Slapton Wood Stream will be warmer, less humid and have a greater light intensity than the north facing slope.

My project was primarily based around my collection of data on the 12<sup>th</sup> June 2010 in Slapton Wood yet without the vast source of secondary data available the investigation would be so much harder. <sup>Yet how often of it helped to</sup> ~~was~~ ~~helped~~ ~~make~~ ~~the~~ ~~the~~ ~~investigation~~ ~~that~~ ~~was~~ ~~come~~ ~~to~~ ~~a~~ ~~successful~~ ~~conclusion~~.

The first piece of secondary data ~~was~~ used was in backing up my hypothesis. The ~~the~~ ~~research~~ <sup>research</sup> Teleedge Institute in Omaha had already done ~~it~~ ~~into~~ ~~this~~ ~~very~~ ~~subject~~ ~~so~~ ~~it~~ ~~was~~ ~~a~~ ~~crucial~~ ~~part~~ ~~of~~ ~~my~~ ~~project~~ ~~to~~ ~~take~~ ~~their~~ ~~outcomes~~ ~~over~~ ~~here~~ ~~in~~ ~~the~~ ~~UK~~ ~~was~~ ~~in~~ ~~different~~ ~~climate~~ ~~conditions~~. Using

Their data also allowed a comparison between areas in different parts of the wood.

The next piece of secondary data came from the BBC and it was the weather for that day and the 3 days beforehand. There had previously been rainfall followed by a mild day which meant humidity was very high in the morning of the experiment. Unfortunately, there was no time to take accurate measurements of the weather so the secondary data helped me to account for ~~there~~ any problems with the data.

Another use of secondary data or the use of Ordnance Survey maps which give the altitude of the height as it could not be measured on the day using typical equipment. This piece of secondary data was ~~the~~ very important however it did allow me to say that this area of the experiment was conducted fairly, which is important in all investigations.

In conclusion, I believe that <sup>all</sup> secondary data was vital in my investigation ~~because~~ <sup>because</sup> it meant that my data could be compared ~~to~~ <sup>easily</sup> and that other important data is ~~not~~ <sup>not</sup> used, e.g. the weather. It also meant that the reliability of the results ~~is~~ <sup>would</sup> not be called into question because data is not accurate unless it was taken at the same altitude on either side of the valley. Any ~~time~~ <sup>time</sup> could rain the data and make the investigation invalid. ~~Therefore~~ This secondary meant I was able to say that my hypothesis was



### Examiner comment – Merit

There is reference to the candidate's own investigation along with a clear focus on the question. The secondary sources used (a similar study from Omaha, the BBC weather forecast for that day and the three previous days and OS maps) are identified and the ways in which they contributed to the investigation discussed. To improve the answer more explicit detail could be given of how exactly the secondary data resources actually enhanced the candidate's own investigation.

## Section B: Environmental Degradation

### Question 5

Figs 5 and 6 show information from a study of air quality in Port Talbot, South Wales between December 2006 and August 2007.

(a) Using Fig. 5, describe the main direction from which the wind blew and the percentage of days on which the wind came from that direction. [2]

(b) Fig. 6 shows hourly sulphur dioxide (SO<sub>2</sub>) concentrations over Port Talbot for different wind directions. [4]

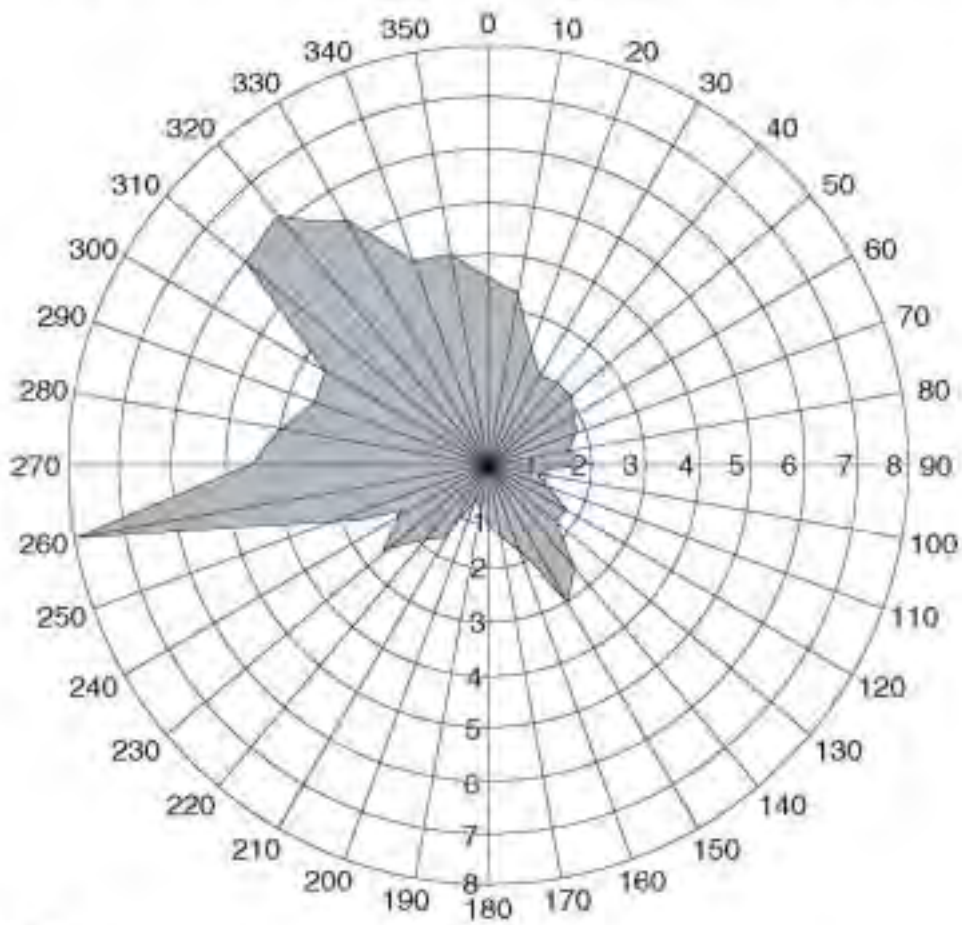
Using Fig. 6, contrast the pattern of SO<sub>2</sub> concentrations throughout the day when the wind came from ENE with that when the wind came from SSE.

(c) Referring to both Fig. 5 and Fig. 6, to what extent is it true to say that there was a link between SO<sub>2</sub> pollution and wind direction in Port Talbot during the study? [6]

(d) Assess the usefulness of Figs 5 and 6 to those responsible for the management of environmental degradation in the Port Talbot area. [8]

Fig. 5 for Question 5

Port Talbot: direction from which the wind blew, December 2006 – August 2007



Key

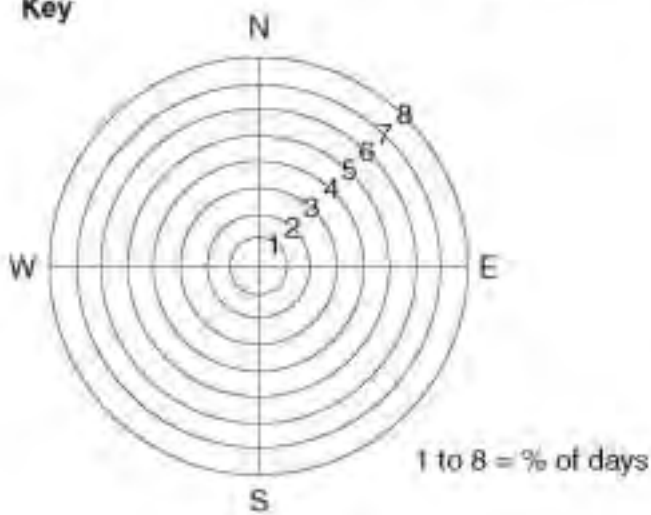
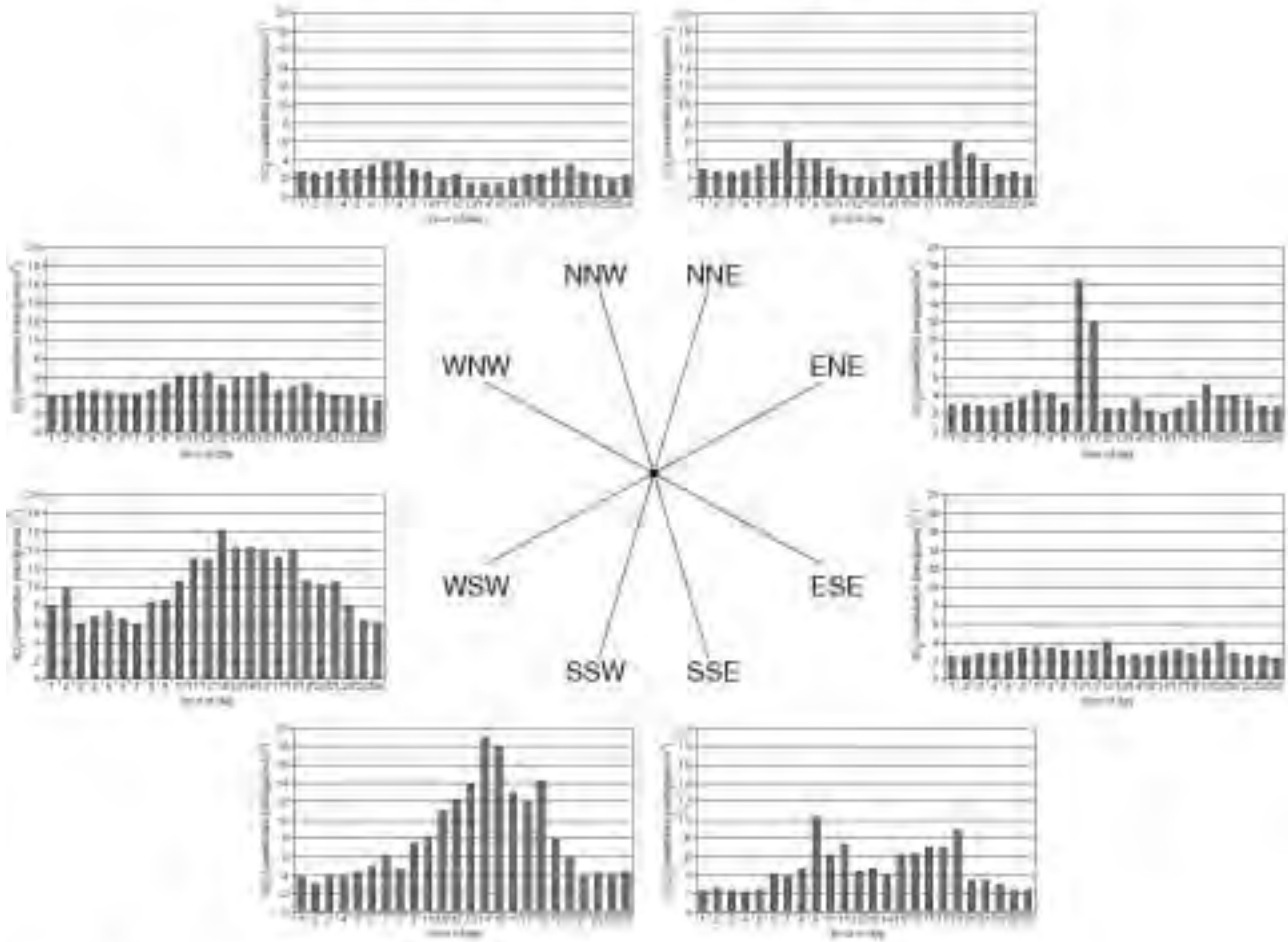
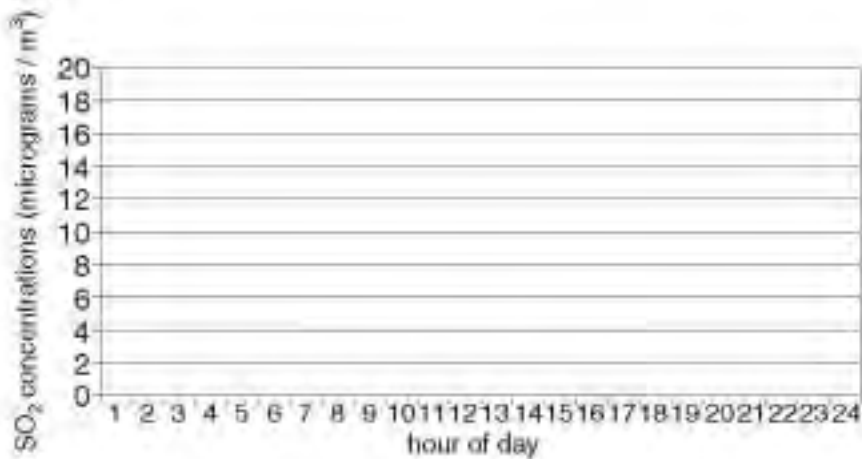


Fig. 6 for Question 5

Hourly sulphur dioxide (SO<sub>2</sub>) concentrations for selected wind directions, Port Talbot, December 2006 – August 2007



**Key**



## Mark scheme

**(a)**

- Most common direction from 260°/is 260 (W to E = 0)
- Percentage – 8% [2]

**(b)** ENE – generally undulating between 2–5; massive peaks at 10:00 (>16/17) and 11:00 (12)

SSE – undulating 2–4 throughout the day; peaks at 09:00 (10.5) and 19:00 (9)

Suggest 2/1 mks for description; 2/3 marks for drawing out the contrasts. (not 3/1) [4]

**(c)** The link seems to be fairly clear from Fig 6. When the wind is from WSW and SSW the peaks are much higher and for much longer periods of time compared to other, especially easterly directions. However, there are some anomalies e.g. the large peaks on the ENE graph and the SSE graph also seems higher than other easterly wind directions.

There should be some reference to Fig. 5 for full marks.

L3 (5–6 marks)

Clear and detailed description of the links; acknowledges the anomalies.

Extensive and accurate data support.

L2 (3–4 marks)

Clear description of the link shown.

Provides data support and, at the top end of this level, some awareness of the anomalies.

L1 (0–2 marks)

Descriptive with little attempt to address the question.

Data support inaccurate or lacking. [6]

**(d)** Candidates are likely to respond that the figures are useful to some extent or only to a limited extent.

Environmental degradation is a wide ranging topic, including land, water and air. The resources give information which will help in terms of air pollution but they give little information about other aspects of environmental degradation. Additionally, the time scale is quite short and may not be representative of the longer term.

A good answer, while discussing the pros and cons of the resources provided, will acknowledge this and perhaps point out other sources of information which would inform the issue.

L3 (6–8 marks)

Clear and detailed analysis of the usefulness and limitations of the resources.

The resources are well used to support the points made. A clear understanding of other resources which would be of use.

L2 (3–5 marks)

Some analysis of the usefulness and limitations of the resources, which may be unbalanced. Provides support for some observations. There may be a limited awareness of other resources which might be useful.

L1 (0–2 marks)

Little understanding of the usefulness of the resources; perhaps simple description.

Support is inaccurate or lacking. [8]

## Example candidate response – Distinction

5

- a) Wind blew at  $260^\circ$  for 81% of days. ✓
- b) The bar graph showing the pattern of  $\text{SO}_2$  concentrations throughout the day when the wind came from ENE shows that throughout the day there was little variation, apart from the dramatic increase between the hours of 10 and 11, where the concentrations reached over 16 micrograms/ $\text{m}^3$  at 10 o'clock. ~~Compared~~ contrasted with the graph showing the pattern of  $\text{SO}_2$  concentrations throughout the day when the wind came from SSE, there is an obvious difference in pattern. Between the hours 7 and 11 o'clock and 15 and 19 o'clock there is an increase in concentration. The highest concentration recorded is at the hour of 9 o'clock when ~~10 micrograms~~ 10 micrograms/ $\text{m}^3$  were recorded. ✓
- c) Referring to both diagram 5 and 6, to a great extent there is a link between  $\text{SO}_2$  pollution and wind direction. This can be proven because, by studying on Fig 5 the high percentage of the wind direction towards  $260^\circ$  for 8 days, compared with the SE Fig 6 showing the hourly sulphur dioxide concentration for the direction WSW, it is clear to see an immediate link. This bar graph shows the highest concentration recordings on average, compared with

the other 7 graphs ✓

To strengthen this point by taking the lowest percentage reading on Fig 5, which is shown as being at 100° with a reading of just over 1%. This closely links to the bar graph showing the sulphur concentrations at ESE which show the lowest average of results, the highest being 4 micrograms/m<sup>3</sup> at the hours of 12 and 2 o'clock.

On the other hand however a graph and reading which show this statement to be incorrect and proven that to no extent is there a link between the SO<sub>2</sub> pollution and wind direction is at the NNW graph and 320°. The graph shows very little concentration and variation during the day, the highest concentration reached is 4 micrograms/m<sup>3</sup> at 7 and 8 o'clock, compared with Fig 5 which shows a high percentage for the direction from which the wind blew reaching 6% of days. This therefore doesn't correspond ✓

Therefore to a certain extent using the figures shown, I believe it is fair to say that in most cases there is a link between SO<sub>2</sub> pollution and wind direction in Port Talbot, however there are examples where this statement is proved incorrect eg. NNW -

LS

d) To those responsible for the management of environment degradation in the Port Talbot area both individual figures can be seen as useful

Figure 5 can be seen as useful material because it can be used to determine certain strategies that can be enforced to protect buildings and the environment from strong winds. So from reading the figure and learning that the highest percentage of wind towards 260° shown, will need the highest amount of attention. ~~between 260° and 270°~~ however the limitations to this graph <sup>are</sup> is that, the data is recorded ~~over~~ between December 2006 and August 2007 therefore not a whole year this could potentially make the graph unreliable to those responsible as it doesn't cover 3 months of the year, which could affect averages and understanding of the wind direction for the rest of the year - this could be vital ✓

Figure 6 can also ~~be~~ be seen as useful material as it gives a clear understanding of the concentrations on average all hours of the day, and from all major wind directions of the compass. Giving this much information to those that are responsible for the environmental degradation, allows them to study at which specific hours concentrations increase, and where the different high and low concentrations differ. This is important as to be able to know this it enables those who are responsible to manage the concentrations at the given wind direction and time of day. ✓



The same limitation applies for Figure 6 as it did for Figure 5 – not a year taken average only... 9 months of the year.....

### Examiner comment – Distinction

Part (a) gains full credit. In part (b) the contrasts are well made and well supported. The points made in part (c) are also well supported with data taken from both Figs 5 and 6, addressing wind directions where there are high SO<sub>2</sub> levels as well as those where SO<sub>2</sub> levels are low. Part (d) correctly points out the seasonal limitation of Fig. 5 and the advantage of the hourly display on Fig. 6. However, the question is about environmental management, not just the management of air pollution and the answer could have been improved by widening the scope accordingly.

## Example candidate response – Merit

5a) Figure 5 shows that the main direction the wind blew in from December 2006 – August 2007 was a westerly direction. 8% of days, the wind blew just south of a true westerly direction. Also, the wind blew for 6% of days in a North Westerly direction.

b) The  $\text{SO}_2$  concentrations of wind from ENE show a general pattern of approximately  $2 - 4 \text{ ng/m}^3$  from the first hour of the day to the last hour. However, the Whereas, wind from SSE shows a higher concentration of  $\text{SO}_2$  during the middle section of the day: from 6 hours to 19 hours, between 4 and  $10 \text{ ng/m}^3$ . However, ENE wind has two very high  $\text{SO}_2$  concentration anomalies on hours 10 and 11, with 17 and  $12 \text{ ng/m}^3$  respectively. Whereas, SSE wind has smaller peaks of  $10 \text{ ng/m}^3$  and  $8 \text{ ng/m}^3$  in the 9<sup>th</sup> hour and 19<sup>th</sup> hour.

c) To a ~~relatively~~ <sup>small</sup> extent it is true to say that there is a link between  $\text{SO}_2$  pollution and wind direction in Port Talbot. Figure 5 shows that the majority of winds coming from a westerly direction, then blowing to the east. However, looking at the corresponding

SO<sub>2</sub> concentrations, they are relatively low. For example, 6% of days in Fig. 5, the wind is blowing from a North Westerly direction, but the SO<sub>2</sub> concentrations in the resulting direction are relatively low. Furthermore, SO<sub>2</sub> concentrations are highest from wind direction of WSW and SSW, ~~however~~ but the wind direction from the North East in figure 5 is only from 2% to 3% of days. Moreover, figure 5 shows many ~~degrees~~ wind directions to a high degree of accuracy, but figure 6 only has 8 directions, thus it is hard to link them accurately. Overall, the links between SO<sub>2</sub> pollution and wind direction is <sup>to a</sup> relative low extent.

d) Collectively, Figure 5 and 6 only have one type of pollution - SO<sub>2</sub> concentration. These concentrations on figure 6 show the exact time in which they occurred from December 2006 and August. This knowledge of time could prove useful in detecting where exactly the SO<sub>2</sub> pollution came from due to the wind direction the different concentrations are linked to. With this information, the management for environmental degradation in Port Talbot can act on improving rules and quotas for each area.

However, Figure 6 only shows SO<sub>2</sub>

concentrations which is one aspect of many types of air pollution. These figures are not useful for determining any other type of gas emission and therefore are difficult for the management to see how significant  $\text{SO}_2$  is compared with every other gas pollution. The scale of time is useful when collating this data over a period, (either months or years) so the pattern can be seen; this will allow predictions to be made for specific areas and also how  $\text{SO}_2$  concentrations have improved. They can use this information to plan areas of high pollution for the future.

### Examiner comment – Merit

Part (a) gains one of the two marks available. There is no credit for westerly direction. In part (b) there are two contrasts drawn between the two wind directions, but the rest is descriptive. The descriptions attract some credit, but the focus of the question is on contrasts. Part (c) refers to both Figs 5 and 6 and does attempt to describe the links but the answer becomes irrelevant towards the end. In part (d) there is an attempt to assess the usefulness of Figs 5 and 6 and there is an awareness that the question is wider than just  $\text{SO}_2$  pollution. The answer could have been improved by suggesting other resources which may be useful for environmental management, for example resources related to water and land degradation.

## Example candidate response – Pass

5a) The main direction of the wind blew from  $260^\circ$  west and blew for 8% of days ✓

5b) When the wind blew from ENE the highest concentration of  $SO_2$  was ~~at 10 and 12~~ where the ~~average~~ concentration ~~at the two~~ ~~hours~~ was around  $16.3 m^3$ . The lowest concentration of  $SO_2$  was at 16 hour of day at  $2 m^3$ . On the other hand when the wind blew from SSE the highest  $SO_2$  concentration was at 9 hour of day

at only  $10.2 m^3$  ✓ and the lowest concentration of  $SO_2$  was at the earlier hours of the day 1, 3, 4 as well as the later hours of the day 23 and 24 where the concentration was just above  $2 m^3$ .

c) It's fair to say that there is a link between wind direction and levels of  $\text{SO}_2$  pollution. The highest levels of  $\text{SO}_2$  was for all days was when the wind was blowing from NSW which was approximately for 8% of days ✓ where as when the wind was blowing from NNW the pollution levels were at their lowest, the wind blew on these days for approximately 6% of days ✓ LI

d) These figures are useful in providing a very detailed set of results for the Port Talbot area. Pollution levels for the hour of day this will be useful when comes to managing peak hours of Port activity. These hours of pollution levels in relation to wind direction will set as good indicators for the estimate  $\text{SO}_2$  concentration of any given day as well as

allowing the management to reduce the emission of  $\text{SO}_2$  as any reduction would be visible on graph. ✓ On the other hand the data does not support the cause of population pollution or a clear method to reduce pollution instead it only gives a general trend that pollution is greatest during the middle of the day.

## Examiner comment – Pass

Part (a) gains full marks. Part (b) gains some credit for description. The section beginning “On the other hand ...” suggests that a contrast is going to be made, but what follows is too weakly expressed to be creditworthy. Part (c) is quite short and narrow in range, with only a couple of valid points being made. Part (d), also, is limited in scope, addressing only SO<sub>2</sub> levels. It could be improved by addressing the advantages and limitations of Figs 5 and 6 and widening the scope to include other dimensions of environmental management (e.g. land, water and other types of air pollution).

## Question 6

- (a) Study Fig. 7 which shows the main threats to coral reefs in the Indian and Pacific Oceans.

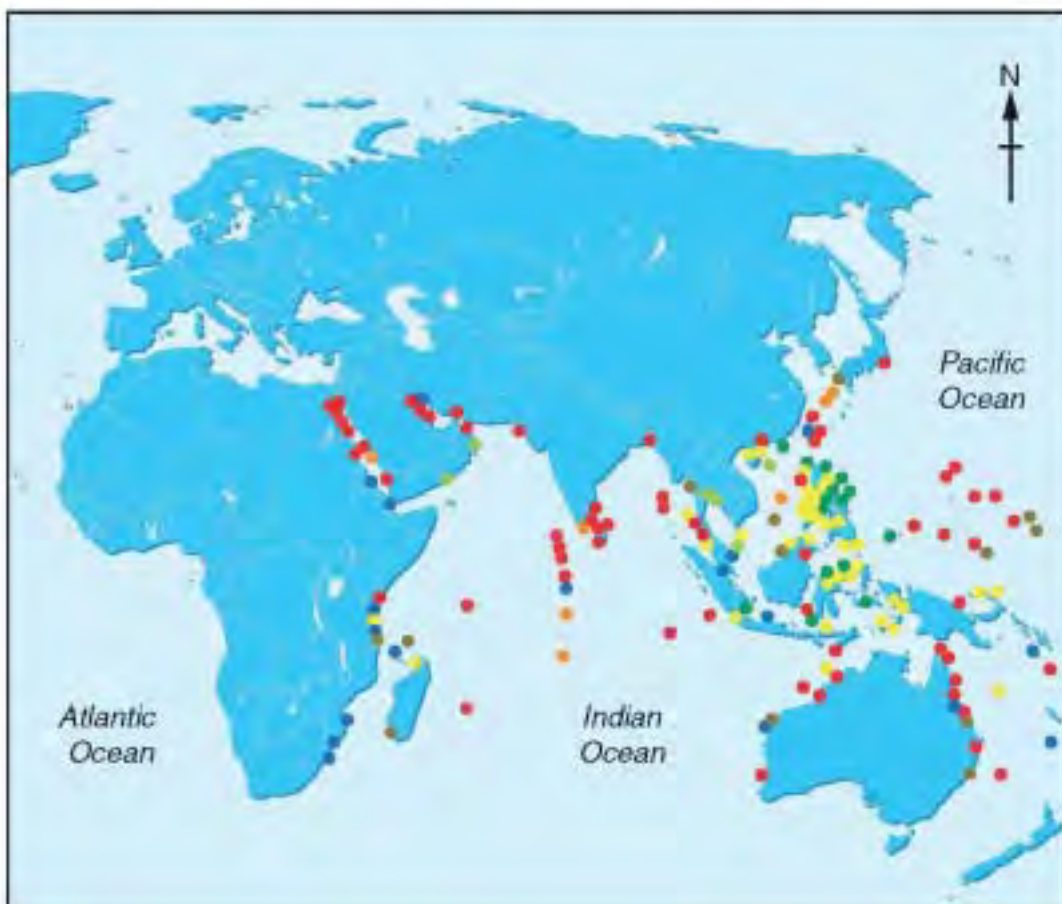
To what extent does Fig. 7 support the view that the threats to coral reefs in the Pacific Ocean are different from the threats in the Indian Ocean? [5]

- (b) 'International co-operation is essential if solutions are to be found to the world's pollution problems.'

From your wider study of environmental degradation, to what extent do you agree with this statement? [10]

**Fig. 7 for Question 6**

**Threats to coral reefs in the Indian and Pacific Oceans**



**Key**

- tourism
- poison fishing
- overexploitation
- sedimentation
- coral harvesting
- dynamite fishing
- pollution



## Mark scheme

- (a)** Valid approaches would be to agree with or (less likely) to challenge the assertion in the question. Look for the quality of the argument and supporting evidence taken from the map.

Pacific Ocean – varied threats – main ones are pollution, dynamite fishing, coral harvesting and sedimentation.

Indian Ocean – again the threats are varied – main ones are pollution and dynamite fishing.

L3 (4–5 marks)

Clear and detailed analysis of the degree to which map evidence supports (or otherwise) the assertion in the question. Data is well used to support the points made.

L2 (2–3 marks)

A valid attempt to address the question. Data is used to support the points made.

L1 (0–1 marks)

Limited ability to interpret the map, may simply describe. Use of data is inaccurate or lacking. No attempt to address the question. [5]

- (b)** Much will depend upon the examples chosen, and candidates may legitimately express total disagreement, partial disagreement or complete agreement with the statement. The important feature is that they must use a range of examples to support their point of view.

L3 (8–10 marks)

Evaluation is to the fore with sophisticated exemplar support. There is a clear assessment of the role of international co-operation.

L2 (5–7 marks)

Addresses the issue of international co-operation but the evaluation, though present, is less well thought out or weakly justified. Exemplar support limited.

L1 (0–4 marks)

There is some reference to international cooperation but the approach is largely descriptive and piecemeal. No attempt to evaluate or very superficial. [10]

## Example candidate response – Distinction

6.

a) Fig 7 shows a number of coral reefs in both the Indian and Pacific oceans which are threatened by pollution. This is particularly true of land settlements such as Australia and Indonesia in the Pacific, and India and Sri Lanka in the Indian Ocean. However, apart from this there are significant differences in the threats in the two oceans.

For example, there is little evidence in the Indian Ocean of dynamite fishing affecting coral reefs (only 2 cases) whereas in the Pacific Ocean there are a large number of reefs particularly around Indonesia threatened by this. Furthermore, there is no evidence of poison fishing affecting coral reefs in the Indian Ocean at all, whereas it extensively affects parts of the Pacific.

Therefore the threats to coral reefs in the Pacific Ocean and Indian Ocean differ to a large extent.

b) International co-operation has been tried as a solution to the world's pollution problems extensively since it first came to fruition that pollution was a global issue.

Treaties at Kyoto in 1997 and Copenhagen in 2010 have been proposed taken place to tackle the world's pollution problems, along with a millennium development goal which aims to cut world pollution by 2015. However, judging by figures suggesting pollution has increased in this period, these attempts at international

co-operation have failed. However, the extent to which this is actually "international co-operation" must be questioned. For example, high polluting countries such as India, Australia and most significantly China and the USA did not join the Kyoto treaty as they believed it would impact their economic development. However, if these countries had co-operated with global plans to reduce pollution, realistically it may have succeeded as an agreement to lower pollution throughout the world would have provided much more of an incentive to reduce pollution. But with lack of evidence to support this theory, one can only speculate.

However, the relative success of local pollution problems <sup>could</sup> ~~could~~ also arguably move towards a solution to the world's pollution problems. For example, the successful mangrove regeneration project and the WWF legislation making much of the Great Barrier Reef a nature reserve has stopped pollution in this area of Australia. Similarly regeneration of sand dunes near Brisbane in Australia after 30 million tonnes of sand was extracted between 1980 and 2000 has been successful, with schemes such as planting Bitou bush ensuring that the sand dunes remain in fact despite the previous pollution and environmental degradation.

However, recent pollution disasters such as the Gulf oil spill in April 2010 puts this

theory, to mention, as the pollution of 30 square miles of ocean around the rig killed all fish, severely affecting the ecosystem and the overall fallow affecting swamps areas in New Orleans and fishing communities throughout Louisiana.

Overall therefore, international co-operation may be effective, but it is not essential if solutions are to be found to the world's pollution problems, as illustrated by the success of local scale developments.

### Examiner comment – Distinction

Part (a) makes some good contrasts between the Pacific and Indian Ocean with data from Fig. 7 being well used to support the points made. The answer could be improved by addressing the “To what extent” aspect of the question more explicitly.

Part (b) starts with a discussion of the limited effectiveness of the Kyoto treaty because of the impact of the non-signatory countries. The candidate then argues that local scale initiatives within a country can be much more effective, supporting this view with some convincing examples. The final paragraph provides a valid assessment.

## Example candidate response – Merit

(a) ~~To a relatively high extent does~~  
 Figure 7 shows that threats to coral reefs in the Pacific Ocean are different to the Indian Ocean to a relatively high extent.

Figure 7 shows 7 different threats to coral reefs; from tourism to pollution. However, the threats in the Indian Ocean are largely due to pollution, especially around the southern tip of India and in the Red Sea. Furthermore, other threats in the Indian Ocean include coral harvesting, sedimentation, overexploitation and tourism. Many of these threats are away from the coasts, as in the middle of the ocean.

Whereas, threats in the Pacific Ocean are predominantly dynamite fishing. Also, threats are poison fishing, sedimentation and pollution. In the Pacific, the majority of threats are along the coasts, and also there are many more threats than in the Indian Ocean. Thus figure 7 shows, to a ~~high~~ relative extent, (apart from the similar threats) that the coral reef threats are different in each Ocean.

b) I agree with this statement to a large extent. Man ~~there~~ has been degrading the environment ~~over~~ for hundreds of years, from building to destroying.

On 20<sup>th</sup> April 2010, the Horizon oil rig in the Gulf of Mexico exploded, killing 11 people and leaking millions of

barrel of oil. The oil rig is owned by BP Oil, an English company. Due to geographical separation, communication between the U.S.A. and the company was poor, and as a result, a vast number of sea habitats have been permanently destroyed and unknown effects for future wildlife. This is an ~~ex~~ example of poor cooperation <sup>from the 2 countries,</sup> resulting in an environmental disaster.

The Convention of Biodiversity Summit happened in Rio ~~de Janeiro~~ <sup>(Brazil)</sup> in 1992. It was a conference for international leaders to determine sustainability laws and act on environmental issues globally. Their outcomes include the sharing of information internationally, quotas on gas emissions, and a target for sustainability. Furthermore, the CITES scheme (Convention of international trade of endangered species) has implemented laws on the trading of certain materials and species. These ~~of~~ laws will decrease certain techniques for killing animals and therefore decrease pollution (like dynamite fishing & poison fishing which also harm the environment).

It is also important to have national co-operation to solve pollution. Environmental Impact Assessments (EIAs) are needed in the U.K. prior to any planning ~~for~~ permission given. It will reduce pollution for new building and keep the environment protected.

Overall, I agree with the statement to

a large extent; pollution is increasing and issues like global warming increasingly need more international cooperation to ~~set~~ as act fast and as a whole globe to collectively decrease environmental degradation.

### Examiner comment – Merit

Part (a) goes beyond description and draws some useful contrasts between the Indian Ocean and the Pacific Ocean. Information from Fig. 7 is well used to support the points made, although there is a tendency to revert to simple description later in the answer.

Part (b) tends to describe different initiatives, but never really addresses the evaluative part of the question needed to access the higher parts of the mark scheme. The CITES scheme is of marginal relevance on its own, but the candidate does link it clearly to pollution by quoting both dynamite and poison fishing.

## Example candidate response – Pass

Q6<sup>a</sup> To a certain extent, Figure 7 supports the view that threats to coral reefs in the Pacific Ocean are different from the threats in the Indian Ocean. This can be shown by the difference ~~and~~ amount of in coloured dots along the graph.

Within the Indian Ocean the prominent threat is pollution, ~~but~~ there is still pollution visible within the Pacific Ocean but not to the same extent. In the Indian Ocean there are approximately 25 red dots representing pollution compared with approximately 17 dots in the Pacific Ocean?

Although pollution is a bigger threat to the coral reefs, by studying Figure 7, there is a higher concentration of threats within the Pacific Ocean. These consist of higher amounts of dynamite fishing, poison fishing and sedimentation.

Therefore to a great extent Figure 7 does support the view that the threats to coral reefs in the Pacific Ocean are different from the threats in the Indian Ocean, more because there is more quantity of the threats rather than variety. ✓

b 'International co-operation is essential if solutions are to be found to the world's pollution problems.'

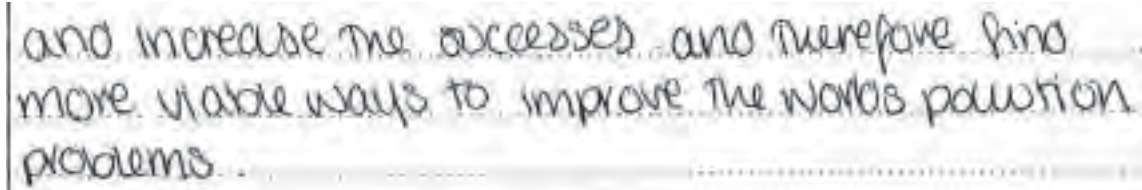


To a great extent, it is very important that international co-operation is determined in order to find solutions to the world's pollution problems.

With example of specific national governmental campaigns such as 're-use, recycle' in the UK, campaigns like this should be taken internationally so that other countries begin to benefit from the positive outcomes such as reducing land fill which ultimately isn't good for the environment. Materials that are ~~not~~ taken to landfill sometimes have to be burnt to make more space for rubbish. The gases and toxic fumes that are created, contribute to global warming and therefore will be seen as a ~~the~~ world's pollution problem.

At global meeting like the G8 meeting, it was decided that all countries would attempt to decrease their carbon footprint and greenhouse emissions. This level of decrease varied from country size. However larger countries such as USA struggled to reach their goal. This however was an attempt ~~to~~ at international co-operation to solve world pollution.

One of the main factors that should be taken into account is the ability to learn of other countries ~~base~~ personal successes and failures at attempts to reduce their own pollution problems. Once this has been noticed that is when international ~~of~~ co-operation should take place in order to improve



and increase the successes and therefore find more viable ways to improve the world's pollution problems.

### Examiner comment – Pass

Part (a) makes a genuine attempt to go beyond simple description and address the question, but there is only limited use of supporting data from Fig. 7.

In part (b) there is some reference to international co-operation, but supporting detail is rather thin. There are also two paragraphs on what should (or could) happen, rather than discussing what actually has happened. A logical order is lacking from the response and the treatment is superficial.

## Question 7

With reference to your own investigation of environmental degradation, evaluate the extent to which the use of secondary sources enhanced your investigation.

Begin by stating the question or hypothesis that you investigated.

[15]

### Mark scheme

Answers should be based firmly on their own investigations, quoting examples drawn from this.

Clearly, much depends on the investigation and the choice of data. Candidates should be aware of the limitations of their own primary data (e.g. spatial, temporal, scale) and the way in which secondary data complements their primary data and enhances and extends their investigation.

In terms of evaluation a range of responses is acceptable from 'to a large extent' to 'to a small extent' depending upon the investigation.

L4 (13–15 marks)

The candidate displays a high order understanding of the ways in which secondary sources enhanced (or otherwise) the investigation with good support. Evaluation to the fore.

L3 (10–12 marks)

Good understanding of the ways in which secondary sources enhanced (or otherwise) the investigation. The answer makes appropriate reference to the candidate's own investigation. Well focused on the question.

L2 (7–9 marks)

More focused on the candidate's own investigation. Describes the use of secondary sources, but only in a superficial fashion.

L1 (0–6 marks)

Discussion lacks detail. Perhaps descriptive only, with only piecemeal comments about secondary sources. Little reference to candidate's own investigation.

[15]

Example candidate response – Distinction

7. Hg

Location: Silver House, Grewmere, Lech District, Cheshire, UK

Hypothesis: Levels of erosion will be greatest at the nearest to the car park at Grewmere town along the Silver House bridge.

Map:

The use of secondary sources in our investigation can be seen as being particularly useful in providing a context for our overall investigation as well as specific information we were not able to acquire on our visit to the site in March 2010. In particular, the use of satellite maps, OS maps and information from the Lech District Natural Park Authority provide effective at enhancing our

investigation.

Firstly, the Ordnance Survey maps provided a local context for our investigation, highlighting the catch of Greenac Lake and the proximity of Greenac house, seen on the sketch map. As well as providing our investigation with background, in particular, this was useful to us for features such as the overall height of Silver How (394m) which had informed our investigation by allowing us to explore possible causes for erosion along the footpath other than human over-exposure from Greenac Farm. This proved vital when, on analysis of our data on depth of peat through Spearman's rank correlation ( $1 - \frac{5 \sum d^2}{n(n^2 - 1)}$ ), found a very weak correlation was found between distance from the peat and depth of peat (as a proxy for overall erosion) (-0.05), well below the significance value of 0.35 below which we were forced to abandon our hypothesis. Thus, the data only allowed us to examine exposure to the influence of wind, as well as the fact that the footpath does correlate on the influence of potential influence which led us to have to reject our hypothesis.

Secondly, information from the Loch District Natural Park Authority (2019) helped us to identify during our ~~study~~ investigation, with the Firth Falls charity highlighting the profile of footpaths that we used as

a potential site of high level of  
 Lichen cause erosion. Moreover, a  
 statistic from the CDNPA that people rarely  
 walk more than 200 metres from their  
 car led us to design an investigation  
 tracking the path along 500m to  
 see if we could prove, or dis-  
 prove the given statistic of path. Data  
 available through fix-it-fells for the same  
 stretch of path also provided a valuable  
 critique of method as our results diverged  
 significantly as well as providing a greater choice  
 of data (rather than just one period) to compare  
 the effects of seasonality on the erosion profile  
 of the path.

Finally, satellite imagery ~~could~~ through  
 providers such as Google Earth and MultiMap,  
 can be seen as an example of a secondary  
 source of non limited use to our investigation.  
 This is due to the fact that much of the  
 information available through the two already  
 been ~~already~~ collected thanks to the OS Maps  
 as the lack of information available  
 through the providers such as the exact date  
 of the image, reduced its effectiveness in  
 enhancing our investigation as we were unable  
 to tell whether it was contemporary or  
 not.

To conclude, secondary sources of, on  
 grounds the whole, greatly enhanced our investigation,  
 both in the creation of a hypothesis but

importantly in an later analysis to reason why we were hard to see reject our hypothesis as they provided possible other causes, not measured during our investigation, for the erosion seen. 54

### Examiner comment – Distinction

There is good understanding of the ways in which secondary data was used to enhance the investigation. Particular examples taken from the candidate's own investigation are explained in detail, e.g. measurement of distance which enabled a statistical analysis of the data to be carried out. Evaluation is to the fore.

## Question 8

With reference to your own investigation of environmental degradation, discuss the extent to which your study supported the geographical theories or concepts being studied.

Begin by stating the question or hypothesis that you investigated.

[15]

### Mark scheme

Answers should be based firmly on their own investigation, quoting examples drawn from this.

Clearly, much depends on the investigation. In terms of evaluation a range of responses is acceptable from 'to a large extent' to 'to a small extent' depending upon the investigation, but be wary of those which claim their study completely confirmed what it set out to achieve.

L4 (13–15 marks)

The candidate displays a high order understanding of the limitations of the final outcomes. Evaluation is to the fore and well supported by examples drawn from the investigation.

L3 (10–12 marks)

Good understanding of what the investigation actually proved. The answer makes appropriate reference to the candidate's own investigation. Well focused on the question.

L2 (7–9 marks)

More focused on the candidate's own investigation. Attempts to address the question, but only in a superficial fashion. Only limited support from the candidate's own investigation.

L1 (0–6 marks)

Discussion lacks detail. Perhaps descriptive only, with little attempt to address the question. Little reference to candidate's own investigation.

[15]

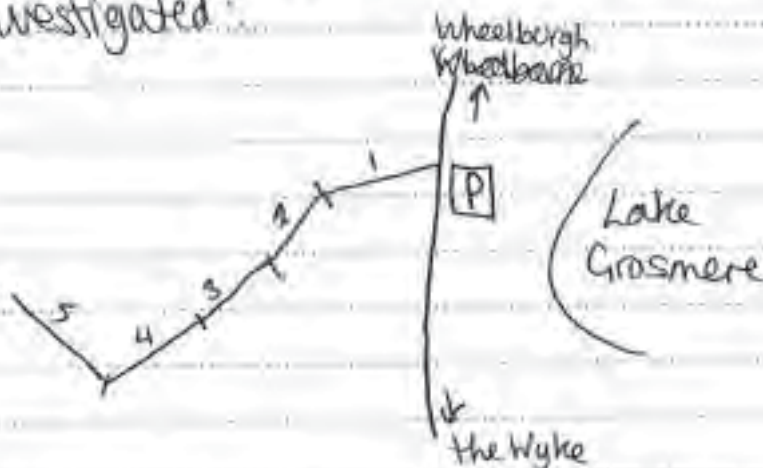


## Example candidate response – Merit

8. Question: Is there an increase in environmental degradation with steepness of gradient on the Silver Howe footpath in the Lake District?

Our investigation sought to identify a link between environmental degradation and gradient on the Silver Howe footpath in the Lake District. We looked at gradient and degradation in the form of width of footpath, depth of footpath, vegetation cover and height and level of management. Our investigation was supported by 3 geographical theories which we concluded to support our study.

The map below shows the area that we investigated:



We split the path into 5 areas to make it stratified linear sampling. It was easy to manage in <sup>working</sup> groups of 4 with our group of 20 people.

Our first geographical theory was that trampling on the footpath increases environmental degradation. Trampling is when the carrying capacity of the footpath is exceeded and so vegetation is destroyed by walkers and soil is

compacted. Also friction from shoes, <sup>such as walking boots</sup> causes environmental ~~degrad~~ soil erosion. We knew that the Lake District receives 8.3 million visitors per year and a high percentage of these go walking. Thus this theory suggested there would be a high amount of environmental degradation due to trampling on this popular footpath.

Our second theory was that precipitation can increase environmental degradation on a footpath. High precipitation rates in the Lake District imply soil will be moist and thus crumble more easily under walkers feet. Also high surface runoff rates on steep gradients tend to carry soil and vegetation to pollute rivers below. Finally if rain is heavy enough and often if it has fallen onto dry land, it will cause soil erosion. Thus we thought that this path would suffer greatly from environmental degradation especially at steeper gradients where runoff would be stronger.

Our final theory was that of pressure from walkers feet, which would be stronger as the gradient got steeper to keep balance and climb the hill. Thus this led us again to predict erosion of the footpath would be ~~steeper~~ greater with higher gradients.

Our study supported our theories. The footpath was highly eroded in areas and it was fairly wide and deep in many parts. However we noticed that ~~the~~ the width of the path increased with

gradient when we plotted a scattergraph and then carried out the Spearman's Rank test which showed a positive correlation. Also we found vegetation cover to be lower in the steeper areas of the graph ~~in zones 3 and 4~~ ~~in zones 3 and 4~~ in zones 3 and 4 where the gradient rose ~~and~~ vegetation cover fell. However the vegetation cover in zone 5 of the footpath was fairly high but we realised that this was due to it being so steep (a gradient of  $20^\circ$ ) that it put off walkers from climbing it.

To conclude we used 3 theories (trampling, precipitation and foot pressure) to predict that footpath erosion and environmental degradation would increase with gradient. Our investigation found this to ~~be~~ be correct. However vegetation cover and environmental degradation was less in the steepest area as this gradient put off walkers.

### Examiner comment – Merit

The answer starts encouragingly by setting out the theories under investigation in some detail. However, the evaluative aspect of the question is only addressed at a fairly superficial level and is not tied strongly to the candidate's own investigation.

## Section C: Deprivation

### Question 9

Study Figs 8 and 9 which show information about Barnsley, a borough in South Yorkshire, UK.

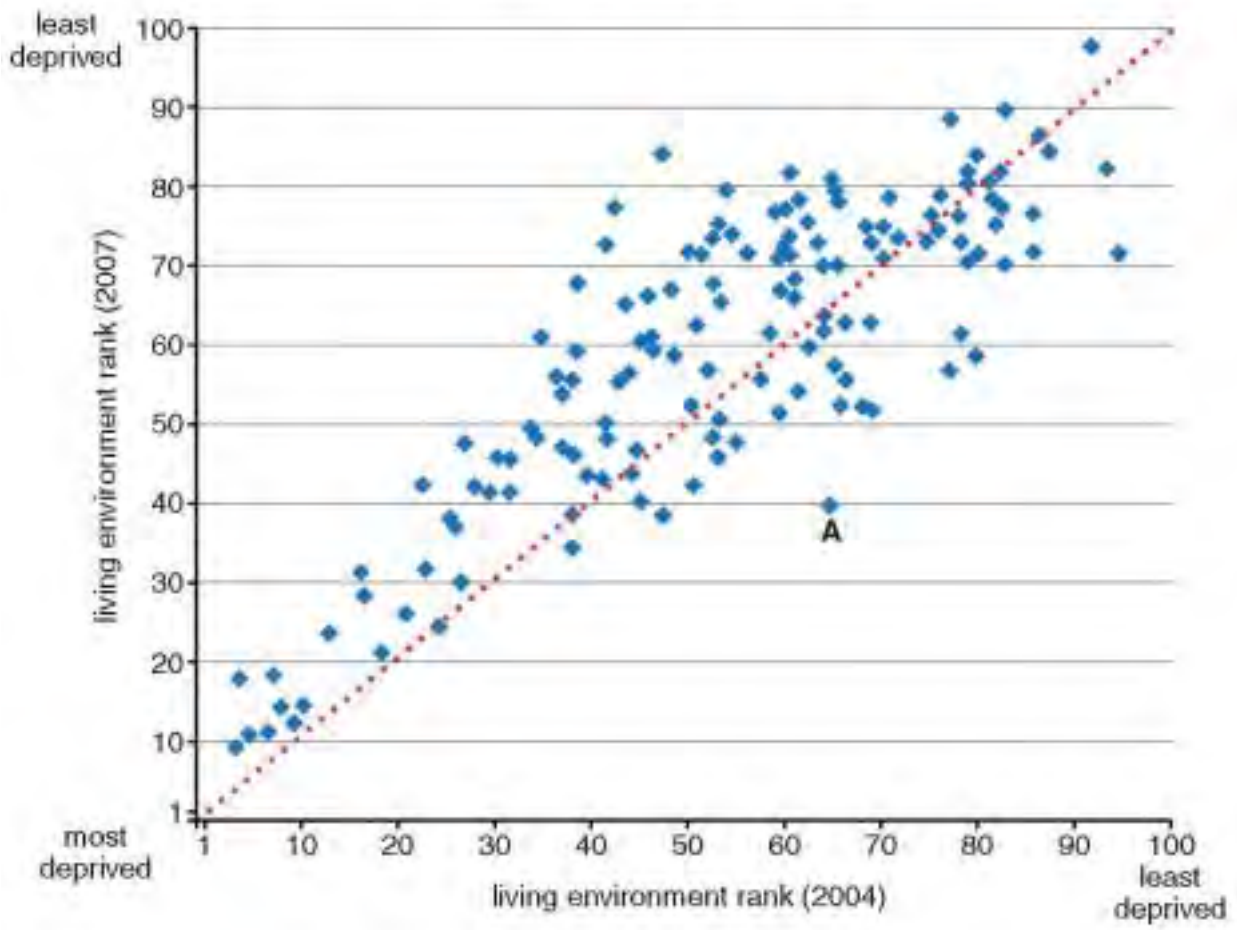
Fig. 8 ranks the living environment of areas in Barnsley in 2004 and 2007, with 1 being the most deprived and 100 being the least deprived.

Fig. 9 shows the distribution of income deprivation in Barnsley in 2007.

- (a) Giving evidence from Fig.8, state whether the living environment in area A on the graph improved or declined from 2004 to 2007. [2]
- (b) Using Fig. 8, how far is it true to say that the living environment improved for all but the least deprived areas in Barnsley between 2004 and 2007? [4]
- (c) To what extent does Fig. 9 show an East-West division to income deprivation in Barnsley? [6]
- (d) Assess the usefulness of Figs 8 and 9 to those responsible for reducing deprivation in Barnsley. [8]

Fig. 8 for Question 9

Living environment in different areas of Barnsley, 2004 and 2007



**Key**

..... no change from 2004 to 2007



## Mark scheme

- (a)** 2004 ranked 65th, 2007 ranked 40th  
Declined [2]

- (b)** A larger number of least deprived (rank >70) areas are below the line (decline)  
However, still some above the line (improve)  
Most deprived areas (rank <30) – none below the line (improve)  
Some judgement (perhaps agreeing or challenging the assertion in the question)

Suggest mark flexibly depending upon quality of judgement and support.  
3/1 or 2/2 for description/judgement. [4]

- (c)** Expect comments in general agreement. Quality may be indicated by support from the Fig, the nature of the judgement and the identification of anomalies.

L3 (5–6 marks)

Clear and detailed assessment, acknowledging the anomalies.  
Extensive and accurate data support.

L2 (3–4 marks)

Clear description of the pattern, there may be some awareness of the anomalies.  
Provides data support.  
An attempt at evaluation.

L1 (0–2 marks)

Descriptive – Limited awareness of the pattern or no reference to the question.  
Data support inaccurate or lacking. [6]

- (d)** Deprivation has many dimensions (e.g. economic, social, environmental) and the resources given are limited in scope.  
Fig. 1 shows “living environment” but there is no indication of how this has been determined.  
Additionally, it deals with ranks and therefore does not show absolute changes in living environment.  
However, a pattern does emerge and it is useful for this reason.  
Fig. 2 deals only with income, but does reveal a clear spatial pattern.

Good responses will deal with the pros and cons of each resource, have a sound grasp of deprivation and probably acknowledge other resources which could be useful (e.g. other dimensions (domains) of deprivation, the views of local residents, experiences from other improvement schemes etc.).

L3 (6–8 marks)

Clear and detailed analysis of the usefulness and limitations of the resources. A sound grasp of deprivation. The resources are well used to support the points made. A clear understanding of other resources which would be of use.

L2 (3–5 marks)

Some analysis of the usefulness and limitations of the resources, which may be unbalanced. Provides support for some observations. At the top end there may be a limited awareness of other resources which might be useful.

L1 (0–2 marks)

Little understanding of the usefulness of the resources; perhaps simple description.  
Support is inaccurate or lacking. [8]

## Example candidate response – Distinction

- a) In 2004, A scored about 65, whereas in 2007 it scored only 40, therefore it declined. ✓
- b) Any blue square above  $y=70$  is an area with improved living environment. The general pattern is that most ( $\approx 75\%$ ) of areas improved. Certainly in the bottom 40, virtually all areas improved. Contrary to the statement posed, a high percentage ( $\approx 75\%$ ) of areas in the 40-80 bracket did not improve but declined. For the least deprived areas, the ~~general~~ statement is relatively accurate: the majority between 80-100 declined although there were 5 anomalous improvements and 3 areas that experienced no change. ✓
- c) It is a fair assessment that the west of Barnsley is significantly less deprived than the east. Taking the divide through Darton West, Dodsworth and Rotherham, only one area – about  $\frac{1}{5}$  km – is not blue or not at least between 51 and 100 on the index of deprivation. The two big areas, Penistone West and Penistone East, fall into the categories 61-70 and 71-100 respectively. So, in general terms there is a divide but looking more closely at the east side there is a dramatic range of spatial inequality. ✓ For example, in Stairfoot an area of 71-100 is directly adjacent to an area between 0-10. This granular patterning is true for the entire east side, i.e. areas of similar deprivation are not clustered together but spread diversely and widely. In this way, it is clear that the west is less deprived overall than the east, although variation on the east side is great, with <sup>multiple</sup> areas filling each bracket in the key. ✓



d) There are a number of issues with the usefulness of Fig. 8 as a graph. Essentially, it only tells you a general, overarching trend of improvement and decline. It gives no indication of what actual area each blue square represents. It gives no indication of the geographical size or population size of each area. It would be an encouraging graph for those reducing deprivation in Barnsley because it shows that from (2004) to (2007) their work has been quite successful, but in no way would it help target the areas in decline. One useful aspect of the graph is that it is easy to detect outliers (anomalies) because they lie quite obviously away from the dotted red line.

The coloured map of Barnsley is quite useful. It gives a scale (and a barrow) - as well as a visual observation of each area size - which helps put each area into relation. However, it gives no indication of population density. This is very important as Penistone West could be predominantly fields with a couple of villages inhabited by elderly people on good pensions and so its significance as being less deprived is perhaps not as important as dark blue areas in the East which may be more populated. Although the colour scheme is quite clear I think it could be better. To my eye, <sup>bright</sup> red stands out more than the berries. Perhaps it would be better to choose colours from the same wheel (e.g. red orange yellow - white) or even shades of grey, from white to black (the human eye best differentiates the white - black colour scheme). Another good aspect is - unlike the graph - it gives specific names so to the people trying to reduce deprivation they would know exactly which areas needed most support.

### Examiner comment – Distinction

Part (a) gains full marks. In part (b) the candidate makes good use of the resource to answer the question, even challenging the given statement and supporting this challenge with evidence. In part (c) the answer focuses on the question, identifying the variation in deprivation in the East of the map and providing good evidence from the resource to support the points made. Part (d) is a good, solid answer making a number of relevant points about the usefulness and limitations of Figs 8 and 9. It could be improved by brief discussion of other resources which might be of use.

## Example candidate response – Merit

C9

- a) The living environment in area A declined from 65 in 2002 to 40 in 2007, a drop of 25 ranks.
- (b) On the graph Fig 8, a blue dot to the left of the red line indicates an area in which the conditions have improved – maybe not by much, but some. The vast majority of the dots are to the left of the line, but there are a significant of middling to least-deprived areas which have worsened between 2002-2007.
- (c) The East-West divide for income deprivation in Barnsley is striking. Taking a blue dividing line to be between Parton East along the Western border & border of Parton East, ~~and~~ Old Town, Kingstone, Warsbrough and Rockingham, the vast majority of areas to the west of that are ~~but~~ in the 61-70% or 71-100% brackets (100% being the least deprived and therefore richest). However, ~~but~~ it must be noted that there are significant patches of higher income areas amongst ~~amongst~~ in the ~~to~~ more deprived east of the city, particularly in the Stairfoot - Darfield - Airedale area and between Parton East and Ropyston in the centre and north respectively. This is

(d) These two diagrams form together form a useful tool for city council planners (assuming that the names of ward areas can be linked to dots in Fig 8, because otherwise it shows up specific area's rank, just general trends.) ~~Fig~~ This is because they are measuring different, but complementary, sets of data. Income inequality is a useful tool for analysis of deprivation patterns, but isn't perfect - it doesn't show access to amenities, building density, building conditions, or any number of other factors which play a part in reducing - person's quality of life. ✓ Fig. 8's living environment survey does, and probably measures a number of other factors including those above, such as litter, noise or congestion, as well. Taken together, however, they provide a useful map for officials and NGOs to target not only low income areas but also those with - lower quality of life, for whatever reason. ✓

### Examiner comment – Merit

Part (a) gains full marks. In part (b) the candidate answers in a very general fashion, failing to use the graph to convincingly support the answer. Part (c) is a good solid answer, using detail from the map to support the points made. Unfortunately, the answer seems to stop in mid-stream. In part (d) some good points are made about the usefulness, or otherwise, of Figs 8 and 9. There is limited awareness of other dimensions of deprivation which may be useful.

## Example candidate response – Pass

9. <sup>score of the</sup>
- a) The living environment in Area A on the graph went from 65 in the living environment rank in 2004, to 40 in the living environment rank in 2007. This shift downwards towards 0 in the rank represent a decline in living environment.
- b) Evaluating the figure 8 it is clear that overall there is a general decline in deprivation over all areas of Burslem between 2004-7. This is because for more areas are placed ~~above~~ on the left side of the line of no change therefore their living environment rank has improved between 04-07. But to answer whether the living environment improved for all but the least deprived areas, I drew a <sup>straight</sup> line between least deprived in 04 and 07. Below this line i.e. previously most deprived, ~~most~~ have improved in fact there are only <sup>perhaps</sup> ~~few~~ below it. Above the line i.e. least deprived there is a more even split between those who have improved and those who have declined. Therefore it has overall stayed the same for the least deprived <sup>in 04</sup> whereas there has been a marked improvement for the most deprived in 04.
- c) Figure 9 does show a significant East-West divide in income deprivation. On the one hand there is the affluent West with the less affluent East. Places like Penistone West and Penistone East are large and least deprived. They extend very <sup>(many km) (2-10km)</sup> ~~far~~ <sup>far</sup> ~~westwards~~ <sup>westwards</sup> from the centre suggesting that they're the ~~best~~ <sup>best</sup> suburbs. This shows that many are ~~of~~ <sup>of</sup> affluent families who tend not to be drawn into the centre but instead live further out and travel to work. These areas will

have the best schools and amenities. ~~From~~ More East around central it follows a similar city layout of some of the least deprived wards. Close to some of the most deprived. For example in Stratford in which tone ~~is~~ <sup>is</sup> a red (0-10) most deprived whereas to the east is an ~~(70-100)~~ <sup>(70-100)</sup> least deprived area. This is the general theme for the center and the East, cluster of almost less deprived next to many of the least deprived. From Dedworth East most very varied spectrum of colours (i.e. levels of deprivation). There are lots of middle more areas especially in Worsbrough (south of center). There are also many large clusters of most deprived (red) just outside the center and East. But there is an anomaly in the west. In Perstone West where there is a single lower more area. This could be a council estate and this variation is common in cities. Figure 9 shows definite East-West division but as with all other inequalities aren't spatially restricted and there are many patches amongst opposite colour areas.

- d) Figures 8+9 offer ~~different~~ <sup>different</sup> but equally useful depiction of data for tackling ~~the~~ deprivation in Barnsley. Figure 8 shows that inequality is actually falling in Barnsley the most deprived are improving and the least deprived are held flat at the same point. Whilst encouraging in that there is a clear improvement in the lower end, it does provide evidence that it must ~~not~~ be careful not to allow the least deprived to fall as that may have an adverse effect. ~~Results~~ <sup>Results</sup> on entire periphery and structure in the economy may fall. It does also show an overall improvement in quality at quite a high rate in a lot of areas but again it's important that this doesn't discourage any further improvements and work.

just rather the knowledge of positive effects.

Figure 9.12a is a more useful tool in depicting future improvements. Whilst it does show where many of the risk areas lie in the West it also more importantly locates the poorer areas in the East. It highlights the clusters and will allow those responsible for reducing deprivation to target the clusters of inequality for regeneration and guidelines. It shows a shift of wealth from the centre outwards, few would be a problem to solve for the council as the 'dead city centre' are one of the most <sup>serious</sup> problems in the UK at the moment. Techniques such as Central Council funded shopping centres in the Centre like West Quays in Southampton could be considered to stimulate interest and halt the possible problem of a dead core. Figure 9 provides a relatively accurate depiction of deprivation but due to its necessarily general data it may be difficult to specifically target certain areas. Due to many of the things heavily decided - least/most deprived this will cause the council to have to consider any action on a ~~small~~ more targeted scale than before. This also relies on more being the major signal of deprivation, it may be closer to have a certain number over so people's standard of living there may be similar to the more expensive East despite the income disparity. Equally Figure 9 only shows living environment disparity, it doesn't factor in many other things such as life expectancy, ~~the~~ literacy which may be major problems. It also fails to locate the areas of deprivation and just shows the overall. So unless ~~you~~ you have the data alongside it it's difficult to extract the relevance.

### Examiner comment – Pass

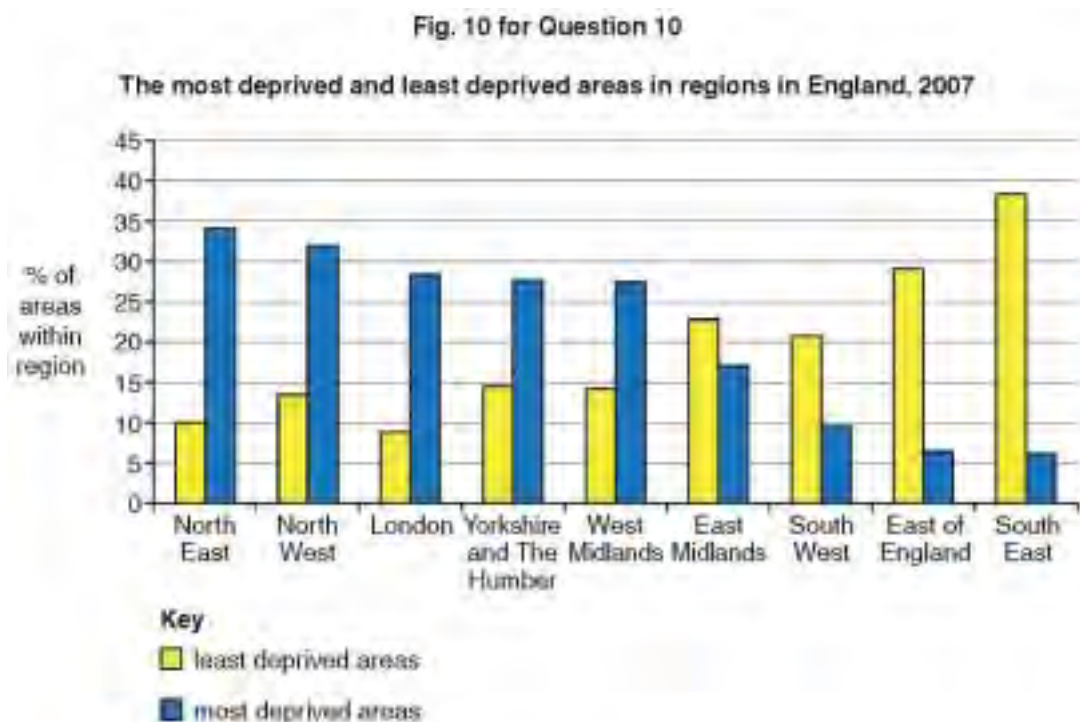
Part (a) gains full credit. Part (b) is not very clear, partly because reference to the diagram is very general. However, “most deprived, most have improved” in line 9 is creditworthy. Part (c) identifies an East-West pattern on Fig. 9 and there is an awareness of some of the anomalies. Reference is made to the map to support the existence of an East-West division. However, there is very little attempt to address the evaluative part of the question. Part (d) provides an analysis of some of the uses and limitations of Figs 8 and 9. There is a limited awareness of some of the other dimensions of deprivation which may be useful.

## Question 10

Study Fig. 10, which shows the most deprived and least deprived areas in selected regions of England in 2007. Fig. 11 locates the regions.

- (a) Using Fig. 10, discuss the extent to which there is a North-South divide in deprivation in England. [5]
- (b) 'Though income deprivation should be recognised in its own right, it should not be the only measure of deprivation.'

From your wider study of deprivation, to what extent do you agree with this statement? [10]





## Mark scheme

- (a)** To a large extent, although the anomaly of London should be pointed out for a full answer.  
 Most deprived areas – the SW, E and SE all have low (<10%) of the most deprived areas; exception – London (27–28%).  
 Least deprived areas – SW, E and SE all have high (21–38%); exception London (only 8%).

L3 (4–5 marks)

Clear and detailed analysis of the degree to which the graph supports the N/S divide. The anomalies are clearly identified. Data is well used to support the points made.

L2 (2–3 marks)

A valid attempt to address whether the N/S divide can be supported or otherwise. Data is used to support the points made. Less importance placed on the anomalies.

L1 (0–1 marks)

Limited ability to interpret the graph, may simply describe. Use of data is inaccurate or lacking. No attempt to address the N/S divide. [5]

- (b)** Candidates should be aware that deprivation has a number of dimensions (e.g. income, employment, health, crime, access etc.) and therefore we should expect them to largely agree with the statement. One legitimate approach would be for candidates to draw a distinction between poverty and deprivation and go on to elaborate on this. Exemplar support will depend very much on the candidate's own studies, but may not be confined to a MEDC context.

L3 (8–10 marks)

Evaluation is to the fore with sophisticated exemplar support. There is clear consideration of the multi-dimensional nature of deprivation.

L2 (5–7 marks)

Addresses the evaluative element of the question, but the evaluation (probably agreement) is expressed without any depth of argument or support.

L1 (0–4 marks)

The approach is largely descriptive and piecemeal.  
 No attempt to address the question. [10]

## Example candidate response – Distinction

10a From looking at the graph we can see several things. The chart shows the percentages for most and least deprived within each region. The North East and North West are the poorest have the highest proportion of most deprived areas, both with over 30%. Comparing these two northern most areas in the UK with the two most southern regions, the South West and the South East. The South West has less than half the percentage of most deprived areas, and more than double the number of least deprived areas, compared to the North East. The South East shows even greater contrast, with just over 5% of most of the region being the most deprived areas. Yorkshire and the Humber is also very comparatively deprived, having less than half the percentage of least deprived areas compared to the East of England. The West Midlands has very similar percentages to the East Midlands, which slightly spoils the North/South divide pattern. There is of course London which has five times the number percentage of most deprived areas compared to the least deprived area, the South East. Apart from London, there seems to be a very clear North-South Divide, and London has to be discounted due to the fact that it's least deprived it is a very large city which has urban issues. It does of course not make it a perfect pattern, but there is still a pattern none the less.

b) Income deprivation is of course an incredibly important measure of deprivation and poverty, however there are many other important factors.

On a global scale, there are several indices that can measure deprivation. Many factors contribute to deprivation.

Unemployment contributes most to deprivation, as long term unemployed are unlikely to be hired for a new job, and although they may be able to live through welfare support and council housing (thus have an income), they will be socially excluded.

Environmental quality contributes to deprivation, as bad quality housing can affect attitudes and affect health. In one

of Rio's favelas, Rocinha, 76% of people have access to good sanitation. Although this is an improvement on what it used to be, there are still 24% of people having to throw sewage into the street or bins. This is due to the bad housing prevalent within the favelas.

In Kolkata, 1/3 of the population lives in 'Bustees', houses made of mud. These get washed away or damaged, or even washed away during the monsoon season.

Bad environmental quality inevitably leads to health problems. In Tower Hamlets, one

of the most deprived areas in the country, 42% of men died prematurely in 2002. A large proportion of these deaths were caused by degenerative diseases such as lung cancer and heart disease, lifestyle diseases which are usually an indicator of smoking and a bad diet, so commonly

associated with poorer areas. During the 1970s, 80s and 90s many miners in County Durham, Lancashire and South Wales experienced lung related health problems. These diseases ~~requiring~~ impoverished those who had them. Education is also another very effective measure of deprivation. In 1996 only 17% of GCSE students in Tower Hamlets received 5 grades A\*-C. ~~This ~~is~~ leads to~~ It is harder to get a good job with poorer education, thus leading to lower wages, and a more deprived life.

On a Global scale, there are several indices of deprivation that use different different measures, along with income to measure poverty. There are different versions of the HDI index, the one for poorer countries including % of children underweight and ~~and~~ access to clean drinking water.

It is important to note that although income deprivation should not just be measured in its own right (due to the other measures outlined above), income is usually indicative of deprivation, as bad health, bad housing, a bad education and unemployment usually lead to a low income. This is ~~where~~ <sup>why</sup> the Indices of Multiple Deprivation, which measures, income, environment, health, skills, and unemployment, gives a high weighting to the income index component. Hence I agree ~~to~~ with the statement to a certain extent, but if I were to pick one measure I had to use to measure deprivation it would be income.

## Examiner comment – Distinction

In part (a) there is a good attempt to assess whether there is a North-South divide visible in Fig. 10. The points made are well supported by reference to the resource. London is identified as an anomaly, but the justification for discounting it is not very robust.

Part (b) discusses the different dimensions of deprivation, illustrating them with exemplar material drawn from countries at different levels of development. The concluding paragraph makes a valid point about the importance of income and, especially, the controlling effect it can have on other dimensions of deprivation.

## Example candidate response – Merit

10a) The graph indicates a relatively strong correlation between ~~the~~ ~~North~~ ~~South~~ more deprived areas in the North and less deprived areas in the South. There are two general trends. Firstly, the number of most deprived areas cuts from  $\approx 34\%$  in the North East to  $\approx 7\%$  in the South East. Secondly, the number of less deprived areas increase from  $\approx 10\%$  in the North East to  $\approx 33\%$  in the South East. However, each pattern is not completely straightforward. For example, London is not in the North but ranks closely to the NE and NW in number of most deprived areas. It is only in the last four categories – E-Midlands, SW, E. of England and SE – that the blue bars really descend and the yellow bars really ascend. Again, London is an anomaly with a relatively small number of least deprived areas. Although for least deprived areas the pattern is more conclusive.

Overall, despite slightly uneven trend, the general ~~gap~~ deprivation gap between the N and S is made apparent by the graph.

5) Income deprivation is fundamental in assessing deprivation as a whole. In 1982, Karl White conducted the first meta-analytic review of the relationship between SES (socio-economic status) and AA (academic achievement). For this question AA is largely irrelevant but to SES is calculating deprivation. He assessed that there would be inherent ambiguities in any such research because of the big differentiation in indicators used. He agreed with the tripartite nature of deprivation conducted by Duncan, Featherman and Duncan's (1972) study. The three crucial factors were: parental income, parental education and parental occupation. So we see that although income is crucial, some measure of family environment

and parental example is also important.

AA McLeod (1998) - who analysed the relationship between deprivation and child development - and Entwistle and Astone (1996) assessed three main categories essential when considering deprivation. Firstly, how research has changed. Past research focused solely on paternal income and paternal education. Nowadays, maternal education, family income and some measure of family structure are considered important. Secondly, they considered the changing structure of society important. (They worked in America). In the US, parental education improved dramatically in the 1990's and children born in 2000 had much better educated parents than those born in 1980 (US Dep. Education). Furthermore, 68% of 15-18yrs had one sibling in 1970 compared to 73% in 1990. This indicates that smaller family size reduces deprivation. Thirdly, that moderating factors should be included such as race/ethnicity, neighbourhood assessment as a whole and education.

Overall, although income is important there are many factors that should be considered. The HDI measure includes literacy rate, infant mortality rate and employment rate. For LEDC's factors such as water quality (and access), life expectancy and family size are also considered.

### Examiner comment – Merit

In part (a) there is a good attempt to address the question. Material is taken from Fig. 10 to support the points made with discussion of the anomaly of London being well handled.

Part (b) discusses past research (some of it quite dated) but fails to integrate it convincingly into answering the question as set. The concluding paragraph identifies aspects of deprivation other than income but, again, fails to address the evaluative part of the question.

## Example candidate response – Pass

10.

- a) Figure 10 clearly shows a North-South divide in England. North West and East and Yorkshire ~~are~~ all have high proportions of most deprived areas ranging from 28% to 34%. West Midlands is also in the group of the ~~most~~ North with most deprived but weighting least deprived 27% to 14.5%. East Midlands, South West and East of England all have ~~more~~ more less deprived areas than more deprived areas with the general trend of 6% to only 16% of most deprived but ~~are~~ 21% to 38% least deprived. A significant anomaly in all of this is London, ~~is~~ very southern yet has high most deprived of 28%. This is due to its city structure and ~~is~~ due to most of its top urban communities from surrounding rich areas.

There is a clear North-South divide with Midlands split East/West. London is an anomaly but with every south areas having more less deprived than most deprived and the North area having more most deprived than less deprived. It is clear that deprivation is more prevalent in the North than it is in the South.

- b) Though income deprivation is an incredibly useful source of information in comparing differences between regions and areas it is only one value and other factors are required that play major roles so it is agreed that it shouldn't be the only measure of deprivation.

Income only shows the ~~income~~ ~~into~~ ~~the~~ ~~country~~ ~~needs~~ other factors to be taken into account to show ~~that~~ ~~the~~ ~~cost~~ where it varies. Life expectancy, literacy, costs of living -- are all indicators of deprivation.

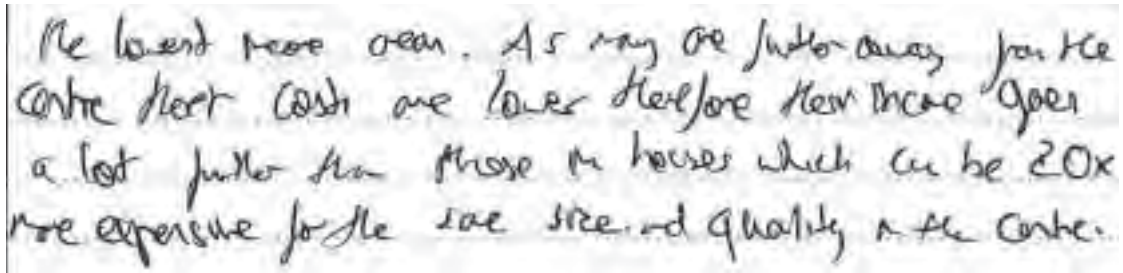


~~on the~~ These can be useful but used alongside each other they can help show a ~~more~~ fuller picture. This can be seen on a ~~national~~ Global, National and Regional scale.

On a global scale this is shown with a difference between cost of living in developing and developed countries. Many live in Africa on close to \$1 a day. Some are able to support themselves on this but in ~~Africa~~ \$1 wouldn't get you very far and you would be incredibly deprived. Whilst those in Africa are deprived they are still able to just about support themselves whereas that would be impossible in the USA. Here the differences in wealth then use weighted measures such as PPP (purchasing power parity) to show how far \$1 dollar would get you relative to each country. This allows for greater comparison referring to the level of deprivation across countries.

Nationally (UK) i.e. North South there is less of a difference. But living in the South is far more expensive so you need a higher level of income to reach the same ~~level~~ living standards of someone in the North. Therefore it is inaccurate just to measure income. Equally wages tend to be higher in the south to cover the higher living costs.

Regionally can be seen in London, UK. To see in June 10 it is relatively deprived but a lot of areas especially central and to the west are very affluent and easily some of the most expensive places in the country. They are only miles away from the most deprived i.e. East London (Hackney). Even regionally there is a vast gap ~~in~~ <sup>in</sup> cost of living costs. Whilst measuring the home would show



The lowest price area. As you go further away from the centre most costs are lower therefore most income goes a lot further than those in houses which can be 20x more expensive for the same size and quality as the centre.

### Examiner comment – Pass

In part (a) there is a good attempt to answer the question. The response is well focused on the evaluative part of the question and information from Fig. 10 is well used to support the points made. The anomaly of London is identified, but the explanatory comment is not required and gains no credit.

In part (b) the answer tends to be at a superficial level. The comments about Africa and the USA are too general to add much to the answer. The UK based paragraphs tend to be descriptive, almost ignoring the crux of the question. The conclusion (which appears in the first paragraph) has little to support it.

## Question 12

With reference to your own investigation of deprivation, discuss the extent to which your study supported the geographical theories or concepts being studied. [15]

### Mark scheme

Begin by stating the question or hypothesis that you investigated.

Answers should be based firmly on their own investigation, quoting examples drawn from this.

Clearly, much depends on the investigation. A range of responses is acceptable, but be wary of those which state their study completely confirmed what it set out to achieve.

L4 (13–15 marks)

The candidate displays a high order understanding of the limitations of the final outcomes. Evaluation is to the fore and well supported by examples drawn from the investigation.

L3 (10–12 marks)

Good understanding of what the investigation actually proved. The answer makes appropriate reference to the candidate's own investigation. Well focused on the question.

L2 (7–9 marks)

More focused on the candidate's own investigation. Attempts to address the question, but only in a superficial fashion. Only limited support from the candidate's own investigation.

L1 (0–6 marks)

Discussion lacks detail. Perhaps descriptive only, with little attempt to address the question. Little reference to candidate's own investigation. [15]

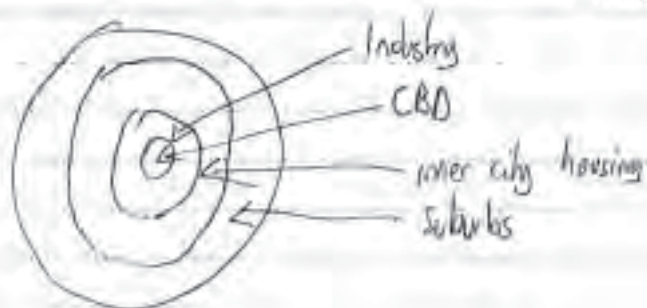
## Example candidate response – Distinction

12

There is a link between ~~IMD~~ <sup>Index of Multiple Deprivation</sup> (IMD) Score and Environmental quality.

For my coursework I studied the environmental quality for the five... least... five median... and... five most deprived SOAs in Oxford. I was inspired by a fieldtrip to Cardiff, where it was clear that the ungentrified inner city housing had much worse EQ scores than suburban areas.

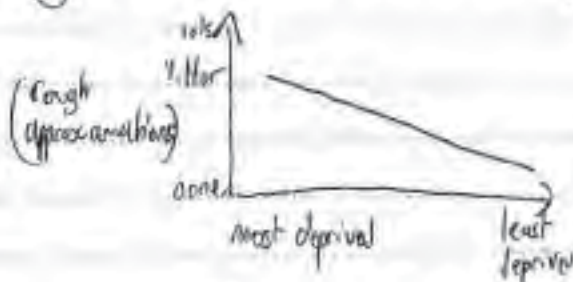
The theory for this follows the ~~Bidder Model~~ <sup>Bidder Model</sup> Burgess <sup>Model</sup>.



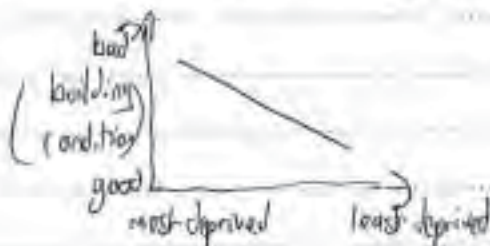
~~During the industrial~~ Industrial areas usually have low class residential housing near them in order to accommodate workers. The suburbs have larger, detached or semidetached housing to house office and management workers who commute by car or train. These houses command higher prices and council tax rates, so areas will be better maintained than others. The inner city housing will usually be terraced or apartments, as they are cheaper and more space efficient, they will also be poorer quality, and be less well maintained.

due to a large percentage being leased by a council or housing association to tenants who tend to care less as it is not their home.

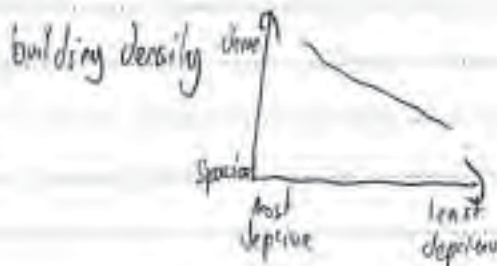
Much of my collected data supported this. The poorest areas within the Oakland are the Blackbird Leys Estate and ~~Baden and Sa~~ estate in Cowley, and the Barton and Sandhills estate. Blackbird Leys is situated next to the BMW Mini plant, which provides 4200 jobs. The richest areas are around the least deprived areas are around Headington and Summertown. These are some way out from the city centre, far away from industry and the CBD. Using my data, I used the product moment correlation coefficient to establish how good my lines of best fit on my graphs were



PMCC score  $\approx -0.5$



PMCC score  $\approx -0.5$



PMCC score  $\approx -0.5$

My data for building condition, density and litter showed clear trends, supporting the idea that EQ is related to deprivation.

However some of my data did not support this theory. Noise produced varied massively and the ~~depressed area~~ ~~scored~~ least deprived area scored quite badly due to its closeness to the A40. The busiest route into central Oxford. Public Spaces were also much more prevalent in the Blackbird Leys Estate than in the the median five and least deprived areas, which varied. This is probably due to the planners in the 50s, 60s and 70s, who were influenced by Le Corbusier's Unité d'Habitation, and the green areas around it, and incorporated this into the design.

However on the whole, and in the measures which mattered the most, such as building condition and density, which I believe are the most representative, my coursework supported the hypothesis.

### Examiner comment – Distinction

The geographical theory under investigation is outlined at the start of the answer. There then follows a brief summary of the findings, although more could have been made of the results of the statistical analysis, especially in relation to the extent to which the study supported the theory under investigation. There is a good understanding of what the investigation actually proved. The answer certainly relates to the candidate's own investigation and there is a focus on the evaluative part of the question, although there is room to further develop this aspect of the response.

Example candidate response – Pass

17. My Question was to evaluate the extent to which in four words in two boroughs of London, environmental quality reflects the IMD rank.

The four boroughs I chose were Camden, Golborne in Kensington and Chelsea and St. Pauls and Bethnal Green south in Tower Hamlets. Kensington and Chelsea is renowned for its affluency ~~and~~ But also its inequality so I chose Camden one of the more affluent areas and Golborne the least affluent area. Tower Hamlets is one of the most deprived areas in London ~~with~~ <sup>with</sup> areas under serious re-generation for the London Olympics as an attempt to reduce inequality. These areas have ~~different~~ ~~of~~ ~~the~~ ~~IMD~~ ~~scale~~ ~~St~~ ~~Pauls~~ ~~is~~ ~~one~~ ~~of~~ ~~the~~ ~~least~~ ~~deprived~~. Bethnal Green South is one of the most deprived. The results were as follows.

	IMD rank (out of 4)	Environmental quality survey (per year)	Score (out of 100) (per year)
Camden	506 (1)	15	30
Golborne	15 (4)	3	48
St Pauls	167 (2)	3	57
Bethnal Green South	22 (3)	-18	59

I used a survey of environmental quality which we created <sup>first</sup> on a pre-pilot survey for Cardiff with the school. The service and amenities survey was used to complement the environmental one as it offered more variables such as proximity to schools, hospitals.

Camden when looking at the ~~per~~ <sup>per</sup> data

of the IMD was expected to have the best environmental quality if it truly did reflect the ranking. This was reinforced with the highest EQ score and the highest Amenity score. Golborne was chosen for its high deprivation according to IMD. Whilst it performed poorly on the EQ and STA it was by no means the worst despite its IMD. St Helens was 2nd on the IMD behind Camden a long way ahead of Golborne on 4<sup>th</sup> yet it was very similar in its EQ result and STA. Bethnal Green South was 3rd on IMD not far off overall behind Golborne yet performed a lot worse in STA and EQ. These results whilst showing a general trend of best Camden best overall and St Helens not too far behind, it does have a major anomaly in the form of Golborne. Whilst lowest on IMD it does perform well showing that whilst it is similar it only reflects the results given by the secondary IMD data.

The reasons for which may be one of a few or a combination. For my secondary data I only used IMD which was last collected in 2000 and published in 2007 meaning it was 5 years out of date a major limitation. Another limitation to my results were numerical as whilst easy to compare they are subjective. I tried to reduce the limitation by creating a pair to get two varied opinions and decide on the correct result.

The concept of equalities being everywhere and nowhere being equal can clearly be shown by the inequality within boroughs. The environmental quality tend to reflect the IMD. This allows for major de-gradations (gentrification) to occur - like it has in Golborne.



rank but didn't ~~not~~ accurately correlate to it. This  
 allowing for inaccuracies shown that even if there  
~~is~~ a perceived equality with raw secondary  
 data the collection of primary data whilst inaccurate  
 and limited does allow for a comparison to be drawn.  
 It is true that the environmental quality reflected the  
 MD rank.

### Examiner comment – Pass

The answer describes the personal investigation – what was done and what the findings were. The theories and concepts under investigation are not made clear. There is some, brief, reference to the limitations of the study but the answer fails to address the 'extent to which' aspect of the question.

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