



**GCE**

**Geography**

**H081/02: Geographical debates**

Advanced Subsidiary GCE

**Mark Scheme for June 2019**

OCR (Oxford Cambridge and RSA) is a leading UK awarding body, providing a wide range of qualifications to meet the needs of candidates of all ages and abilities. OCR qualifications include AS/A Levels, Diplomas, GCSEs, Cambridge Nationals, Cambridge Technicals, Functional Skills, Key Skills, Entry Level qualifications, NVQs and vocational qualifications in areas such as IT, business, languages, teaching/training, administration and secretarial skills.

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This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by examiners. It does not indicate the details of the discussions which took place at an examiners' meeting before marking commenced.

All examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the report on the examination.

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## Annotations

Annotation	Meaning
	Highlight
	Off page comment
	Omission
	Indicates questionable points / comments
	Rubric error (place at start of Question not being counted)
	Level 1
	Level 2
	Level 3
	Level 4
	Development of point
	Irrelevant; a significant amount of material that does not answer the question
	Point has been seen and noted
	No Examples
	Must be used on all blank pages where there is no candidate response
	Evaluation
	Highlighting an issue e.g. irrelevant paragraph. Use in conjunction with another stamp e.g IRRL

## Subject-specific Marking Instructions

### INTRODUCTION

Your first task as an Examiner is to become thoroughly familiar with the material on which the examination depends. This material includes:

- the specification, especially the assessment objectives
- the question paper and its rubrics
- the mark scheme.

You should ensure that you have copies of these materials.

You should ensure also that you are familiar with the administrative procedures related to the marking process. These are set out in the OCR booklet **Instructions for Examiners**. If you are examining for the first time, please read carefully **Appendix 5 Introduction to Script Marking: Notes for New Examiners**.

Please ask for help or guidance whenever you need it. Your first point of contact is your Team Leader.



## USING THE MARK SCHEME

Please study this Mark Scheme carefully. The Mark Scheme is an integral part of the process that begins with the setting of the question paper and ends with the awarding of grades. Question papers and Mark Schemes are developed in association with each other so that issues of differentiation and positive achievement can be addressed from the very start.

This Mark Scheme is a working document; it is not exhaustive; it does not provide 'correct' answers. The Mark Scheme can only provide 'best guesses' about how the question will work out, and it is subject to revision after we have looked at a wide range of scripts.

The Examiners' Standardisation Meeting will ensure that the Mark Scheme covers the range of candidates' responses to the questions, and that all Examiners understand and apply the Mark Scheme in the same way. The Mark Scheme will be discussed and amended at the meeting, and administrative procedures will be confirmed. Co-ordination scripts will be issued at the meeting to exemplify aspects of candidates' responses and achievements; the co-ordination scripts then become part of this Mark Scheme.

Before the Standardisation Meeting, you should read and mark in pencil a number of scripts, in order to gain an impression of the range of responses and achievement that may be expected.

In your marking, you will encounter valid responses which are not covered by the Mark Scheme: these responses must be credited. You will encounter answers which fall outside the 'target range' of Bands for the paper which you are marking. Please mark these answers according to the marking criteria.

Please read carefully all the scripts in your allocation and make every effort to look positively for achievement throughout the ability range. Always be prepared to use the full range of marks.

**LEVELS OF RESPONSE QUESTIONS:**

The indicative content indicates the expected parameters for candidates' answers, but be prepared to recognise and credit unexpected approaches where they show relevance.

Using 'best-fit', decide first which set of level descriptors best describes the overall quality of the answer. Once the level is located, adjust the mark concentrating on features of the answer which make it stronger or weaker following the guidelines for refinement.

**Highest mark:** If clear evidence of all the qualities in the level descriptors is shown, the HIGHEST Mark should be awarded.

**Lowest mark:** If the answer shows the candidate to be borderline (i.e. they have achieved all the qualities of the levels below and show limited evidence of meeting the criteria of the level in question) the LOWEST mark should be awarded.

**Middle mark:** This mark should be used for candidates who are secure in the level. They are not 'borderline' but they have only achieved some of the qualities in the level descriptors.

Be prepared to use the full range of marks. Do not reserve (e.g.) highest level marks 'in case' something turns up of a quality you have not yet seen. If an answer gives clear evidence of the qualities described in the level descriptors, reward appropriately.

Quality of extended response will be assessed in questions marked with an (\*). Quality of extended response is not attributed to any single assessment objective but instead is assessed against the entire response for the question.

	AO1	AO2	AO3	Quality of extended response
<b>Comprehensive</b>	A wide range of detailed and accurate knowledge that demonstrates fully developed understanding that shows full relevance to the demands of the question. Precision in the use of question terminology.	Knowledge and understanding shown is consistently applied to the context of the question, in order to form a:  clear, developed and convincing analysis that is fully accurate.  clear, developed and convincing interpretation that is fully accurate.  detailed and substantiated evaluation that offers secure judgements leading to rational conclusions that are evidence based.	Quantitative, qualitative and/or fieldwork skills are used in a consistently appropriate and effective way and with a high degree of competence and precision.	There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.
<b>Thorough</b>	A range of detailed and accurate knowledge that demonstrates well developed understanding that is relevant to the demands of the question. Generally precise in the use of question terminology.	Knowledge and understanding shown is mainly applied to the context of the question, in order to form a :  clear and developed analysis that shows accuracy.  clear and developed interpretation that shows accuracy.  detailed evaluation that offers generally secure judgements, with some link between rational conclusions and evidence.	Quantitative, qualitative and/or fieldwork skills are used in a suitable way and with a good level of competence and precision.	There is a line of reasoning presented with some structure. The information presented is in the most-part relevant and supported by some evidence.

<b>Reasonable</b>	<p>Some sound knowledge that demonstrates partially developed understanding that is relevant to the demands of the question.</p> <p>Awareness of the meaning of the terms in the question.</p>	<p>Knowledge and understanding shown is partially applied to the context of the question, in order to form a:</p> <p>sound analysis that shows some accuracy.</p> <p>sound interpretation that shows some accuracy.</p> <p>sound evaluation that offers generalised judgements and conclusions, with limited use of evidence.</p>	<p>Quantitative, qualitative and/or fieldwork skills are used in a mostly suitable way with a sound level of competence but may lack precision.</p>	<p>The information has some relevance and is presented with limited structure. The information is supported by limited evidence.</p>
<b>Basic</b>	<p>Limited knowledge that is relevant to the topic or question with little or no development.</p> <p>Confusion and inability to deconstruct terminology as used in the question.</p>	<p>Knowledge and understanding shows limited application to the context of the question in order to form a:</p> <p>simple analysis that shows limited accuracy.</p> <p>simple interpretation that shows limited accuracy.</p> <p>Un-supported evaluation that offers simple conclusions.</p>	<p>Quantitative, qualitative and/or fieldwork skills are used inappropriately with limited competence and precision.</p>	<p>The information is basic and communicated in an unstructured way. The information is supported by limited evidence and the relationship to the evidence may not be clear.</p>

Question		Answer	Marks	Guidance
1	(a)	<p><b>Explain how two of the Milankovitch cycles influence climate change.</b></p> <ul style="list-style-type: none"> <li>• Obliquity or tilt of the Earth (✓) varies between 22 and 24.5 degrees (✓) varies over a period of about 40,000 years (✓) when the tilt is less there is less seasonal variation (e.g. summers are cooler and winters are warmer. (✓)</li> <li>• Eccentricity(✓) if the orbit changes between elliptical and circular (✓) varies over between 95,000 and 415,000 years (✓) when the orbit is more circular it is warmer (✓) when the orbit is more elliptical and is the earth is further from the sun ice ages can occur. (✓)</li> <li>• Precession of equinoxes (✓)when the planet is closest to the sun (perihelion) varies (✓) The periodicity is 22,000 years(✓) If the perihelion is in the northern hemisphere in winter there will be warmer winters and cooler summers. (✓)</li> </ul>	4	<p><b>AO1 – 4 marks</b></p> <p>2 x 1 mark (✓) for each correct cycle. 2 x 1 mark (✓) for each explanation of how it influences climate.</p> <p>Only two cycles can be credited.</p> <p>Focus should be on the knowledge and understanding of the relationship between the cycle and climate change.</p>
	(b)	<p><b>Suggest how understanding the carbon cycle influences human response to climate change.</b></p> <p><b>Level 3 (5-6 marks)</b> Demonstrates <b>thorough</b> knowledge and understanding of the carbon cycle (AO1).</p> <p><b>Place specific details</b> should be <b>accurate</b> with the amount helping determine where within the level the response lies.</p> <p>Demonstrates <b>thorough</b> application of knowledge and understanding to provide an <b>accurate, clear and developed analysis</b> as to how understanding the carbon cycle influences</p>	6	<p><b>AO1 – 3 marks</b></p> <p>Knowledge and understanding of the carbon cycle could potentially include:</p> <ul style="list-style-type: none"> <li>• Carbon exchanges - respiration, precipitation, fuel combustion, weathering and erosion.</li> <li>• Processes - photosynthesis, volcanic activity, leaf litter decomposition and marine deposit decomposition and ocean – atmosphere exchange.</li> <li>• Stores - atmosphere, oceans, Earth's crust, soil, oil and gas deposits, ice, vegetation and groundwater.</li> </ul>

Question	Answer	Marks	Guidance
	<p>human response to climate change (AO2).</p> <p><b>Level 2 (3-4 marks)</b> Demonstrates <b>reasonable</b> knowledge and understanding of the carbon cycle (AO1).</p> <p><b>Place specific</b> material is present which is <b>partially accurate</b> with the amount helping determine where within the level the response lies.</p> <p>Demonstrates <b>reasonable</b> application of knowledge and understanding to provide a <b>sound analysis</b> showing some accuracy and development as to how understanding the carbon cycle influences human response to climate change (AO2).</p> <p><b>Level 1 (1-2 marks)</b> Demonstrates <b>basic</b> knowledge and understanding of the carbon cycle (AO1).</p> <p>Little or no <b>place specific</b> material is present and or is inaccurate.</p> <p>Demonstrates <b>basic</b> application of knowledge and understanding to provide a <b>simple analysis</b> showing limited accuracy and little development as to how understanding the carbon cycle influences human response to climate change (AO2).</p> <p><b>0 marks</b> No response or no material worthy of credit.</p>		<ul style="list-style-type: none"> <li>Positive feedback - increased evaporation, reduced albedo, declining forest cover, increased cloudiness, release of methane, melting of permafrost and increased ocean acidity.</li> <li>Negative feedback - expansion of forests, increased cloudiness, and increased aerosols in the atmosphere.</li> </ul> <p><b>AO2 – 3 marks</b></p> <p>Application of knowledge and understanding to analyse how understanding the carbon cycle influences human response to climate change could potentially include:</p> <p>Reduce carbon dioxide emissions by</p> <ul style="list-style-type: none"> <li>Increased energy efficiency. The UK Government gives all electrical appliances and houses for sale an energy rating from A to G. this allows consumers to select energy efficient products.</li> <li>Conservation of energy. The Energy Saving Trust is a Social enterprise in the UK that works with both public and private organisations to advise about energy efficiency.</li> <li>Shifts to low carbon energy fuel sources e.g. biomass and nuclear. The UK government is developing a new Nuclear PowerStation at Hinkley Point costing £16bn. This will be funded by EDF energy and Chinese partner companies.</li> <li>Carbon capture and storage which was</li> </ul>

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				<p>proposed at Peterhead storing the carbon 100km off the coast in the old Goldeneye oil field.</p> <p>Increase carbon dioxide uptake by</p> <ul style="list-style-type: none"> <li>- Reforestation e.g. REDD+ scheme that increases carbon dioxide uptake through photosynthesis.</li> </ul>
(c)	(i)	<p><b>Study Fig. 1, a scattergraph showing the relationship between GDP per capita and the percentage of renewable energy consumption.</b></p> <p><b>Using evidence from the scattergraph Fig. 1 describe the relationship between GDP per capita and the percentage of renewable energy consumption.</b></p> <ul style="list-style-type: none"> <li>• There is a negative correlation between the two data sets.</li> <li>• Typically countries with lower GDP per capita generate less energy from renewable resources e.g. Thailand, Ukraine and Malaysia.</li> <li>• As the GDP increases the percentage of energy from renewable sources decreases.</li> <li>• Once GDP exceeds \$10,000 there is little positive impact on the percentage of energy from renewable resources.</li> <li>• France lies almost in the middle of the data points with a GDP per capita of \$36527 and the third highest percentage of renewable energy of 13.9%</li> <li>• An outlier is Uganda with a GDP of \$674 and a percentage of renewable energy of 86.8% in 2015 which is much higher than expected for such a low GDP.</li> <li>• Uganda has a much higher percentage of renewable energy than the other points causing a negative correlation between the two data sets.</li> </ul>	4 AO3x4	<p><b>AO3 – 4 marks</b></p> <p><b>4 x 1 mark for each (✓) for each correct description of the relationship.</b></p> <ul style="list-style-type: none"> <li>• Correlation (direction) - 1 mark (✓)</li> <li>• Strength of the relationship - 1 mark (✓)</li> <li>• Describing the relation between the two data sets (variables) - 1 mark (✓)</li> <li>• The steepness of the relationship indicating the rate at which the dependent variable (percentage of energy from renewable sources) changes with changes in the independent variable (GDP) (✓)</li> <li>• Identifying outliers - 1 mark (✓)</li> <li>• Impact of outliers on the correlation 1 mark (✓)</li> <li>• Correctly quoting data - 1 mark (✓)</li> </ul>

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		<table border="1"> <tr> <td>Data sets:</td> <td>GDP per capita 2015</td> <td>Percentage of renewable energy consumption (2015)</td> </tr> <tr> <td>Australia</td> <td>\$ 56,554.00</td> <td>9.18</td> </tr> <tr> <td>Ireland</td> <td>\$ 62,139.00</td> <td>9.08</td> </tr> <tr> <td>France</td> <td>\$ 36,527.00</td> <td>13.50</td> </tr> <tr> <td>Malaysia</td> <td>\$ 9,649.00</td> <td>5.19</td> </tr> <tr> <td>Thailand</td> <td>\$ 5,815.00</td> <td>22.86</td> </tr> <tr> <td>Ukraine</td> <td>\$ 2,124.00</td> <td>4.14</td> </tr> <tr> <td>Bolivia</td> <td>\$ 3,077.00</td> <td>17.54</td> </tr> <tr> <td>Uganda</td> <td>\$ 674.00</td> <td>89.05</td> </tr> </table>			Data sets:	GDP per capita 2015	Percentage of renewable energy consumption (2015)	Australia	\$ 56,554.00	9.18	Ireland	\$ 62,139.00	9.08	France	\$ 36,527.00	13.50	Malaysia	\$ 9,649.00	5.19	Thailand	\$ 5,815.00	22.86	Ukraine	\$ 2,124.00	4.14	Bolivia	\$ 3,077.00	17.54	Uganda	\$ 674.00	89.05		
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(c)	(ii)	<p><b>Using evidence from Fig. 1, analyse reasons for differences in the percentage of renewable energy consumption.</b></p> <p><b>Level 3 (5-6 marks)</b> Demonstrates <b>thorough</b> application of knowledge and understanding to provide clear and developed analysis that shows accuracy as to reasons for differences in the percentage of energy from renewable sources (AO2).</p> <p>Demonstrates <b>thorough</b> investigation and interpretation of the quantitative data resource to fully evidence differences in the percentage of energy from renewable sources. There must be strong ideas linking resource evidence to the possible reasons for differences in the percentage of energy from renewable sources (AO3).</p> <p><b>Level 2 (3-4 marks)</b> Demonstrates <b>reasonable</b> application of knowledge and understanding to provide clear and developed analysis that shows accuracy as to reasons for differences in the percentage of energy from renewable sources (AO2).</p>	<b>6</b> AO2x3 AO3x3		<b>AO2 – 3 marks</b> Application of knowledge and understanding to analyse reasons for differences in the percentage of energy from renewable sources could potentially include: <ul style="list-style-type: none"> <li>• Demand for energy is greater in ACs /EDCs.</li> <li>• Some countries have greater fossil fuel deposits so are able to use more fossil fuels</li> <li>• Some countries are applying strong regulations and have started to move to renewables</li> <li>• Some countries have a greater energy demand due to their climate e.g. for heating or air conditioning</li> <li>• Countries with large geographical areas will require longer journeys using more fossil fuels and therefore create more CO<sub>2</sub> emissions from travelling vast distances.</li> <li>• Cost of introducing renewable schemes.</li> <li>• Reliability of renewable schemes.</li> <li>• Availability / access to renewable technology.</li> </ul>																												

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	<p>Demonstrates <b>reasonable</b> investigation and interpretation of the quantitative data resource to fully evidence differences in the percentage of energy from renewable sources. There must be good ideas linking resource evidence to the possible reasons for differences in the percentage of energy from renewable sources (AO3).</p> <p><b>Level 1 (1-2 marks)</b> Demonstrates <b>basic</b> application of knowledge and understanding to provide clear and developed analysis that shows accuracy as to reasons for differences in the percentage of energy from renewable sources (AO2).</p> <p>Demonstrates <b>basic</b> investigation and interpretation of the quantitative data resource to fully evidence differences in the percentage of energy from renewable sources. There must be some ideas linking resource evidence to resource evidence to the possible reasons for differences in the percentage of energy from renewable sources (AO3).</p>		<p><b>AO3 – 3 marks</b> Evidence from investigation and interpretation of the data could potentially include:</p> <ul style="list-style-type: none"> <li>Uganda stands out with very high amounts of renewable energy i.e. 86.8%. This may be due to the lack of development of large power stations to supply a national grid in that country, resulting in less non-renewable energy being used. This may be due to lack of fossil fuel reserves. Renewable energy sources such as HEP and Solar are the main source of power in Uganda.</li> <li>Thailand, Ireland and Australia over 9% renewable energy. This may be due to government policy and availability of technology to develop renewable energy sources.</li> <li>Ukraine has a very low amount of renewable energy, just 13%. This may be due to a reliance on other non-renewable, efficient forms of energy. It may be due to the presence natural reserves of fossil fuels that occur there allowing them to produce and export energy.</li> </ul>

Question		Answer	Marks	Guidance
(d)		<p><b>'Challenges to climate change adaptation are easiest to overcome in Advanced Countries' How far do you agree with this statement?</b></p> <p><b>Level 4 (10–12 marks)</b> Demonstrates <b>comprehensive</b> and accurate knowledge and understanding of challenges to climate change adaptation. (AO1).</p> <p>Demonstrates <b>comprehensive</b> application of knowledge and understanding to provide a detailed and convincing evaluation offering secure judgements leading to rational conclusions that are evidence based as to the extent to which the challenges to climate change adaptation are easiest to overcome in ACs (AO2).</p> <p><b>Level 3 (7-9 marks)</b> Demonstrates <b>thorough</b> and mainly accurate knowledge and understanding of challenges to climate change adaptation. (AO1).</p> <p>Demonstrates <b>thorough</b> application of knowledge and understanding to provide a detailed evaluation offering generally secure judgements with some link between rational conclusions and evidence as to the extent to which the challenges to climate change adaptation are easiest to overcome in ACs (AO2).</p> <p><b>Level 2 (4-6 marks)</b> Demonstrates <b>reasonable</b> and some accurate knowledge and understanding of challenges to climate change adaptation. (AO1).</p> <p>Demonstrates <b>reasonable</b> application of knowledge and understanding to provide a sound evaluation offering generalised</p>	<b>12</b> AO1x6 AO2x6	<p><b>AO1 – 6 marks</b> Knowledge and understanding of challenges to climate change adaptation could potentially include:</p> <ul style="list-style-type: none"> <li>• Technological challenges – development of technology for salinizing sea water, developing efficient irrigation techniques, developing the use of grey water, developing effective warning systems for weather hazards, implementing hard engineering structures e.g. sea walls, conservation of natural coastal features preventing erosion e.g. sand dunes</li> <li>• Socio-economic challenges – diagnosing and treating illnesses e.g. malaria, poverty preventing people moving from areas susceptible to flooding e.g. Ganges delta.</li> <li>• Political challenges – Funding available to governments in ACs and EDCs/LDCs, implementation and use of appropriate technology</li> </ul> <p><b>AO2 – 6 marks</b> Application of knowledge and understanding to analyse and evaluate the extent to which the challenges to climate change adaptation are easiest to overcome in ACs could potentially include:</p> <p>Overcoming challenges to adaptation to risks posed by climate change is strongly linked to key development factors such as GDP. This is illustrated by the responses of contrasting countries such as Australia and Bangladesh.</p> <p>AC</p> <ul style="list-style-type: none"> <li>• Australia agreed to lower carbon dioxide emissions of about 25% by 2030 but this target</li> </ul>

Question	Answer	Marks	Guidance
	<p>judgements and conclusions with limited links to evidence as to the extent to which the challenges to climate change adaptation are easiest to overcome in ACs (AO2).</p> <p><b>Level 1 (1-3 marks)</b> Demonstrates <b>basic</b> and/or inaccurate knowledge and understanding of challenges to climate change adaptation. (AO1).</p> <p>Demonstrates <b>basic</b> application of knowledge and understanding offering either unsupported or minimal if any evaluation. Judgements and conclusions, if any, are simplistic regarding the extent to which the challenges to climate change adaptation are easiest to overcome in ACs (AO2).</p> <p><b>0 marks</b> No response or no material worthy of credit.</p>		<p>is much lower than many other ACs.</p> <ul style="list-style-type: none"> <li>• The Australian government is investing US\$9bn to develop new water resources which is very costly.</li> <li>• Research has been undertaken in Australia into the impacts of climate change and has drawn up priority areas. However, some areas that are of lower priority will not receive any help to adapt e.g. building coastal defences.</li> </ul> <p>LIDC</p> <ul style="list-style-type: none"> <li>• Bangladesh considers global warming is the responsibility of the developed world so has focused on adapting to change.</li> <li>• Bangladesh has limited financial resources resulting in low cost community based schemes being used to tackle climate change. e.g. Using drip irrigation or creating floating vegetable garden rafts.</li> <li>• The Bangladeshi Government has established a health promotion unit to tackle the spread of water and vector borne diseases; this is very costly.</li> <li>• Summary: climate change challenges are most easily overcome in ACs that have the wealth, education and technology to address challenges. However LIDCs and EDCs can successfully address problems using simple solutions and appropriate technology which are effective. However, education about the solutions available can be a barrier to this.</li> </ul>

Question		Answer	Marks	Guidance
2	(a)	<p><b>Explain <u>two</u> ways that rainfall can influence the outbreak of disease.</b></p> <ul style="list-style-type: none"> <li>Seasonal rainfall / increase in rainfall in the tropics creates aquatic habitats e.g. ponds, puddles and stagnant pools (✓) which allow insects and disease vectors to flourish and complete their life cycle (✓).</li> <li>Pre-monsoon and at the end of the monsoon some fly populations are at their highest (✓) they can transmit diseases to humans (✓).</li> <li>The life cycle of snails is linked to rainfall (✓) snails host other species which can transmit diseases to humans (✓).</li> </ul>	4 AO1x4	<p><b>AO1 – 4 marks</b></p> <p>2 x 2 mark (✓) for each correct explanatory point. Focus should be on the knowledge and understanding of the relationship between rainfall and the outbreak of disease.</p>
	(b)	<p><b>Suggest why there are conservation issues relating to the international trade in medicinal plants.</b></p> <p><b>Level 3 (5-6 marks)</b> Demonstrates <b>thorough</b> knowledge and understanding of the international trade in medicinal plants (AO1).</p> <p><b>Place specific details</b> should be <b>accurate</b> with the amount helping determine where within the Level the response lies.</p> <p>Demonstrates <b>thorough</b> application of knowledge and understanding to provide an <b>accurate, clear and developed</b> analysis as to why there are conservation issues relating to the international trade in medicinal plants (AO2).</p> <p><b>Level 2 (3-4 marks)</b> Demonstrates <b>reasonable</b> knowledge and understanding of the international trade in medicinal plants (AO1).</p>	6 AO1x3 AO2x3	<p><b>AO1 – 3 marks</b></p> <p>Knowledge and understanding of the international trade in medicinal plants could potentially include:</p> <ul style="list-style-type: none"> <li>The expansion of European power around the world from the fifteenth century onwards was followed by a wave of creation of botanic gardens and the first potential crop tried out at Hakgala Botanic Garden in Sri Lanka was quinine (in 1861), soon followed by tea (in 1865).</li> <li>Many plants were transported around the globe and tried out in botanic gardens or arboreta in the colonies. For example, the Germans established a botanic garden at Amani in the East Usambara (Tanzania) in 1902, planting about 900 species, nearly all exotics and nearly all woody. The Royal Botanic Gardens Kew at one time had a policy of facilitating the</li> </ul>

Question	Answer	Marks	Guidance
	<p><b>Place specific</b> material is present which is <b>partially accurate</b> with the amount helping determine where within the Level the response lies.</p> <p>Demonstrates <b>reasonable</b> application of knowledge and understanding to provide a <b>sound</b> analysis showing some accuracy and development as to why there are conservation issues relating to the international trade in medicinal plants (AO2).</p> <p><b>Level 1 (1-2 marks)</b> Demonstrates <b>basic</b> knowledge and understanding of the international trade in medicinal plants (AO1).</p> <p>Little or no <b>place specific</b> material is present and or is inaccurate.</p> <p>Demonstrates <b>basic</b> application of knowledge and understanding to provide a <b>simple analysis</b> showing limited accuracy and little development as to why there are conservation issues relating to the international trade in medicinal plants (AO2).</p> <p><b>0 marks</b> No response or no material worthy of credit.</p>		<p>movement of plants around the British Empire.</p> <ul style="list-style-type: none"> <li>Many traditional medicinal plants are sourced from wild plants in LIDCs. 80% of the world's population rely on these.</li> <li>Major international trade in medicinal plants is not only from developing to urban-industrial countries. For instance, there is major trade from the Himalayas, including Nepal, to India and beyond, mostly for use in herbal medicine (notably ayurvedic medicine).</li> <li>The majority of plant species used in traditional or herbal medical treatments are harvested from the wild rather than cultivated. In some parts of the world, large numbers of people are involved in the collection of wild medicinal plants to sell – for example people from an estimated 323,000 households in Nepal alone.</li> <li>Mounting poverty can fuel commercial harvesting because more people driven to collect medicinal plants to sell can be a useful source of income.</li> <li>In the Himalayas, the medicinal plant sector tends to be highly regulated, with a series of permits required for the collection, transport and export of medicinal plants. There can also be total bans on the harvesting of some species, such as the orchid <i>Dactylorhiza hatagirea</i> in Nepal and all species of wild yews <i>Taxus</i> in China. However, these legal controls have proved difficult to enforce.</li> </ul> <p><b>AO2 – 3 marks</b> Application of knowledge and understanding to suggest</p>

Question	Answer	Marks	Guidance
			<p>why there are conservation issues relating to international trade in medicinal plants could potentially include:</p> <ul style="list-style-type: none"> <li>• Supply and demand. <ul style="list-style-type: none"> <li>◦ High reliance on wild plants for traditional medicine is unsustainable;</li> <li>◦ As a result the most sought after species are under pressure.</li> </ul> </li> <li>• Survival of wild medicinal species is threatened by over harvesting. <ul style="list-style-type: none"> <li>◦ This reduces genetic diversity and endangers their overall survival.</li> <li>◦ Slow growing species occupying specialised niches are particularly vulnerable.</li> </ul> </li> <li>• Habitat destruction can potentially cause the loss of species that have not been screened for their medicinal value. <ul style="list-style-type: none"> <li>◦ Biopiracy by multinationals can also lead to benefits for the world but not the native people inhabiting the ecosystem.</li> <li>◦ Where profits have been shared with local people, they have endeavoured to protect the rainforest and improved their quality of life.</li> </ul> </li> </ul>

	(c) (i)	<p><b>Study Fig. 2, a scattergraph showing the relationship between GDP per capita and the percentage of adults (aged 15-49) living with HIV in 2016.</b></p>	4 AO3x4	<p><b>AO3 – 4 marks</b></p> <p><b>4 x 1 mark for each (✓) for each correct description of the relationship.</b></p> <ul style="list-style-type: none"> <li>• Correlation (direction) - 1 mark (✓)</li> <li>• Strength of the relationship -1 mark (✓)</li> <li>• Describing the relation between the data sets (variables) - 1 mark (✓)</li> <li>• The steepness of the relationship indicating the rate at which the dependent variable (adults living with HIV) changes with changes in the independent variable (GDP) (✓)</li> <li>• Identifying outliers - 1 mark (✓)</li> <li>• Impact of outliers on the correlation 1 mark (✓)</li> <li>• Correctly quoting data - 1 mark (✓)</li> </ul>																											
		<p><b>Using evidence from the scattergraph Fig. 2 describe the relationship between GDP per capita and the percentage of adults (aged 15-49) living with HIV.</b></p> <ul style="list-style-type: none"> <li>• There is a negative correlation between the two data sets.</li> <li>• As GDP increases the the trend shows the percentage of adults living with HIV decreasing.</li> <li>• A strong outlier is Kenya with a GDP of \$3,400 and adult HIV rates of 5.4% which is higher than the trend shown for such a low GDP.</li> <li>• Another outlier is Bolivia with a GDP of \$7,200 and adult HIV rates of 0.3%, which is much lower than expected for the low level of GDP.</li> <li>• With the exception of Bolivia, countries with a GDP of greater than \$20,000 have the lowest percentage of adults living with HIV (0.4% or less).</li> <li>• Kenya has much higher percentage of adults with HIV than the other countries causing negative correlation between the two data sets.</li> </ul>	<table border="1" data-bbox="377 978 1185 1399"> <thead> <tr> <th>Data sets:</th> <th>GDP per capita 2016</th> <th>HIV - adult prevalence rate (aged 15-49) living with HIV</th> </tr> </thead> <tbody> <tr> <td>France</td> <td>\$36,870</td> <td>0.4</td> </tr> <tr> <td>Ireland</td> <td>\$64,100</td> <td>0.2</td> </tr> <tr> <td>Australia</td> <td>\$49,896</td> <td>0.1</td> </tr> <tr> <td>Thailand</td> <td>\$5,979</td> <td>1.1</td> </tr> <tr> <td>Ukraine</td> <td>\$2,185</td> <td>0.9</td> </tr> <tr> <td>Malaysia</td> <td>\$9,508</td> <td>0.4</td> </tr> <tr> <td>Kenya</td> <td>\$1,462</td> <td>5.4</td> </tr> <tr> <td>Bolivia</td> <td>\$3,117</td> <td>0.3</td> </tr> </tbody> </table>	Data sets:	GDP per capita 2016	HIV - adult prevalence rate (aged 15-49) living with HIV	France	\$36,870	0.4	Ireland	\$64,100	0.2	Australia	\$49,896	0.1	Thailand	\$5,979	1.1	Ukraine	\$2,185	0.9	Malaysia	\$9,508	0.4	Kenya	\$1,462	5.4	Bolivia	\$3,117	0.3	
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(c)	<p><b>(ii)</b> <b>Using evidence from Fig. 2, analyse reasons for differences in HIV rates between countries.</b></p> <p><b>Level 3 (5-6 marks)</b> Demonstrates <b>thorough</b> application of knowledge and understanding to provide clear and developed analysis that shows accuracy as to reasons for differences in HIV rates between countries (AO2).</p> <p>Demonstrates <b>thorough</b> investigation and interpretation of the quantitative data resource to fully evidence differences in HIV rates. There must be strong ideas linking resource evidence to the possible reasons for differences in HIV rates (AO3).</p> <p><b>Level 2 (3-4 marks)</b> Demonstrates <b>reasonable</b> application of knowledge and understanding to provide clear and developed analysis that shows accuracy as to reasons for differences in HIV rates between countries (AO2).</p> <p>Demonstrates <b>reasonable</b> investigation and interpretation of the quantitative data resource to fully evidence differences in HIV rates. There must be good ideas linking resource evidence to the possible reason for differences in HIV rates (AO3).</p> <p><b>Level 1 (1-2 marks)</b> Demonstrates <b>basic</b> application of knowledge and understanding to provide clear and developed analysis that shows accuracy as reasons for differences in HIV rates between countries (AO2).</p> <p>Demonstrates <b>basic</b> investigation and interpretation of the quantitative data resource to fully evidence differences in HIV rates. There must be some ideas linking resource evidence to resource evidence to the possible reasons for differences in HIV rates (AO3).</p>	<p><b>6</b></p> <p>AO2x3 AO3x3</p>	<p><b>AO2 – 3 marks</b></p> <p>Application of knowledge and understanding to analyse reasons for differences in HIV rates between countries could potentially include:</p> <ul style="list-style-type: none"> <li>• Proximity to initial place of origin of the disease in Sub-Saharan Africa.</li> <li>• Risk of infection varies between countries for a variety of reasons including: <ul style="list-style-type: none"> <li>◦ Attitude to barrier contraception</li> <li>◦ Infected blood transfusions in LIDCs</li> <li>◦ Sharing needles and other injecting materials</li> </ul> </li> <li>• Education/status in society of mothers affects their awareness of ways to reduce risk of transmission during pregnancy, child birth and whilst breast feeding.</li> <li>• Standard of medical care available (including access to barrier contraception) to mothers and babies depends on a variety of factors including ability of families to access the services that are available depending on: <ul style="list-style-type: none"> <li>◦ Availability of medical care due to wealth</li> <li>◦ Distance from facilities, especially in LIDCs</li> <li>◦ Urban or rural – usually urban residents can access services more easily, especially in LIDCs</li> </ul> </li> </ul> <p><b>AO3 – 3 marks</b></p> <p>Evidence from investigation and interpretation of the data could potentially include:</p> <ul style="list-style-type: none"> <li>• 5 countries have adult HIV rates under 0.4%, (France, Ireland, Australia, Malaysia and Bolivia) – ACs / EDCs (except Bolivia) with ability to</li> </ul>

				<p>provide appropriate medical services.</p> <ul style="list-style-type: none"> <li>• 2 countries have adult HIV rates around 1% (Ukraine and Thailand). Possible reasons include <ul style="list-style-type: none"> <li>◦ difficult to afford the healthcare of richer nations</li> <li>◦ limited education</li> <li>◦ risk of infection is greater.</li> </ul> </li> <li>• The highest adult HIV rate is 5.4%, Kenya, an LIDC with the lowest GDP of those on the graph, and it is closest to the original location of the disease in humans – the Congo.</li> </ul>
(d)	<p><b>'Mitigating against non-communicable diseases by government and international agencies is most effective through direct strategies rather than indirect strategies.'</b>  <b>How far do you agree with this statement?</b></p> <p><b>Level 4 (10–12 marks)</b>  Demonstrates <b>comprehensive</b> and accurate knowledge and understanding of strategies used to mitigate against non-communicable diseases by government and international agencies (AO1).</p> <p>Demonstrates <b>comprehensive</b> application of knowledge and understanding to provide a detailed and convincing evaluation offering secure judgements leading to rational conclusions that are evidence based as to the extent to which direct strategies rather than indirect strategies used by government and international agencies are most effective in mitigating against non-communicable diseases (AO2).</p> <p><b>Level 3 (7–9 marks)</b>  Demonstrates <b>thorough</b> and mainly accurate knowledge and understanding of strategies used to mitigate against non-communicable diseases by government and international agencies (AO1).</p>	12 AO1x6 AO2x6	<p><b>AO1 – 6 marks</b></p> <p>Knowledge and understanding of direct and indirect strategies used to mitigate against non-communicable diseases could potentially include:</p> <ul style="list-style-type: none"> <li>• Direct strategies could include: <ul style="list-style-type: none"> <li>◦ Investment in advanced medical technology</li> <li>◦ Mass screening</li> <li>◦ Reducing waiting times between hospital / doctor visits</li> <li>◦ Research into understanding the disease</li> <li>◦ Legislation of causes of diseases e.g. sun bed legislation to prevent skin cancer.</li> </ul> </li> <li>• Indirect strategies could include: <ul style="list-style-type: none"> <li>◦ Education and health campaigns to inform public of the causes of non-communicable diseases</li> <li>◦ Charity fundraising for further research</li> </ul> </li> </ul>	

	<p>Demonstrates <b>thorough</b> application of knowledge and understanding to provide a detailed evaluation offering generally secure judgements with some link between rational conclusions and evidence as to the extent to which direct strategies rather than indirect strategies used by government and international agencies are most effective in mitigating against non-communicable diseases (AO2).</p> <p><b>Level 2 (4-6 marks)</b> Demonstrates <b>reasonable</b> and some accurate knowledge and understanding of strategies used to mitigate against non-communicable diseases by government and international agencies (AO1).</p> <p>Demonstrates <b>reasonable</b> application of knowledge and understanding to provide a sound evaluation offering generalised judgements and conclusions with limited links to evidence as to the extent to which direct strategies rather than indirect strategies used by government and international agencies are the most successful in mitigating against non-communicable diseases (AO2).</p> <p><b>Level 1 (1-3 marks)</b> Demonstrates <b>basic</b> and/or inaccurate knowledge and understanding of direct strategies used to mitigate against non-communicable diseases by government and international agencies (AO1).</p> <p>Demonstrates <b>basic</b> application of knowledge and understanding offering either unsupported or minimal if any evaluation. Judgements and conclusions, if any, are simplistic regarding the extent to which direct strategies rather than indirect strategies used by governments and international agencies are most effective in mitigating against non-communicable diseases (AO2).</p> <p><b>0 marks</b></p>	<p><b>AO2 – 6 marks</b> Application of knowledge and understanding to analyse and evaluate the extent to which direct strategies rather than indirect strategies used by governments and international agencies are most effective in mitigating against non-communicable diseases could potentially include:</p> <p><b>Direct strategies</b></p> <ul style="list-style-type: none"> <li>• Investment in advanced medical technology. In the UK to treat cancer there is investment in radiotherapy and diagnostic methods. In 2015 the UK government announced up to £300 million more spent on cancer diagnostics every year by 2020-2021, so anyone with suspected cancer will be diagnosed within a maximum of 28 days of being referred by a GP, which experts say could help save 11,000 lives a year</li> <li>• Mass screening for breast, bowel and cervical cancer in the UK is well established and successful at finding diseases earlier, to allow for effective treatment. Screening can cut bowel cancer deaths by 40% and for breast cancer resulted in 1300 fewer deaths.</li> <li>• Clinical treatment of skin cancer includes the removal of malignant melanomas and chemotherapy. Removal of stage 1 melanomas removes the cancer.</li> <li>• International organisations such as the WHO conducts research into the causes of the disease.</li> <li>• Skin cancer rates are rising by 3% per year. The UK government has legislated against use of</li> </ul>
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		No response or no material worthy of credit.		<p>sun beds and set age limits for use (over 18s only). The aim is to stop the increase in skin cancer rates</p> <p>Indirect strategies</p> <ul style="list-style-type: none"><li>• Education about lifestyle linked to affluence that contribute to cancer e.g. lack of exercise, overweight</li><li>• Health campaigns about the dangers of smoking and excessive drinking in the UK can reduce the incidence of preventable cancers. Anti-smoking campaigns can support people in quitting. On average 15.7% of smokers have given up over the past decade. 53% of all people participating in Stoptober were successful at quitting smoking.</li><li>• Publicity campaigns including met office advice on UV intensities</li></ul> <p>Candidates are limited to a maximum of the top of level 2 for both AO1 and AO2 if only describing a communicable disease e.g. Malaria</p>
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Question		Answer	Marks	Guidance
3	(a)	<p><b>Explain how nuclear waste and plastics each pollute the ocean system.</b></p> <ul style="list-style-type: none"> <li>Industrial pollutants include radioactive nuclear waste; can get into the ocean via dumping, accident (✓) which can cause a build-up of radioactivity (✓) absorbed in the food chain (✓), and hazardous to health (✓)</li> <li>Plastics can get into the ocean from rivers beach and accidental discharge from storm damaged ships (✓). The plastics float and can collect together e.g. The Great Pacific Garbage Patch/North Pacific gyre (✓). Ingestion and damage to ocean living animals and birds (✓). Most plastics break down into micro-plastics which can affect the food chain (✓).</li> </ul>	4 AO1x4	<p><b>AO1 – 4 marks</b> 2 x 2 marks for each explanation (✓) of how nuclear waste and plastics pollute the ocean system (✓). Focus should be on the knowledge and understanding of how the two pollutants pollute the ocean system</p>
	(b)	<p><b>Suggest how climate change alters sea levels.</b></p> <p><b>Level 3 (5-6 marks)</b> Demonstrates <b>thorough</b> knowledge and understanding of climate change and sea levels (AO1).</p> <p><b>Place specific details</b> should be <b>accurate</b> with the amount helping determine where within the Level the response lies.</p> <p>Demonstrates <b>thorough</b> application of knowledge and understanding to provide an <b>accurate, clear and developed analysis</b> as to how climate change alters sea levels (AO2).</p>	6 AO1x3 AO2x3	<p><b>AO1 – 3 marks</b> Knowledge and understanding of changes in sea level could potentially include:</p> <ul style="list-style-type: none"> <li>Climate change – changes in temperature e.g. recent temperature increase (global warming)</li> <li>Sea levels have changed over geological time. <ul style="list-style-type: none"> <li>Eustatic – changes in absolute sea levels affected by the amount of water in the ocean; over the past decades a eustatic rise in sea level is taking place.</li> <li>Isostatic – changes in absolute level of the land affecting local sea level at coasts</li> </ul> </li> </ul>

Question	Answer	Marks	Guidance
	<p><b>Level 2 (3-4 marks)</b>  Demonstrates <b>reasonable</b> knowledge and understanding of climate change and sea levels (AO1).</p> <p><b>Place specific</b> material is present which is <b>partially accurate</b> with the amount helping determine where within the Level the response lies.</p> <p>Demonstrates <b>reasonable</b> application of knowledge and understanding to provide a <b>sound analysis</b> showing some accuracy and development as to how climate change alters sea levels (AO2).</p> <p><b>Level 1 (1-2 marks)</b>  Demonstrates <b>basic</b> knowledge and understanding of climate change and sea levels (AO1).</p> <p>Little or no <b>place specific</b> material is present and or is inaccurate.</p> <p>Demonstrates <b>basic</b> application of knowledge and understanding to provide a <b>simple analysis</b> showing limited accuracy and little development as to how climate change alters sea levels (AO2).</p> <p><b>0 marks</b>  No response or no material worthy of credit.</p>		<p><b>AO2 – 3 marks</b>  Application of knowledge and understanding to analyse how climate change alters sea levels could potentially include;</p> <ul style="list-style-type: none"> <li>• Thermal expansion of water. As temperature rises the density of water decreases, which increases the volume of water and causes a rise in sea level.</li> <li>• As global warming increases glaciers and small ice caps are melting. The water that is released flows via rivers to oceans causing sea levels to rise e.g. melting glacial water from the Himalayas and Andes is transferred to oceans by rivers increasing sea levels.</li> <li>• Melting ice sheets e.g. Greenland and Antarctic, increase sea levels</li> <li>• The margins of ice sheets are rapidly thinning due to ablation. Flows of ice towards the sea are accelerating causing sea levels to rise.</li> </ul>

(c)	i	<p><b>Study Fig. 3, a scattergraph showing the relationship between the amount of crude oil transported globally by sea and the number of oil spills greater than 7 tonnes and less than 700 tonnes from 2008 to 2015.</b></p> <p><b>Using evidence from the scattergraph Fig. 3 describe the relationship between the amount of crude oil transported and the number of oil spills.</b></p> <ul style="list-style-type: none"> <li>• There is a very weak positive correlation between the two data sets.</li> <li>• As the crude oil transported by sea increases so does the number of oil spills.</li> <li>• One strong outlier is 2009 with a 1711 million tonnes of crude oil being transported globally and 7 oil spills of less than 700 tonnes occurring i.e. the number of oil spills is higher than expected for a relatively low amount of crude oil being transported.</li> <li>• If the outlier was excluded then there would be a stronger positive trend.</li> <li>• Another outlier is 2011, which has the joint fewest number of oil spills despite the year seeing a large amount of oil transported by sea (1759 million tonnes)</li> </ul> <table border="1" data-bbox="359 1008 1179 1437"> <thead> <tr> <th>Data sets:</th><th>Global crude oil transported by sea (million tonnes)</th><th>Annual number of oil spills of less than 700 tonnes</th></tr> </thead> <tbody> <tr> <td>2008</td><td>1785</td><td>7</td></tr> <tr> <td>2009</td><td>1711</td><td>7</td></tr> <tr> <td>2010</td><td>1788</td><td>5</td></tr> <tr> <td>2011</td><td>1759</td><td>4</td></tr> <tr> <td>2012</td><td>1786</td><td>7</td></tr> <tr> <td>2013</td><td>1738</td><td>5</td></tr> <tr> <td>2014</td><td>1707</td><td>4</td></tr> <tr> <td>2015</td><td>1761</td><td>6</td></tr> </tbody> </table>	Data sets:	Global crude oil transported by sea (million tonnes)	Annual number of oil spills of less than 700 tonnes	2008	1785	7	2009	1711	7	2010	1788	5	2011	1759	4	2012	1786	7	2013	1738	5	2014	1707	4	2015	1761	6	4 AO3x4	<p><b>AO3 – 4 marks</b></p> <p><b>4 x 1 mark for each (✓) for each correct description of the relationship.</b></p> <ul style="list-style-type: none"> <li>• Correlation (direction) - 1 mark (✓)</li> <li>• Strength of the relationship - 1 mark (✓)</li> <li>• Describing the relation between the data sets (variables) - 1 mark (✓)</li> <li>• The steepness of the relationship indicating the rate at which the dependent variable (oil spills) changes with changes in the independent variable (crude oil transported) (✓)</li> <li>• Identifying outliers - 1 mark (✓)</li> <li>• Impact of outliers on the correlation 1 mark (✓)</li> <li>• Correctly quoting data - 1 mark (✓)</li> </ul>
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(c)	ii	<p><b>Using evidence from Fig. 3, analyse reasons for differences in the number of oil spills over the year's identified on the scattergraph.</b></p> <p><b>Level 3 (5-6 marks)</b> Demonstrates <b>thorough</b> application of knowledge and understanding to provide clear and developed analysis that shows accuracy as to reasons for differences in the number of oil (AO2).</p> <p>Demonstrates <b>thorough</b> investigation and interpretation of the quantitative data resource to fully evidence differences in the number of oil spills. There must be strong ideas linking resource evidence to the possible reasons for differences in the number of oil (AO3).</p> <p><b>Level 2 (3-4 marks)</b> Demonstrates <b>reasonable</b> application of knowledge and understanding to provide clear and developed analysis that shows accuracy as to reasons for in the number of oil (AO2).</p> <p>Demonstrates <b>reasonable</b> investigation and interpretation of the quantitative data resource to fully evidence differences in the number of oil spills. There must be good ideas linking resource evidence to the possible reasons for differences in the number of oil (AO3).</p> <p><b>Level 1 (1-2 marks)</b> Demonstrates <b>basic</b> application of knowledge and understanding to provide clear and developed analysis that shows accuracy as to reasons for differences in the number of oil spills (AO2).</p> <p>Demonstrates <b>basic</b> investigation and interpretation of the quantitative data resource to fully evidence differences in the number of oil spills. There must be some ideas linking</p>	<p><b>6</b> AO2x3 AO3x3</p>	<p><b>AO2 – 3 marks</b> Application of knowledge and understanding to analyse reasons for differences in the number of oil spills could potentially include:</p> <ul style="list-style-type: none"> <li>• The variation in the amount of crude oil being transported by sea per year</li> <li>• Training of staff – changes in the training requirements may result in fewer mistakes being made or general carelessness.</li> <li>• Maintenance/marine technology advances - equipment and tankers safer</li> <li>• Changes in laws regarding shipping may result in fewer oil spills.</li> <li>• Actions of terrorists, vandals, countries at war or illegal dumpers may cause oil spills</li> <li>• Unsuitable/dangerous weather conditions, causing ships to be damaged resulting in oil spills</li> </ul> <p>Candidates may also refer to specific examples of oil spills that they have studied and the years that they occurred in.</p> <p><b>AO3 – 3 marks</b> Evidence from investigation and interpretation of the data could potentially include:</p> <ul style="list-style-type: none"> <li>• In 2008, 2009 and 2012 there could be a number of reasons for the higher number of oil spills (7 oil spills). These could include human error resulting in collision, poor weather conditions damaging tankers and causing leaks and terrorists bombing/ attempting to bomb oil tankers resulting in oil spills and errors in loading and unloading oil.</li> <li>• In 2011 and 2014 the lower number of oils spills (4 oil spills) could be due to the Navy</li> </ul>

	resource evidence to resource evidence to the possible reasons for differences in the number of oil (AO3).			<p>Special Forces preventing terror attacks on oil tankers. There may have been less incidents of unsuitable weather, resulting in fewer tankers being damaged.</p> <ul style="list-style-type: none"> <li>• The amount of oil transported in 2014 was quite low (1707 million tonnes) as a result there may have been fewer oil spills.</li> <li>• The relatively weak correlation shown on the scattergraph suggests that there are many reasons other than the volume of crude oil that is transported to explain the differences in the number of oil spills.</li> <li>• There is a lack of pattern shown by the data plots, each of which represents a different year.</li> </ul>
(d)	<p><b>'Biological resources within oceans can be used in sustainable ways.'</b> How far do you agree with this statement?</p> <p><b>Level 4 (10–12 marks)</b> Demonstrates <b>comprehensive</b> and accurate knowledge and understanding of biological resources within oceans (AO1).</p> <p>Demonstrates <b>comprehensive</b> application of knowledge and understanding to provide a detailed and convincing evaluation offering secure judgements leading to rational conclusions that are evidence based as to whether biological resources within oceans can be used in sustainable ways (AO2).</p> <p><b>Level 3 (7–9 marks)</b> Demonstrates <b>thorough</b> and mainly accurate knowledge and understanding biological resources within oceans (AO1).</p> <p>Demonstrates <b>thorough</b> application of knowledge and understanding to provide a detailed evaluation offering</p>	12 AO1x6 AO2x6	<p><b>AO1 – 6 marks</b></p> <p>Knowledge and understanding of biological resources within oceans could potentially include:</p> <ul style="list-style-type: none"> <li>• Natural capital (non-manufactured goods that have a value to humans) e.g. shellfish, tuna and krill, yields a natural income. Among the most value are clams oysters mussels, scallops, squid and octopus. It contributes an estimated US \$2.5 trillion per year into the global economy</li> <li>• Use of biological resources as a food supply.</li> <li>• Understanding of biological resources through increased exploration and more advanced technology.</li> <li>• Hunting of whales is seen as part of Inuit culture and is largely undertaken to supply food, although the rest of the whale is also used. The Inuit of Nunavut have only killed 5 bowhead whales since 1991, under a strict quota from the Canadian Government.</li> </ul>	

	<p>generally secure judgements with some link between rational conclusions and evidence as to whether biological resources within oceans can be used in sustainable ways (AO2).</p> <p><b>Level 2 (4-6 marks)</b> Demonstrates <b>reasonable</b> and some accurate knowledge and understanding of biological resources within oceans (AO1).</p> <p>Demonstrates <b>reasonable</b> application of knowledge and understanding to provide a sound evaluation offering generalised judgements and conclusions with limited links to evidence as to whether biological resources within oceans can be used in sustainable ways (AO2).</p> <p><b>Level 1 (1-3 marks)</b> Demonstrates <b>basic</b> and/or inaccurate knowledge and understanding of biological resources within oceans (AO1).</p> <p>Demonstrates <b>basic</b> application of knowledge and understanding offering either unsupported or minimal if any evaluation. Judgements and conclusions, if any, are simplistic regarding whether biological resources within oceans can be used in sustainable ways (AO2).</p> <p><b>0 marks</b> No response or no material worthy of credit.</p>	<p><b>AO2 – 6 marks</b> Application of knowledge and understanding to analyse and evaluate whether biological resources within oceans can be used in sustainable ways could potentially include:</p> <p>Provisioning services - If fishing is unregulated then this can lead to overfishing, which affects the whole food chain.</p> <p>Cultural services- If a beach is contaminated by an oil spill then it cannot be used for fishing or tourism and can have longer term effects on other biological resources within the ecosystem.</p> <p>Krill fishing</p> <ul style="list-style-type: none"> <li>Unsustainable use – harvesting of krill for processing into oil, animal feeds and bait. This resulted in Krill stocks dropping severely by as much as 80% since 1970s. This will have a significant impact on the food chain.</li> <li>Sustainable use – Krill catch is now limited by the CCAMLR (Commission for the Conservation of Antarctic Marine Living Resources), maintaining a healthy krill stock for breeding and supplying predators with a food source.</li> <li>Sustainable use – CCAMLR are monitoring and regulating boats fishing illegally so that conservation and fishing is in balance to provide a healthy ecosystem.</li> </ul>
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Question		Answer	Marks	Guidance
4	(a)	<p><b>Explain food security using <u>two</u> of the World Food Programme's three pillars.</b></p> <ul style="list-style-type: none"> <li>Food security is when all people at all times have sufficient food (✓) this is affected by availability, access and utilisation (✓)</li> <li>Availability is determined by the level of food production, stock levels and trade (✓)</li> <li>Access to food can be affected by income, expenditure, markets and food prices (✓)</li> <li>Utilization is the way the body makes the most of various nutrients (✓) this can be affected by good feeding practises, diversity of diet, preparation and inter-household distribution of food (✓)</li> <li>Stability of these three elements in adequate levels is needed to maintain food security (✓) and can be affected by adverse weather, political instability, unemployment and rising food prices.</li> </ul>	4 AO1x4	<p><b>AO1 – 4 marks</b></p> <p>2 x 1 mark (✓) for each pillar identified. 2 x 1 mark (✓) for each explanation of how each pillar ensures food security.</p> <p>Focus should be on the knowledge and understanding of the three pillars model of food security.</p> <p>Where a candidate names one pillar only credit 1 mark (✓)</p>
	(b)	<p><b>Suggest how extreme weather events can affect food production.</b></p> <p><b>Level 3 (5-6 marks)</b> Demonstrates <b>thorough</b> knowledge and understanding of extreme weather events that affect food production (AO1).</p> <p><b>Place specific details</b> should be <b>accurate</b> with the amount helping determine where within the Level the response lies.</p> <p>Demonstrates <b>thorough</b> application of knowledge and understanding to provide an <b>accurate, clear and developed analysis</b> as to how extreme weather events can affect food production (AO2).</p>	6 AO1x3 AO2x3	<p><b>AO1 – 3 marks</b></p> <p>Knowledge and understanding of extreme weather events that affect food production could potentially include:</p> <ul style="list-style-type: none"> <li>Climate change is leading to increasing frequency of extreme weather events which can affect food production</li> <li>El-Niño and its link to extreme weather events</li> <li>Tropical storms – tropical storms produced severe winds and extremely high precipitation. Climate change will cause these to become more intense.</li> <li>Heatwaves – This is several days or weeks of unusually hot weather. They can lead to wild fires occurring.</li> </ul>

		<p><b>Level 2 (3-4 marks)</b> Demonstrates <b>reasonable</b> knowledge and understanding of extreme weather events that affect food production (AO1).  <b>Place specific</b> material is present which is <b>partially accurate</b> with the amount helping determine where within the Level the response lies.  Demonstrates <b>reasonable</b> application of knowledge and understanding to provide a <b>sound analysis</b> showing some accuracy and development as to how extreme weather events can affect food production (AO2).  <b>Level 1 (1-2 marks)</b> Demonstrates <b>basic</b> knowledge and understanding of extreme weather events that affect food production (AO1).  Little or no <b>place specific</b> material is present and or is inaccurate.  Demonstrates <b>basic</b> application of knowledge and understanding to provide a <b>simple analysis</b> showing limited accuracy and little development as to how extreme weather events can affect food production (AO2).  <b>0 marks</b> No response or no material worthy of credit.</p>		<ul style="list-style-type: none"> <li>○ Flood – as climate change occurs heavy rainfall and flooding events may become more common.</li> <li>○ Drought - causing crop failure due to reduced water quality and quantity.</li> </ul> <p><b>AO2 – 3 marks</b> Application of knowledge and understanding to analyse how extreme weather events can affect food production could potentially include:</p> <ul style="list-style-type: none"> <li>- Tropical storms can be the major source of rainfall for drier tropical areas. Climate change could cause these storms to become more intense, causing more destruction of farmland.</li> <li>- Drought can result in crop failure. In 2003 southern Ethiopia experienced the longest drought on record as a result 20 million people needed food aid.</li> <li>- Floods can destroy crops, disrupt food distribution and erode the soil. In the UK DEFRA estimate 35,000 ha of arable land will be flooded once every 3 years.</li> <li>- Heatwaves can be critical if they coincide with key stages of crop development. Fires can destroy crops and high temperatures can cause crop failure.</li> </ul>
(c)	i	<p><b>Study Fig. 4, a scattergraph showing the relationship between GDP per capita and calorie supply per capita in 2011.</b>  <b>Using evidence from the scattergraph Fig. 4 describe the relationship between GDP per capita and calorie supply per capita.</b></p> <ul style="list-style-type: none"> <li>• There is a weak positive correlation between the two data sets, for example, Australia has the highest GDP</li> </ul>	4 AO3x4	<p><b>AO3 – 4 marks</b></p> <p><b>4 x 1 mark for each (✓) for each correct description of the relationship.</b></p> <ul style="list-style-type: none"> <li>• Correlation (direction) - 1 mark (✓)</li> <li>• Strength of the relationship - 1 mark (✓)Describing the relation between the data sets (variables) - 1 mark (✓)</li> </ul>

	<p>per capita but Ireland and France have higher calorie supplies per capita.</p> <ul style="list-style-type: none"> <li>As the GDP per capita increases so does the calorie supply per capita.</li> <li>An outlier is Ukraine with a GDP of \$3569 and calorie supply per capita of 3142 kcal/day, higher than expected for a relatively low GDP per capita.</li> <li>Ukraine has a high number of calories given its low GDP, if the outlier was excluded then there would be a stronger positive trend.</li> </ul> <table border="1" data-bbox="361 584 1185 986"> <thead> <tr> <th>Data sets:</th><th>GDP per capita 2011</th><th>Food supply per capita (kcal/day 2011)</th></tr> </thead> <tbody> <tr> <td>Ireland</td><td>\$ 52,567.00</td><td>3591.00</td></tr> <tr> <td>France</td><td>\$ 43,810.00</td><td>3524.00</td></tr> <tr> <td>Australia</td><td>\$ 62,245.00</td><td>3265.00</td></tr> <tr> <td>Ukraine</td><td>\$ 3,569.00</td><td>3142.00</td></tr> <tr> <td>Malaysia</td><td>\$ 10,405.00</td><td>2855.00</td></tr> <tr> <td>Thailand</td><td>\$ 5,491.00</td><td>2760.00</td></tr> <tr> <td>Uganda</td><td>\$ 584.00</td><td>2279.00</td></tr> <tr> <td>Bolivia</td><td>\$ 2,377.00</td><td>2254.00</td></tr> </tbody> </table>	Data sets:	GDP per capita 2011	Food supply per capita (kcal/day 2011)	Ireland	\$ 52,567.00	3591.00	France	\$ 43,810.00	3524.00	Australia	\$ 62,245.00	3265.00	Ukraine	\$ 3,569.00	3142.00	Malaysia	\$ 10,405.00	2855.00	Thailand	\$ 5,491.00	2760.00	Uganda	\$ 584.00	2279.00	Bolivia	\$ 2,377.00	2254.00		<ul style="list-style-type: none"> <li>The steepness of the relationship indicating the rate at which the dependent variable (calorie supply) changes with changes in the independent variable (GDP)(✓) Identifying outliers - 1 mark (✓)</li> <li>Impact of outliers on the best fit line 1 mark (✓)</li> <li>Correctly quoting data - 1 mark (✓)</li> </ul>
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	<p><b>ii</b> Using evidence from <u>Fig. 4</u>, analyse reasons for differences in calorie supply per capita.</p> <p><b>Level 3 (5-6 marks)</b> Demonstrates <b>thorough</b> application of knowledge and understanding to provide clear and developed analysis that shows accuracy as to reasons for differences in the calorie supply per capita. (AO2).</p> <p>Demonstrates <b>thorough</b> investigation and interpretation of the quantitative data resource to fully evidence differences in the calorie supply per capita. There must be strong ideas linking resource evidence to possible reasons for differences</p>	<b>6</b> AO2x3 AO3x3	<p><b>AO2 – 3 marks</b></p> <p>Application of knowledge and understanding to analyse reasons for differences in the calorie supply per capita could potentially include:</p> <ul style="list-style-type: none"> <li>Calorie supply per capita is a measure of the amount of food available for consumption. The higher the calorie supply per capita the more secure the food (the higher the food security).</li> <li>Calorie supply per capita can be affected by a range of physical and human factors including climate, landscape, the political situation and</li> </ul>																											

	<p>in the calorie supply per capita (AO3).</p> <p><b>Level 2 (3-4 marks)</b> Demonstrates <b>reasonable</b> application of knowledge and understanding to provide clear and developed analysis that shows accuracy as to reasons for differences in the calorie supply per capita. (AO2).</p> <p>Demonstrates <b>reasonable</b> investigation and interpretation of the quantitative data resource to fully evidence differences in the calorie supply per capita. There must be good ideas linking resource evidence to possible reasons for differences in the calorie supply per capita (AO3).</p> <p><b>Level 1 (1-2 marks)</b> Demonstrates <b>basic</b> application of knowledge and understanding to provide clear and developed analysis that shows accuracy as to reasons for differences in the calorie supply per capita. (AO2).</p> <p>Demonstrates <b>basic</b> investigation and interpretation of the quantitative data resource to fully evidence differences in the calorie supply per capita. There must be some ideas linking resource evidence to possible reasons for differences in the calorie supply per capita (AO3).</p>		<p>land ownership.</p> <ul style="list-style-type: none"> <li>• Countries with a higher GDP will be in a position to buy supplies to bolster provision in times of need, something not available to poorer countries.</li> </ul> <p><b>AO3 – 3 marks</b> Evidence from investigation and interpretation of the data could potentially include:</p> <ul style="list-style-type: none"> <li>• 3 countries (Ireland, France and Australia UK) have calorie supply scores of &gt;3200 – meaning they are very secure with regards to food; they are ACs so have ability to import and stockpile, but they also have climates suitable for growing crops.</li> <li>• Ukraine is just outside this group; whilst it is an EDC with a GDP of \$3,569, their high calorie supply (3142 calories per day) indicates a climate suitable for growing a surplus of crops and ensuring food security.</li> <li>• Bolivia has the lowest calorie supply (2254 calories per day), despite having a GDP over 4 times higher than Uganda (\$2377). This indicates an unsuitable climate or terrain for growing crops, making food production challenging. The low wealth of the people makes them vulnerable to food price increases and the reliance on imports.</li> </ul>
(d)	<p><b>'Long term strategies to ensure food security are more effective than short term strategies.' How far do you agree with this statement?</b></p> <p><b>Level 4 (10–12 marks)</b> Demonstrates <b>comprehensive</b> and accurate knowledge and understanding of long and short term strategies that affect food security (AO1).</p>	<p>12 AO1x6 AO2x6</p>	<p><b>AO1 – 6 marks</b> Knowledge and understanding of strategies to ensure food security could potentially include:</p> <p>Short term – often responding to emergencies; food aid provided by organisations such as the World Food Programme, also donor driven aid.</p>

	<p>Demonstrates <b>comprehensive</b> application of knowledge and understanding to provide a detailed and convincing evaluation offering secure judgements leading to rational conclusions that are evidence based as to the extent to which long term strategies to ensure food security are the most effective (AO2).</p> <p><b>Level 3 (7-9 marks)</b> Demonstrates <b>thorough</b> and mainly accurate knowledge and understanding of long and short term strategies that affect food security (AO1).</p> <p>Demonstrates <b>thorough</b> application of knowledge and understanding to provide a detailed evaluation offering generally secure judgements with some link between rational conclusions and evidence as to the extent to which long term strategies to ensure food security are the most effective (AO2).</p> <p><b>Level 2 (4-6 marks)</b> Demonstrates <b>reasonable</b> and some accurate knowledge and understanding of long and short term strategies that affect food security (AO1).</p> <p>Demonstrates <b>reasonable</b> application of knowledge and understanding to provide a sound evaluation offering generalised judgements and conclusions with limited links to evidence as to the extent to which long term strategies to ensure food security are the most effective (AO2).</p> <p><b>Level 1 (1-3 marks)</b> Demonstrates <b>basic</b> and/or inaccurate knowledge and understanding of long and short term strategies that affect food security (AO1).</p> <p>Demonstrates <b>basic</b> application of knowledge and understanding offering either unsupported or minimal if any evaluation. Judgements and conclusions, if any, are</p>		<p><b>Long term</b></p> <ul style="list-style-type: none"> <li>• Capacity building through countries and communities building a resilient food system including economic development, government monitoring of food supply, investment into research and innovation and efficient storage and distribution.</li> <li>• economic development,</li> <li>• Government monitoring of food supply and distribution,</li> <li>• Efficiency of pricing and distribution within domestic markets,</li> <li>• Access to fair trade agreements,</li> <li>• Food safety,</li> <li>• Investment in research/innovation and transport infrastructure,</li> <li>• Efficient storage and distribution to minimise waste,</li> <li>• Educating people in healthy and nutritious diets</li> <li>• Long term system redesign, introducing large scale technological change, small scale bottom up approaches,</li> </ul> <p><b>AO2 – 6 marks</b> Application of knowledge and understanding to analyse and evaluate the extent to which long term strategies to ensure food security are the most effective could potentially include:</p> <p><b>Long term</b></p> <ul style="list-style-type: none"> <li>• In Cuba <ul style="list-style-type: none"> <li>○ The government is offering guaranteed prices for farmers and financial support with modernising agriculture in the long term. This protects farmers from short term fluctuating food prices, to ensure</li> </ul> </li> </ul>
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	<p>simplistic regarding the extent to which long term strategies to ensure food security are the most effective (AO2).</p> <p><b>0 marks</b></p> <p>No response or no material worthy of credit.</p>		<p>sufficient production of food.</p> <ul style="list-style-type: none"><li>○ Farmers are starting to grow new drought-resistant crops such as avocados, oranges and guavas.</li><li>● Short term strategies are useful to reduce serious food shortages for example WFP food aid to refugees e.g. in war torn Syria. But this is not sustainable in the long term.</li><li>● Food security needs to resume at a national level rather than depending on support from overseas, as Cuba did in the Soviet period resulting in post-Soviet food production collapse.</li><li>● Summary: The long term strategies are most effective at solving the problems of food security ensuring a modern and efficient agricultural systems. However, it is also necessary to introduce short term strategies whilst the long term strategies are being developed to ensure overall food security.</li></ul>
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Question		Answer	Marks	Guidance
5	(a)	<p><b>Explain <u>two</u> scales used to assess earthquake magnitude.</b></p> <ul style="list-style-type: none"> <li>The Mercalli scale is a qualitative scale that measures the intensity of earthquakes (✓) the scale quantifies the impacts of an earthquake that can be felt and seen (✓); the intensity is usually highest nearer the epicentre (✓); it assesses earthquakes, using 12 degrees of observed intensity (✓); it is especially useful in targeting responses to earthquake hazards, particularly in LIDCs (✓).</li> <li>The Richter scale has no upper limit though the largest earthquakes score around 9 (✓); uses the amplitude of seismic waves to determine earthquake magnitude (✓); the scale is logarithmic so for each increase on the scale the earthquake is 10x bigger (✓).</li> <li>The moment magnitude scale measures the energy released by an earthquake (✓); it is more accurate than the Richter scale (✓); the amount of energy released is related to the geological properties of the rock (✓). It is the most accurate measurement of large earthquakes as it uses the amount of physical movement caused by an earthquake (✓).</li> </ul>	4 AO1x4	<p><b>AO1 – 4 marks</b> 2 x 2 mark (✓) for each scale identified and its correct explanation. Focus should be on the knowledge and understanding of each of the two scales is used to assess earthquake magnitude.</p>
	(b)	<p><b>Explain how movements of the Earth's crust form rift valleys.</b></p> <p><b>Level 3 (5-6 marks)</b> Demonstrates <b>thorough</b> knowledge and understanding of movements of the Earth's crust that relate to rift valleys (AO1).</p> <p><b>Place specific details</b> should be <b>accurate</b> with the amount helping determine where within the Level the response lies.</p> <p>Demonstrates <b>thorough</b> application of knowledge and</p>	6 AO1x3 AO2x3	<p><b>AO1 – 3 marks</b> Knowledge and understanding of movements of the earth's crust that relate to rift valleys could potentially include:</p> <ul style="list-style-type: none"> <li>Divergence of the plates at a divergent (constructive) plate boundary</li> <li>Parallel/marginal faulting</li> <li>hot spots</li> <li>Crustal stretching</li> </ul>

Question		Answer	Marks	Guidance
		<p>understanding to provide an <b>accurate, clear and developed analysis</b> as to how movements of the Earth's crust form rift valleys (AO2).</p> <p><b>Level 2 (3-4 marks)</b> Demonstrates <b>reasonable</b> knowledge and understanding of movements of the Earth's crust that relate to rift valleys (AO1).</p> <p><b>Place specific</b> material is present which is <b>partially accurate</b> with the amount helping determine where within the Level the response lies.</p> <p>Demonstrates <b>reasonable</b> application of knowledge and understanding to provide a <b>sound analysis</b> showing some accuracy and development as to how movements of the Earth's crust form rift valleys (AO2).</p> <p><b>Level 1 (1-2 marks)</b> Demonstrates <b>basic</b> knowledge and understanding of movements of the Earth's crust that relate to rift valleys (AO1).</p> <p>Little or no <b>place specific</b> material is present and or is inaccurate.</p> <p>Demonstrates <b>basic</b> application of knowledge and understanding to provide a <b>simple analysis</b> showing limited accuracy and little development as to how movements of the Earth's crust form rift valleys (AO2).</p> <p><b>0 marks</b> No response or no material worthy of credit.</p>		<p><b>AO2 – 3 marks</b> Application of knowledge and understanding to analyse how rift valleys form could potentially include:</p> <ul style="list-style-type: none"> <li>• Rift valleys form on constructive plate margins, <ul style="list-style-type: none"> <li>◦ An example is the central Iceland rift valley.</li> <li>◦ The convection currents at this plate margin diverge, pulling the Eurasian and North American plates apart by on average 2.5cm per year.</li> </ul> </li> <li>• The crust has stretched and become thinner. <ul style="list-style-type: none"> <li>◦ The stresses that this creates results in faulting parallel to the plate margin</li> <li>◦ Allowing sections of crust to sink into the mantle (graben) as they are no longer supported by the structure of the tectonic plate.</li> </ul> </li> <li>• In places lakes form in the sunken land e.g. Þingvallavatn, Iceland.</li> </ul>
(c)	i	<p><b>Study Fig. 5, a scattergraph showing the relationship between the magnitude of an earthquake and the number of deaths caused by that earthquake.</b></p> <p><b>Using evidence from the scattergraph Fig. 5 describe the relationship between earthquake magnitude (Richter scale)</b></p>	4 AO3x4	<p><b>AO3 – 4 marks</b></p> <p><b>4 x 1 mark for each (✓) for each correct description of the relationship.</b></p> <ul style="list-style-type: none"> <li>• Correlation (direction) - 1 mark (✓)</li> </ul>

Question		Answer	Marks	Guidance																		
		<p>and the number of earthquake deaths.</p> <ul style="list-style-type: none"> <li>There is an extremely weak positive correlation between the two data sets, for example Japan, 2011 experienced the highest magnitude earthquake and had the joint 2<sup>nd</sup> lowest death toll, whilst Haiti, 2010 experienced the highest death toll from a much smaller magnitude earthquake.</li> <li>As magnitude increases on the Richter scale there is a weak trend for the amount of deaths to increase.</li> <li>.</li> <li>An outlier is the Haiti earthquake in 2010 measuring 7.0 on the Richter scale and causing 222,500 deaths, higher than expected for an earthquake of this magnitude</li> <li>If Haiti were excluded from the data set there would be a stronger positive trend.</li> <li>Japan, 2011, could be said to be another outlier, with a much lower death toll than expected for such a high magnitude earthquake (9.1).</li> </ul> <p>Data sets:</p> <table border="1"> <thead> <tr> <th>Richter Scale</th> <th>Death toll</th> </tr> </thead> <tbody> <tr> <td>7.0</td> <td>222500</td> </tr> <tr> <td>9.0</td> <td>165700</td> </tr> <tr> <td>7.9</td> <td>87500</td> </tr> <tr> <td>7.6</td> <td>73300</td> </tr> <tr> <td>7.3</td> <td>8600</td> </tr> <tr> <td>6.6</td> <td>26800</td> </tr> <tr> <td>7.6</td> <td>20000</td> </tr> <tr> <td>9.1</td> <td>19800</td> </tr> </tbody> </table>	Richter Scale	Death toll	7.0	222500	9.0	165700	7.9	87500	7.6	73300	7.3	8600	6.6	26800	7.6	20000	9.1	19800		<ul style="list-style-type: none"> <li>Strength of the relationship -1 mark (✓)</li> <li>Describing the relation between the data sets (variables) - 1 mark (✓)</li> <li>The steepness of the relationship indicating the rate at which the dependent variable (number of earthquake deaths) changes with changes in the independent variable (magnitude of an earthquake)</li> <li>Identifying outliers - 1 mark (✓)</li> <li>Impact of outliers on the best fit line 1 mark (✓)</li> <li>Correctly quoting data - 1 mark (✓)</li> </ul>
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	ii	<p><b>Using evidence from Fig. 5, analyse reasons for differences in earthquake deaths.</b></p> <p><b>Level 3 (5-6 marks)</b> Demonstrates <b>thorough</b> application of knowledge and understanding to provide clear and developed analysis that shows accuracy as to reasons for differences in earthquake deaths. (AO2).</p> <p>Demonstrates <b>thorough</b> investigation and interpretation of the quantitative data resource to fully evidence differences in earthquake deaths. There must be strong ideas linking resource evidence to the possible reasons for differences in earthquake deaths (AO3).</p> <p><b>Level 2 (3-4 marks)</b> Demonstrates <b>reasonable</b> application of knowledge and understanding to provide clear and developed analysis that shows accuracy as to reasons for differences in the earthquake deaths (AO2).</p> <p>Demonstrates <b>reasonable</b> investigation and interpretation of the quantitative data resource to fully evidence differences in from earthquake deaths. There must be good ideas linking resource evidence to the possible reasons for differences earthquake deaths (AO3).</p> <p><b>Level 1 (1-2 marks)</b> Demonstrates <b>basic</b> application of knowledge and understanding to provide clear and developed analysis that shows accuracy as to reasons for differences in earthquake deaths. (AO2).</p> <p>Demonstrates <b>basic</b> investigation and interpretation of the quantitative data resource to fully evidence differences in</p>	6 AO2x3 AO3x3	<p><b>AO2 – 3 marks</b></p> <p>Application of knowledge and understanding to analyse reasons for differences in the earthquake deaths could potentially include:</p> <ul style="list-style-type: none"> <li>• The way in which the plate margin was being monitored and whether people were given warning to evacuate</li> <li>• The time, magnitude and duration of the earthquake</li> <li>• Whether there were sufficient preparedness for earthquakes e.g. building design and land use zoning</li> <li>• Where the epicentre was located</li> <li>• The secondary hazards generated by the earthquake e.g. tsunami, landslides and avalanches</li> <li>• Population density in the area affected by the earthquake</li> <li>• Poor quality temporary accommodation for homeless people and subsequent spread of disease in camps</li> </ul> <p><b>AO3 – 3 marks</b></p> <p>Evidence from investigation and interpretation of the data could potentially include:</p> <ul style="list-style-type: none"> <li>• The very weak correlation shown on the scattergraph suggests that there are many reasons other than earthquake magnitude to explain the differences in earthquake deaths.</li> <li>• Haiti (2010) has the highest earthquake death toll (222,500). It is an LIDC and therefore not as wealthy as an AC which would have been able to provide more investment into the monitoring and</li> </ul>

Question		Answer	Marks	Guidance
		earthquake deaths. There must be some ideas linking resource evidence to resource evidence to the possible reasons for differences earthquake deaths (AO3).		<p>preparation for earthquakes.</p> <ul style="list-style-type: none"> <li>The extremely high magnitude of the Japan (2011) earthquake (9.1), resulted in relatively few deaths. Japan - able to provide more investment into the monitoring and preparedness which should reduce the death toll.</li> <li>Nepal (2015) is an LIDC and had the smallest number of deaths (8600). The amount of deaths was very low for a magnitude 7.3 earthquake. This may be due to low population density in the region.</li> </ul>
(d)		<p><b>“Environmental impacts of volcanic activity are the most damaging.’ How far do you agree with this statement?</b></p> <p><b>Level 4 (10–12 marks)</b> Demonstrates <b>comprehensive</b> and accurate knowledge and understanding of a range of impacts of volcanic activity (AO1).</p> <p>Demonstrates <b>comprehensive</b> application of knowledge and understanding to provide a detailed and convincing evaluation offering secure judgements leading to rational conclusions that are evidence based as to the extent to which the environmental impacts of volcanic activity are the most damaging (AO2).</p> <p><b>Level 3 (7-9 marks)</b> Demonstrates <b>thorough</b> and mainly accurate knowledge and understanding of a range of impacts of volcanic activity (AO1).</p> <p>Demonstrates <b>thorough</b> application of knowledge and understanding to provide a detailed evaluation offering generally secure judgements with some link between rational conclusions and evidence as to the extent to which the environmental impacts of volcanic activity are the most damaging (AO2).</p>	12 AO1x6 AO2x6	<p><b>AO1 – 6 marks</b> Knowledge and understanding of a range of impacts of volcanic activity could potentially include:</p> <ul style="list-style-type: none"> <li>Political- financial response to the impacts, co-ordinating aid and rebuilding programmes, future management of the hazard.</li> <li>Economic – damage to businesses, infrastructure, farming, fisheries and tourism</li> <li>Environmental – damage to habitats, resulting in animal deaths, lahars blocking rivers and causing flooding, ash covering grazing land, ash blocking solar radiation resulting in short term global temperature change.</li> </ul> <p><b>AO2 – 6 marks</b> Application of knowledge and understanding to analyse and evaluate the extent to which the environmental impacts of volcanic eruptions are the most damaging could potentially include:</p> <ul style="list-style-type: none"> <li>Damage caused by volcanic activity will differ in magnitude/importance based on a range of factors such as level of development, nature of the volcanic activity and environmental</li> </ul>

Question	Answer	Marks	Guidance
	<p><b>Level 2 (4-6 marks)</b> Demonstrates <b>reasonable</b> and some accurate knowledge and understanding of a range of impacts of volcanic activity (AO1).</p> <p>Demonstrates <b>reasonable</b> application of knowledge and understanding to provide a sound evaluation offering generalised judgements and conclusions with limited links to evidence as to the extent to which the environmental impacts of volcanic activity are the most damaging (AO2).</p> <p><b>Level 1 (1-3 marks)</b> Demonstrates <b>basic</b> and/or inaccurate knowledge and understanding of a range of impacts of volcanic activity (AO1).</p> <p>Demonstrates <b>basic</b> application of knowledge and understanding offering either unsupported or minimal if any evaluation. Judgements and conclusions, if any, are simplistic regarding the extent to which the environmental impacts of volcanic activity are the most damaging (AO2).</p> <p><b>0 marks</b> No response or no material worthy of credit.</p>		<p>significance of the area where it occurred.</p> <ul style="list-style-type: none"> <li>Two examples of volcanic activity demonstrate this, with evidence of whether environmental impacts were the most damaging</li> </ul> <p>Mount Ontake, Japan 2014 tourist area</p> <ul style="list-style-type: none"> <li>Economic impact on local and national economy - massive amounts of ash inundated the hotels etc – resort closed – economic damage to related businesses - renovation after the eruption.</li> <li>63 deaths</li> <li>Environmental impact - vegetation killed where the endangered Raicho birds live, population of 513 decimated (extinction risks).</li> </ul> <p>Summary: environmental impact on the Raicho bird is important as they are endangered but is less damaging than loss of life and the economic impact.</p> <p>Mount Pinatubo, Philippines 1991</p> <ul style="list-style-type: none"> <li>Economic impact - 80,000ha of farm land was buried in ash; 1 million animals died (ash contaminated grass); \$425m of damage was caused to agriculture. This results in significant losses for farmers – potential bankruptcy – migration to cities.</li> <li>Environmental impact - Ash blocked out the sunlight causing global cooling of -0.5 degrees Celsius in the following year. 77 lahars choked rivers with ash and small sediment - flooding in the surrounding areas - 350 people died. Lava permanently damaged buildings and 200,000 homes destroyed</li> <li>Political - USGS and PHILVOLCS – monitoring, hazard maps, alerts; government and Red Cross aid</li> </ul> <p>Summary: Environmental impacts</p>

Question	Answer	Marks	Guidance
			<ul style="list-style-type: none"><li>○ on farming - damaging with associated economic impacts, as they affect a majority of the populations livelihoods and source of food.</li><li>○ on the environment – very important including global cooling.</li></ul>

## SECTION B – SYNOPTIC QUESTIONS

Question		Answer	Marks	Guidance
6	(a)	<p><b>With reference to Fig. 6 suggest how climate change affects social inequality</b></p> <p><b>Level 3 (6-8 marks)</b> Demonstrates <b>thorough</b> knowledge and understanding of climate change and social inequality (AO1).</p> <p>Demonstrates <b>thorough</b> application of knowledge and understanding to provide a clear and developed interpretation that shows accuracy of how climate change affects social inequality (AO2).</p> <p>This will be shown by including <b>well-developed</b> ideas linking climate change to social inequality.</p> <p>There are clear attempts to make synoptic links between content from different parts of the course of study.</p> <p><b>Level 2 (3-5 marks)</b> Demonstrates <b>reasonable</b> knowledge and understanding of climate change and social inequality (AO1).</p> <p>Demonstrates <b>reasonable</b> application of knowledge and understanding to provide a sound interpretation that shows some accuracy of how climate change affects social inequality (AO2).</p> <p>This will be shown by including <b>developed</b> ideas linking climate change to social inequality</p> <p>There are some attempts to make synoptic links between content from different parts of the course of study but these are not always relevant.</p>	8 AO1 x4 AO2 x4	<p><b>Indicative Content</b> <b>AO1 – 4 marks</b> Knowledge and understanding of climate change and social inequality could potentially include:</p> <ul style="list-style-type: none"> <li>• Climate change: Global warming - impacts include: <ul style="list-style-type: none"> <li>○ Melting ice sheets</li> <li>○ Rising sea levels</li> <li>○ Increased frequency of storms</li> <li>○ Drought in some areas, flooding in others</li> </ul> </li> <li>• Social inequality including: <ul style="list-style-type: none"> <li>○ How resources, wealth and opportunities are not evenly spread between places.</li> <li>○ Measures that reflect influences such as environment, economy and society</li> <li>○ Its existence within (intra) countries and between (inter) countries</li> <li>○ Different levels of vulnerability (fig 6)</li> </ul> </li> </ul> <p><b>AO2 – 4 marks</b> Application of knowledge and understanding to interpret how climate change affects social inequality could potentially include:</p> <ul style="list-style-type: none"> <li>• Climate change has impacts that can increase social inequality eg policies in ACs that contribute to climate change such as USA's withdrawal from the Paris agreement.</li> <li>• Increased vulnerability because social inequality makes coping with extreme weather events e.g. winter storms and hurricanes more challenging for people in LIDCs and for some disadvantaged groups (fig 6).</li> <li>• Resistance to climate change directives (eg India and other low and middle income countries who</li> </ul>

	<p><b>Level 1 (1-2 marks)</b>  Demonstrates <b>basic</b> knowledge and understanding of climate change and social inequality (AO1).</p> <p>Demonstrates <b>basic</b> application of knowledge and understanding to provide a simple interpretation that shows limited accuracy of how climate change affects social inequality (AO2).</p> <p>There will be <b>simple</b> ideas linking climate change to social inequality.</p> <p>There are limited attempts to make synoptic links between content from different parts of the course of study.</p> <p><b>0 marks</b>  No response or no response worthy of credit</p>		<p>believe ACs should shoulder the costs of reducing carbon emissions) – a cycle of increased climate change leading to further social inequality.</p> <ul style="list-style-type: none"> <li>The importance of breaking such a cycle in order to reduce the social inequalities between countries (eg globalisation including mobile phone technologies) and within countries (eg regeneration in Birmingham). Could be done by addressing national policies to reduce inequality (eg UK government policies on taxation, subsidies etc)..</li> </ul>
(b)	<p><b>Examine how climate change affects landforms in landscape systems.</b></p> <p><b>Level 3 (6-8 marks)</b>  Demonstrates <b>thorough</b> knowledge and understanding of climate change and landforms. (AO1).</p> <p>Demonstrates <b>thorough</b> application of knowledge and understanding to provide a clear and developed analysis that shows accuracy of how climate change affects landforms in landscape systems. (AO2).</p> <p>There must be <b>well-developed</b> ideas of how climate change affects landforms in landscape systems.</p> <p>There are clear attempts to make synoptic links between content from different parts of the course of study.</p> <p><b>Level 2 (3-5 marks)</b>  Demonstrates <b>reasonable</b> knowledge and understanding of climate change and landforms (AO1).</p>	<b>8</b> AO1 x4 AO2 x4	<p><b>Indicative Content</b>  <b>AO1 – 4 marks</b>  Knowledge and understanding of climate change and landforms could potentially include:</p> <p>Climate change: Past climates - evidence reveals periods of greenhouse and icehouse earth, including glacial and interglacial periods. Current interglacial.  Post industrial climate change – global warming with associated changes eg reduced ice cover, sea levels, incidence of storms/droughts.</p> <p>Landforms: natural features of the earth characterized by the area in which they are found and influenced by a range of physical factors; develop due to a variety of interconnected climatic and geomorphic processes; influenced by flows of energy and materials on the geomorphic processes that contribute to distinctive landforms.</p> <p>NB detail of processes is not required.</p>

	<p>Demonstrates <b>reasonable</b> application of knowledge and understanding to provide a sound analysis that shows some accuracy of how climate change affects landforms in landscape systems. (AO2).</p> <p>There must be <b>developed</b> ideas of how climate change affects landforms in landscape systems.</p> <p>There are some attempts to make synoptic links between content from different parts of the course of study but these are not always relevant.</p> <p><b>Level 1 (1-2 marks)</b></p> <p>Demonstrates <b>basic</b> knowledge and understanding of climate change and landforms. (AO1).</p> <p>Demonstrates <b>basic</b> application of knowledge and understanding to provide a simple analysis that shows limited accuracy of how climate change affects landforms in landscape systems. (AO2).</p> <p>This will be shown by including <b>simple</b> ideas of how climate change affects landforms in landscape systems.</p> <p>There are limited attempts to make synoptic links between content from different parts of the course of study.</p> <p><b>0 marks</b></p> <p>No response or no response worthy of credit.</p>	<p>Landforms typical of coastal or glaciated or dry land regions. Candidates choose one of these three landscape systems.</p> <p><b>AO2 – 4 marks</b></p> <p>Application of knowledge and understanding to analyse how climate change affects landforms in landscape systems could potentially include:</p> <p>Changes to landforms over time from millennia to seconds, reflecting how past and present climates as well as short term weather conditions affect landforms.</p> <p>Processes <i>relevant to the question</i> may be credited.</p> <p>Coastal: As sea level falls emergent coastal areas have distinctive landforms. For example Isle of Portland – raised beach formed 125000 years ago during an interglacial with much higher sea levels than now, and an abandoned cliff with solifluction deposits – periglacial conditions during the last ice age.</p> <p>As sea level rises submergent coastal areas have distinctive landforms (rias, fjords). Rising sea levels contributed to the formation of Chesil beach and subsequent changes in climate eg increased storms modify (and threaten) it.</p> <p>Glaciated: Glacio-fluvial landforms exist as a result of climate change at the end of glacial periods. Meltwater released from glaciers mostly during deglaciation, leading to outwash, ie sediments carried by meltwater that form landforms, including kames, eskers and outwash plains – many examples in Iceland, and continued present day temperature increases allow colonisation by plants.</p> <p>Periglacial landforms exist as a result of climate change before and/or after glacial periods leading to landforms,</p>
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				<p>including patterned ground and pingos. Much of Southern England was dominated by periglacial conditions in the last ice age with some residual features eg patterned ground on Dartmoor. Modification of these residual landforms by processes associated with present climate.</p> <p>Dryland: Fluvial landforms can exist in dryland landscapes as a result of earlier pluvial periods shaping landforms, for example pleistocene rivers and lakes in the Mojave region of California. These have been modified by processes associated with present climate.</p> <p>Periglacial landforms can exist in dryland landscapes as a result of earlier colder periods shaping landforms, including frost shattered debris, nivation hollows and solifluction deposits such as talus slopes found in New Mexico and central Arizona formed 10,000 years ago (fossil landforms are potentially at risk from present day processes).</p>
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Question		Answer	Marks	Guidance
7	(a)	<p><b>With reference to Fig. 7 suggest how the spread of infectious diseases is linked to social inequality</b></p> <p><b>Level 3 (6-8 marks)</b> Demonstrates <b>thorough</b> knowledge and understanding of the spread of communicable diseases and social inequality (AO1).  Demonstrates <b>thorough</b> application of knowledge and understanding to provide a clear and developed interpretation that shows accuracy of how the spread of communicable diseases is linked to social inequality (AO2).  This will be shown by including <b>well-developed</b> ideas linking resource evidence on communicable diseases to social inequality.  There are clear attempts to make synoptic links between content from different parts of the course of study.</p> <p><b>Level 2 (3-5 marks)</b> Demonstrates <b>reasonable</b> knowledge and understanding of the spread of communicable diseases and social inequality (AO1).  Demonstrates <b>reasonable</b> application of knowledge and understanding to provide a sound interpretation that shows some accuracy of how the spread of communicable diseases is linked to social inequality (AO2).  This will be shown by including <b>developed</b> ideas linking resource evidence on communicable diseases to social inequality.</p>	<b>8</b> AO1 x4 AO2 x4	<p><b>Indicative Content</b> <b>AO1 – 4 marks</b></p> <p>Knowledge and understanding of communicable/infectious disease and social inequality could potentially include:</p> <ul style="list-style-type: none"> <li>• Definition of communicable diseases (infectious, contagious);</li> <li>• Range of communicable diseases e.g. TB, Cholera, AIDS/HIV, Influenza and Malaria.</li> </ul> <p><b>Spread of communicable diseases</b></p> <ul style="list-style-type: none"> <li>○ Diffusion: expansion – spread outwards from source area, relocation – leaves area of origin and moves to a new area eg via migration, hierarchical – disease spreads through places in order often from large city to small towns/villages, contagious – spread of disease by direct contact with a carrier.</li> <li>○ Barriers to spread of communicable disease: physical (distance, ocean, mountains); human (political – close borders, safety precautions eg curfew in Sierra Leone in 2005 to reduce spread of ebola, face masks, immunisation to reduce spread of viruses)</li> </ul> <p><b>Social inequality including</b></p> <ul style="list-style-type: none"> <li>○ Uneven spatial distribution of resources, wealth and opportunities, within (intra) countries and between (inter) countries leading to different levels of vulnerability to disease (fig 7).</li> <li>○ LIDCs are dominated by poverty (poor living conditions, inadequate food supply, water pollution)</li> <li>○ Indicators related to inequality such as environment, economy and society</li> </ul>

	<p>There are some attempts to make synoptic links between content from different parts of the course of study but these are not always relevant.</p> <p><b>Level 1 (1-2 marks)</b> Demonstrates <b>basic</b> knowledge and understanding of the spread of communicable diseases and social inequality (AO1).</p> <p>Demonstrates <b>basic</b> application of knowledge and understanding to provide a simple interpretation that shows limited accuracy of how the spread of communicable diseases is linked to social inequality (AO2).</p> <p>There will be <b>simple</b> ideas linking resource evidence on communicable diseases to social inequality.</p> <p>There are limited attempts to make synoptic links between content from different parts of the course of study.</p> <p><b>0 marks</b> No response or no response worthy of credit</p>	<p><b>AO2 – 4 marks</b> Application of knowledge and understanding to interpret how the spread of communicable diseases is linked to social inequality could potentially include:</p> <ul style="list-style-type: none"> <li>• Within countries evidence of disease-social inequality links (fig 7) e.g. India's poorest rates of mortality are 150/1000 but their richest fifth just 60/1000 - highlights the correlation between communicable disease and wealth.</li> <li>• LIDCs are dominated by problems associated with communicable disease due to factors related to poverty/overcrowding and in many cases tropical climatic conditions.</li> <li>• Communicable diseases dominate mortality in LIDCs eg. TB present in all regions but 95% of deaths in low and middle income countries, 2013 Nigeria mortality rate = 94/100,000</li> <li>• Example - spread of Malaria in Ethiopia (tropical climate + poverty). Worldwide, 583,000 deaths in 2013 of which three quarters were children under 5.</li> <li>• Spread of a communicable disease creates further socio-economic inequalities such as reduction in work force/absenteeism, slowing economic growth.</li> </ul> <p>For a focus on non-communicable diseases candidates can only reach top of level 2.</p>
(b)	<p><b>Examine how non-communicable diseases are affected by the processes of economic change</b></p> <p><b>Level 3 (6-8 marks)</b> Demonstrates <b>thorough</b> knowledge and understanding of non-communicable disease and the processes of economic change (AO1).</p>	<p><b>8</b> AO1 x4 AO2 x4</p> <p><b>Indicative Content</b> <b>AO1 – 4 marks</b> Knowledge and understanding of non-communicable diseases and the processes of economic change could potentially include:</p> <ul style="list-style-type: none"> <li>• Non-communicable diseases <ul style="list-style-type: none"> <li>○ Definition - non-infectious, may be degenerative,</li> </ul> </li> </ul>

	<p>Demonstrates <b>thorough</b> application of knowledge and understanding to provide a clear and developed analysis that shows accuracy of how non-communicable diseases are affected by the processes of economic change (AO2).</p> <p>There must be <b>well-developed</b> ideas of how non-communicable diseases are affected by the processes of economic change.</p> <p>There are clear attempts to make synoptic links between content from different parts of the course of study.</p> <p><b>Level 2 (3-5 marks)</b></p> <p>Demonstrates <b>reasonable</b> knowledge and understanding of non-communicable diseases and the processes of economic change (AO1).</p> <p>Demonstrates <b>reasonable</b> application of knowledge and understanding to provide a sound analysis that shows some accuracy of how non-communicable diseases are affected by the processes of economic change (AO2).</p> <p>There must be <b>developed</b> ideas of how non-communicable diseases are affected by the processes of economic change.</p> <p>There are some attempts to make synoptic links between content from different parts of the course of study but these are not always relevant.</p> <p><b>Level 1 (1-2 marks)</b></p> <p>Demonstrates <b>basic</b> knowledge and understanding of non-communicable diseases and the processes of economic change (AO1).</p> <p>Demonstrates <b>basic</b> application of knowledge and understanding to provide a simple analysis that shows limited accuracy of how non-communicable diseases are affected by</p>	<ul style="list-style-type: none"> <li>○ Range e.g. heart disease, cancer, diabetes</li> <li>○ Common cause of death in industrial and post-industrial societies</li> </ul> <ul style="list-style-type: none"> <li>● Processes of economic change <ul style="list-style-type: none"> <li>○ Transition from primary production through secondary to a stage of deindustrialisation followed by service sector expansion.</li> <li>○ May be driven by national and local initiatives eg 20<sup>th</sup> and 21<sup>st</sup> century changes in Birmingham</li> <li>○ Usually accompanied by increases in individual and national wealth</li> </ul> </li> </ul> <p><b>AO2 – 4 marks</b></p> <p>Application of knowledge and understanding to analyse how non-communicable diseases are affected by the processes of economic change could potentially include:</p> <ul style="list-style-type: none"> <li>● Candidates may use the epidemiological transition to structure their answer to this question.</li> <li>● LIDCs have a higher prevalence for communicable diseases (diseases of poverty) and ACs have a higher prevalence for noncommunicable diseases (diseases of affluence)</li> <li>● The links between wealth and health, especially seen within countries. E.g. N/S divide in UK and high mortality rates from non-communicable diseases in cities and areas of deprivation.</li> <li>● The socio-economic costs of disease e.g. Cancer which costs the UK £15 billion per year due to early deaths and patients taking time off work and for treatment on the National Health Service. Most affluent overall have better chances of survival than least affluent, largely explained by pre-existing health status and speed of diagnosis.</li> <li>● Deprivation increases the likelihood of lifestyle</li> </ul>
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	<p>the processes of economic change (AO2).</p> <p>This will be shown by including <b>simple</b> ideas of how non-communicable disease are affected by the processes of economic change.</p> <p>There are limited attempts to make synoptic links between content from different parts of the course of study.</p> <p><b>0 marks</b></p> <p>No response or no response worthy of credit.</p>		<p>choices that can increase risk of non-communicable disease e.g. smoking, alcohol consumption and obesity.</p> <ul style="list-style-type: none"><li>• ACs are dominated by problems associated with non-communicable disease due to wealth related lifestyle factors. Eg cancer cases 255/100,000 adults in Europe compared with 123/100,000 adults in Africa</li><li>• As economic change occurs it is paralleled by the epidemiological transition. Eg air pollution and cancer spread in India (EDC) as a function of rapid industrialisation and urbanisation. Degenerative diseases are the main cause of mortality in post-industrial societies.</li></ul> <p>For a focus on communicable diseases candidates can only reach top of level 2</p>
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Question	Answer	Marks	Guidance
8 (a)	<p><b>With reference to Fig. 8 suggest how the use of ocean energy affects sense of place</b></p> <p><b>Level 3 (6-8 marks)</b> Demonstrates <b>thorough</b> knowledge and understanding of the use of ocean energy and sense of place (AO1).</p> <p>Demonstrates <b>thorough</b> application of knowledge and understanding to provide a clear and developed interpretation that shows accuracy of how the use of ocean energy affects sense of place (AO2).</p> <p>This will be shown by including <b>well-developed</b> ideas linking resource evidence on the use of ocean energy to sense of place.</p> <p>There are clear attempts to make synoptic links between content from different parts of the course of study.</p> <p><b>Level 2 (3-5 marks)</b> Demonstrates <b>reasonable</b> knowledge and understanding of the use of ocean energy and sense of place (AO1).</p> <p>Demonstrates <b>reasonable</b> application of knowledge and understanding to provide a sound interpretation that shows some accuracy of how the use of ocean energy affects sense of place (AO2).</p> <p>This will be shown by including <b>developed</b> ideas linking resource evidence on the use of ocean energy to sense of place.</p> <p>There are some attempts to make synoptic links between content from different parts of the course of study but these are not always relevant.</p>	<b>8</b> AO1 x4 AO2 x4	<p><b>Indicative Content</b>  <b>AO1 – 4 marks</b>  Knowledge and understanding of the use of ocean energy and sense of place could potentially include:</p> <p>Use of ocean energy:  Require infra structure investment including terminals, drilling/extraction equipment, cables etc as well as a workforce with a range of skills who need accommodation and transport (fig 8).</p> <p>Geopolitical concerns, territorial waters, UN convention on the Law of the Sea</p> <p>Environmental issues – differ according to the product</p> <ul style="list-style-type: none"> <li>○ Oil and gas – non-renewable (fig 8)</li> <li>○ Wave and tidal energy – renewable</li> </ul> <p>Sense of place:</p> <ul style="list-style-type: none"> <li>○ Identity of a place, particular features of a place that give it unique qualities.</li> <li>○ The characteristics of a place that give people a sense of belonging.</li> <li>○ People's feel/perception of what a place is like – can change over time, eg with increased travel, greater experience of the world and the impact of globalisation.</li> </ul> <p><b>AO2 – 4 marks</b>  Application of knowledge and understanding to interpret how the use of ocean energy affects sense of place could potentially include:</p> <p>Use of ocean energy; the factors that can affect sense of place</p> <ul style="list-style-type: none"> <li>- extraction industries - waste generating, polluting, impact on environment eg Deepwater horizon disaster in the Gulf of Mexico – despite effective beach cleaning,</li> </ul>

	<p><b>Level 1 (1-2 marks)</b>  Demonstrates <b>basic</b> knowledge and understanding of the use of ocean energy and sense of place (AO1).</p> <p>Demonstrates <b>basic</b> application of knowledge and understanding to provide a simple interpretation that shows limited accuracy of how the use of ocean energy affects sense of place (AO2).</p> <p>There will be <b>simple</b> ideas linking resource evidence on the use of ocean energy to sense of place.</p> <p>There are limited attempts to make synoptic links between content from different parts of the course of study.</p> <p><b>0 marks</b>  No response or no response worthy of credit</p>		<p>negative perception damaged the sense of place that had attracted tourists</p> <ul style="list-style-type: none"> <li>- international trade in the products, globally significant. Limited deep sea research so the 'sense of place' in oceans may be tenuous and potential environmental damage high. Oceans, perceived as the last unexplored/unexploited natural areas of the world, environmentally rich and not damaged by human activity. But examples show otherwise.</li> <li>- means of generating income for individuals, nations/governments, companies (often TNCs) - normally large scale investment leading to dominance by a number of giant companies. As well as the positives of more jobs through the multiplier effect (such as the 240,000 jobs linked to the US Gulf energy industries) companies fund conservation projects, both ways that contribute to a sense of place.</li> <li>- infrastructure on land may mean losing/changing the characteristics of places eg barrages across estuaries for generating tidal power, wind farms on skyline. Changes in transport, accommodation and wealth can change the feel of a place (see fig 8).</li> </ul>
(b)	<p><b>Examine how a change in sea-level affects place-making processes</b></p> <p><b>Level 3 (6-8 marks)</b>  Demonstrates <b>thorough</b> knowledge and understanding of sea level change and place-making processes (AO1).</p> <p>Demonstrates <b>thorough</b> application of knowledge and understanding to provide a clear and developed analysis that shows accuracy of how a change in sea level affects place-making processes (AO2).</p> <p>There must be <b>well-developed</b> ideas of how a change in sea level affects place-making processes.</p>	<b>8</b> AO1 x4 AO2 x4	<p><b>Indicative Content</b>  <b>AO1 – 4 marks</b>  Knowledge and understanding of sea level change and place-making processes could potentially include:</p> <p><b>Sea level change</b></p> <ul style="list-style-type: none"> <li>- rise (linked to global warming) – flooding, land area reduced</li> <li>- fall (land rises or reduction in water supply to an internal sea) – limited access to water for fishing etc</li> </ul> <p><b>Place-making processes</b></p> <ul style="list-style-type: none"> <li>- governments and organisations attempt to present places to the wider world to attract inward</li> </ul>

	<p>There are clear attempts to make synoptic links between content from different parts of the course of study.</p> <p><b>Level 2 (3-5 marks)</b> Demonstrates <b>reasonable</b> knowledge and understanding of sea level change and place-making processes (AO1).</p> <p>Demonstrates <b>reasonable</b> application of knowledge and understanding to provide a sound analysis that shows some accuracy of how a change in sea level affects place-making processes (AO2).</p> <p>There must be <b>developed</b> ideas of how a change in sea level affects place-making processes.</p> <p>There are some attempts to make synoptic links between content from different parts of the course of study but these are not always relevant.</p> <p><b>Level 1 (1-2 marks)</b> Demonstrates <b>basic</b> knowledge and understanding of sea level change and place-making processes (AO1).</p> <p>Demonstrates <b>basic</b> application of knowledge and understanding to provide a simple analysis that shows limited accuracy of how a change in sea level affects place-making processes (AO2).</p> <p>This will be shown by including <b>simple</b> ideas of how a change in sea level affects place-making processes.</p> <p>There are limited attempts to make synoptic links between content from different parts of the course of study.</p> <p><b>0 marks</b> No response or no response worthy of credit.</p>		<p>investment and regeneration.</p> <ul style="list-style-type: none"> <li>- local community groups shape the place they live,</li> <li>- branding – constructs a different place meaning through reimaging and regeneration;</li> <li>- making a successful place requires planning and design</li> </ul> <p><b>AO2 – 4 marks</b> Application of knowledge and understanding to analyse how a change in sea level affects place-making processes could potentially include:</p> <p>Details from a case study of one island community in either the Indian Ocean, Pacific Ocean or the Caribbean Sea.</p> <p>Sea level rise: Problems to be managed – flooding, contamination of fresh water supplies, damage to tourism, associated issues eg emigration, unemployment.</p> <p>Maldives policy</p> <ul style="list-style-type: none"> <li>- maintain existing situation with protection – sea walls, barriers, ie investment by governments (may mean funds diverted from other projects eg housing, communications, health).</li> <li>- Build new city on artificial island, one of several.</li> <li>- Encourage other countries to invest.</li> </ul> <p>Local initiatives eg raise houses on stilts in the Philippines, floating gardens – Bangladesh</p> <p>Venice – flood barrier proposal to protect Venice and its tourist industry.</p> <p>Sea level fall - Aral Sea Problems - abandoned fishing industry, desertification Local place-making attempts through long term</p>
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				reforestation
9	(a)	<p><b>With reference to Fig.9 suggest how the globalisation of the food industry is linked to economic change</b></p> <p><b>Level 3 (6-8 marks)</b> Demonstrates <b>thorough</b> knowledge and understanding of globalisation of the food industry and economic change (AO1).</p> <p>Demonstrates <b>thorough</b> application of knowledge and understanding to provide a clear and developed interpretation that shows accuracy of how globalisation of the food industry is linked to economic change (AO2).</p> <p>This will be shown by including <b>well-developed</b> ideas linking resource evidence to globalisation of the food industry and economic change.</p> <p>There are clear attempts to make synoptic links between content from different parts of the course of study.</p> <p><b>Level 2 (3-5 marks)</b> Demonstrates <b>reasonable</b> knowledge and understanding of X globalisation of the food industry and economic change (AO1).</p> <p>Demonstrates <b>reasonable</b> application of knowledge and understanding to provide a sound interpretation that shows some accuracy of how globalisation of the food industry is linked to economic change (AO2).</p> <p>This will be shown by including <b>developed</b> ideas linking resource evidence to globalisation of the food industry and economic change.</p> <p>There are some attempts to make synoptic links between content from different parts of the course of study but these are not always relevant.</p>	8 AO1 x4 AO2 x4	<p><b>Indicative Content</b> <b>AO1 – 4 marks</b> Knowledge and understanding of globalisation of the food industry and economic change could potentially include:</p> <p>Globalisation of the food industry</p> <ul style="list-style-type: none"> <li>- greater interconnectedness leading to increased flows of people, goods, information</li> <li>- improved access to global food sources,</li> <li>- increased demand for food</li> <li>- changing global tastes</li> <li>-</li> </ul> <p>Economic change</p> <ul style="list-style-type: none"> <li>- Driven by economic (wealth related) forces</li> <li>- Includes globalisation – food industry is one aspect of this, (increased flows of capital, goods, services, people)</li> <li>- can create opportunities for some while creating and exacerbating social inequality for others; may contribute to the uneven distribution of resources, wealth and opportunities between places</li> </ul> <p><b>AO2 – 4 marks</b> Application of knowledge and understanding to interpret how globalisation of the food industry is linked to economic change could potentially include:</p> <p>Globalisation</p> <ul style="list-style-type: none"> <li>- Bulk handling (Fig 9), containerisation reduces costs of transport. Across the world – economic/efficient to transport tons of grain and other products to meet demand</li> <li>- Greater global competition, decision making factors include comparative advantage (the most financially rewarding response to demand often means production located miles from market eg</li> </ul>

	<p><b>Level 1 (1-2 marks)</b> Demonstrates <b>basic</b> knowledge and understanding of globalisation of the food industry and economic change (AO1).</p> <p>Demonstrates <b>basic</b> application of knowledge and understanding to provide a simple interpretation that shows limited accuracy of how globalisation of the food industry is linked to economic change (AO2).</p> <p>There will be <b>simple</b> ideas linking resource evidence to globalisation of the food industry and economic change</p> <p>There are limited attempts to make synoptic links between content from different parts of the course of study.</p> <p><b>0 marks</b> No response or no response worthy of credit</p>		<p>fig 9 grain in Brazil rather than China/S Korea)</p> <p>Issues and opportunities associated with globalisation of the food industry linked to economic change</p> <ul style="list-style-type: none"> <li>- growth of agribusiness may lead to inequality eg between TNCs (favouring capital intensive growers) and small suppliers (may be marginalised),</li> <li>- GM crops, use of fertilisers etc + monoculture giving increased yields</li> <li>- consumer choice – linked to advertising, impact of tourism etc associated with increased affluence – dietary change</li> <li>- meat products involve animal consumption of plant based foods – change linked to wealth – and associated increase in both land required and waste,</li> <li>- China (one of the grain importing countries in Fig 9) has increased consumption of meat products (more expensive) six-fold in the last 30 years, including availability via fast food chains.</li> </ul>
(b)	<p><b>Examine how food security can reduce economic inequality in a country</b></p> <p><b>Level 3 (6-8 marks)</b> Demonstrates <b>thorough</b> knowledge and understanding of food security and economic inequality (AO1).</p> <p>Demonstrates <b>thorough</b> application of knowledge and understanding to provide a clear and developed analysis that shows accuracy of how food security can reduce economic inequality (AO2).</p> <p>There must be <b>well-developed</b> ideas of how food security can reduce economic inequality.</p>	<p><b>8</b> AO1 x4 AO2 x4</p>	<p><b>Indicative Content</b> <b>AO1 – 4 marks</b> Knowledge and understanding of food security and economic inequality could potentially include:</p> <p><b>Food security</b> When all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life Three pillars - food access, food affordability and food use</p> <p><b>Economic inequality</b> Extremes of wealth and poverty</p>

	<p>There are clear attempts to make synoptic links between content from different parts of the course of study.</p> <p><b>Level 2 (3-5 marks)</b> Demonstrates <b>reasonable</b> knowledge and understanding of food security and economic inequality (AO1).</p> <p>Demonstrates <b>reasonable</b> application of knowledge and understanding to provide a sound analysis that shows some accuracy of how food security can reduce economic inequality (AO2).</p> <p>There must be <b>developed</b> ideas of how food security can reduce economic inequality.</p> <p>There are some attempts to make synoptic links between content from different parts of the course of study but these are not always relevant.</p> <p><b>Level 1 (1-2 marks)</b> Demonstrates <b>basic</b> knowledge and understanding of food security and economic inequality (AO1).</p> <p>Demonstrates <b>basic</b> application of knowledge and understanding to provide a simple analysis that shows limited accuracy of how food security can reduce economic inequality (AO2).</p> <p>This will be shown by including <b>simple</b> ideas of how food security can reduce economic inequality.</p> <p>There are limited attempts to make synoptic links between content from different parts of the course of study.</p> <p><b>0 marks</b> No response or no response worthy of credit.</p>	<ul style="list-style-type: none"> <li>- national (rural/urban contrasts such as 'leafy Surrey'/inner London boroughs) a</li> <li>- international (ACs with high GDP eg USA compared with LIDCs with low GDP eg Mali, South Sudan)</li> </ul> <p>Various reasons, often complex, including natural resources+suitability for food production, extreme weather/natural disasters, war, development/trade, population movement.</p> <p><b>AO2 – 4 marks</b> Application of knowledge and understanding to analyse how food security can reduce economic inequality could potentially include:</p> <ul style="list-style-type: none"> <li>• Food security allows people to lead active and healthy lives with less risk of illness and no nutrition related problems so people can work ie earn money.</li> <li>• Government efforts to increase food security should benefit poorer members of society in particular (Indian government subsidies for grain purchase) – reducing economic inequality (in theory). But economic forces eg high prices and limited local availability of/access to best quality crops, linked to competition with export markets, can perpetuate economic inequality.</li> <li>• Kenya <ul style="list-style-type: none"> <li>- 50% live below the poverty line and 30% GDP from exports of veg and flowers.</li> <li>- Urban food security 'sack gardening' in Kibera, Nairobi – small wage for employees and a proportion of money from sales to help young people set up their own business</li> </ul> </li> <li>• Desertification – land becomes unproductive, populations displaced, extreme poverty – so regeneration/prevention essential eg FAO Acacia project in Sahel region, trees, livestock and low level</li> </ul>
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			<p>crops = income for farmers and funds available for reinvestment in the community.</p> <ul style="list-style-type: none"><li>• Global hunger index – scores have fallen (more food secure) in countries such as Thailand and Mexico linked to high levels of economic growth.</li><li>• Variations in food security within countries such as China, Colombia – usually linked to poverty (food insecure) and wealth (food secure).</li></ul>
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Question	Answer	Marks	Guidance
10 (a)	<p><b>With reference to Fig. 10 suggest how risk of mortality from seismic activity is affected by global patterns of social inequality.</b></p> <p><b>Level 3 (6-8 marks)</b> Demonstrates <b>thorough</b> knowledge and understanding of risk of mortality from seismic activity and global patterns of social inequality (AO1).</p> <p>Demonstrates <b>thorough</b> application of knowledge and understanding to provide a clear and developed interpretation that shows accuracy of how risk of mortality from seismic activity is affected by global patterns of social inequality (AO2).</p> <p>This will be shown by including <b>well-developed</b> ideas linking resource evidence on risk of mortality from seismic activity with global patterns of social inequality.</p> <p>There are clear attempts to make synoptic links between content from different parts of the course of study.</p> <p><b>Level 2 (3-5 marks)</b> Demonstrates <b>reasonable</b> knowledge and understanding of risk of mortality from seismic activity and global patterns of social inequality (AO1).</p> <p>Demonstrates <b>reasonable</b> application of knowledge and understanding to provide a sound interpretation that shows some accuracy of how risk of mortality from seismic activity is affected by global patterns of social inequality (AO2).</p> <p>This will be shown by including <b>developed</b> ideas linking resource evidence on risk of mortality from seismic activity with global patterns of social inequality.</p> <p>There are some attempts to make synoptic links between content from different parts of the course of study but these</p>	<b>8</b> AO1 x4 AO2 x4	<p><b>Indicative Content</b>  <b>AO1 – 4 marks</b>  Knowledge and understanding of risk of mortality from seismic activity and global patterns of social inequality could potentially include:</p> <ul style="list-style-type: none"> <li>Fig 10 shows mortality risk of earthquakes of the world <ul style="list-style-type: none"> <li>Likelihood of human damage, destruction;</li> <li>Tectonically active locations – earthquakes and volcanoes often coincide – plate boundaries eg 'Pacific ring of fire', 'mid-Atlantic ridge'.</li> <li>Other risk factors associated with tectonically active locations – tsunami, ash cloud, mudslides.</li> </ul> </li> <li>Global patterns of social inequality. <ul style="list-style-type: none"> <li>Reflected in GDP, an indicator of wealth which in itself affects quality of life and standard of living.</li> <li>ACs, EDCs, LIDCs</li> <li>Other measures of social inequality include Human Development index, a composite measure including income, life expectancy and education.</li> </ul> </li> </ul> <p><b>AO2 – 4 marks</b>  Application of knowledge and understanding to interpret how risk of mortality from seismic activity is affected by global patterns of social inequality could potentially include:</p> <p>Risk map Fig10 includes</p> <ul style="list-style-type: none"> <li>high and low income countries in high risk areas (Japan, Nepal)</li> <li>high and low income countries in low risk areas (Ghana and Australia)</li> <li>so no direct correlation between risk and global patterns of social inequality.</li> </ul>

	<p>are not always relevant.</p> <p><b>Level 1 (1-2 marks)</b> Demonstrates <b>basic</b> knowledge and understanding of risk of mortality from seismic activity and global patterns of social inequality (AO1).</p> <p>Demonstrates <b>basic</b> application of knowledge and understanding to provide a simple interpretation that shows limited accuracy of how risk of mortality from seismic activity is affected by global patterns of social inequality (AO2).</p> <p>There will be <b>simple</b> ideas linking resource evidence on risk of mortality from seismic activity with global patterns of social inequality.</p> <p>There are limited attempts to make synoptic links between content from different parts of the course of study.</p> <p><b>0 marks</b> No response or no response worthy of credit</p>		<p>Investment by governments in emergency services, warning systems in tectonically active areas depends on:</p> <ul style="list-style-type: none"> <li>- available income,</li> <li>- other funding priorities eg education, healthcare.</li> </ul> <p>ACs often manage tectonic risk better than LIDCs - High income, high risk countries are successful in modifying the event and/or loss through building design, education, good communications etc thus reducing risk to residents eg Japan,</p> <p>Low income countries tend to suffer greater loss of life eg 2015 Nepal earthquake. However beneficial investment had been put into education and building design.</p>
(b)	<p><b>Examine how volcanic activity contributes to changes in landscape systems</b></p> <p><b>Level 3 (6-8 marks)</b> Demonstrates <b>thorough</b> knowledge and understanding of volcanic activity and changes in landscape systems (AO1).</p> <p>Demonstrates <b>thorough</b> application of knowledge and understanding to provide a clear and developed analysis that shows accuracy of how volcanic activity contributes to changes in landscape systems. (AO2).</p> <p>There must be <b>well-developed</b> ideas of how volcanic activity contributes to changes in landscape systems..</p> <p>There are clear attempts to make synoptic links between</p>	<p><b>8</b> AO1 x4 AO2 x4</p>	<p><b>Indicative Content</b> <b>AO1 – 4 marks</b></p> <p>Knowledge and understanding of volcanic activity and changes in landscape systems could potentially include:</p> <ul style="list-style-type: none"> <li>• Volcanic activity <ul style="list-style-type: none"> <li>○ Location <ul style="list-style-type: none"> <li>- converging and diverging plate margins</li> <li>- hot spots</li> </ul> </li> <li>○ Characteristics of eruption depending on nature of material ejected, level of explosion, plate boundary location</li> <li>○ Landforms/landscape – including basalt plateau, cone shaped mountains, new islands</li> </ul> </li> <li>• Landscape systems – one of the three will be chosen</li> </ul>

	<p>content from different parts of the course of study.</p> <p><b>Level 2 (3-5 marks)</b>  Demonstrates <b>reasonable</b> knowledge and understanding of volcanic activity and changes in landscape systems (AO1).</p> <p>Demonstrates <b>reasonable</b> application of knowledge and understanding to provide a sound analysis that shows some accuracy of how volcanic activity contributes to changes in landscape systems. (AO2).</p> <p>There must be <b>developed</b> ideas of how volcanic activity contributes to changes in landscape systems..</p> <p>There are some attempts to make synoptic links between content from different parts of the course of study but these are not always relevant.</p> <p><b>Level 1 (1-2 marks)</b>  Demonstrates <b>basic</b> knowledge and understanding of volcanic activity and changes in landscape systems (AO1).</p> <p>Demonstrates <b>basic</b> application of knowledge and understanding to provide a simple analysis that shows limited accuracy of how volcanic activity contributes to changes in landscape systems. (AO2).</p> <p>This will be shown by including <b>simple</b> ideas how volcanic activity contributes to changes in landscape systems..</p> <p>There are limited attempts to make synoptic links between content from different parts of the course of study.</p> <p><b>0 marks</b>  No response or no response worthy of credit.</p>		<ul style="list-style-type: none"> <li>- Coastal</li> <li>- Glaciated</li> <li>- Dryland</li> </ul> <ul style="list-style-type: none"> <li>o Changes in landscape systems related to <ul style="list-style-type: none"> <li>- weathering, erosion, deposition</li> <li>- extreme events</li> <li>- climate change</li> </ul> </li> </ul> <p><b>AO2 – 4 marks</b>  Application of knowledge and understanding to analyse how volcanic activity contributes to changes in landscape systems could potentially include:</p> <p>A volcanic eruption will create an immediate change to the landscape system where it occurs.  Past eruptions changed landscape systems. Over 10s, 1000s, millions of years processes existing in the area whether coastal, glaciated or dryland, will continue to change the region including the volcanic area.</p> <ul style="list-style-type: none"> <li>• Ash – changes annual insolation and precipitation patterns – relevant to snow fall, glacier inputs and outputs</li> <li>• Under ice eruptions – interaction between magma and ice. Eg Iceland – Jokulhaups giving massive deposits of sediments carried by meltwaters</li> <li>• Creating new coastlines that are evolving e.g. on Hotspot islands where basaltic flows cool in oceans. New coastal areas with coastal features evolving ‘from scratch’.</li> <li>• Constructive plate margins that form new islands e.g. Surtsey in Iceland and islands on the Mid-Atlantic Ridge.</li> <li>• Volcanic deserts – where repeated eruptions prevent vegetation from colonising (central Hawaii)</li> <li>• Volcanoes in the Sahara – change the dryland landscape because physical shape and formation</li> </ul>
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					<p>different from other hot desert features such as dunes, rock pavement.</p> <ul style="list-style-type: none"><li>Volcanic deposits (ash, lava etc) contrast with existing rocks affecting rates of weathering and erosion giving different shape to the landforms.</li></ul>
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## SECTION C

Question		Answer	Marks	Guidance
11		<p><b>To what extent have human activities influenced the balance between incoming and outgoing energy through the atmosphere?</b></p> <p><b>AO1</b> <b>Level 4 (8-10 marks)</b> Demonstrates <b>comprehensive</b> knowledge and understanding of human activities and the balance between incoming and outgoing energy through the atmosphere.</p> <p><b>Level 3 (5-7 marks)</b> Demonstrates <b>thorough</b> knowledge and understanding of human activities and the balance between incoming and outgoing energy through the atmosphere.</p> <p><b>Level 2 (3-4 marks)</b> Demonstrates <b>reasonable</b> knowledge and understanding of human activities and the balance between incoming and outgoing energy through the atmosphere.</p> <p><b>Level 1 (1-2 marks)</b> Demonstrates <b>basic</b> knowledge and understanding of human activities and the balance between incoming and outgoing energy through the atmosphere.</p> <p><b>AO2</b> <b>Level 4 (8-10 marks)</b> Demonstrates <b>comprehensive</b> application of knowledge and understanding to provide a clear, developed and convincing analysis that is fully accurate of how human activities influence the balance between incoming and outgoing energy through the atmosphere.</p>	<p><b>20</b></p> <p><b>AO1 X 10</b></p> <p><b>AO2 X 10</b></p>	<p><b>Indicative content</b> <b>AO1 – 10 marks</b> Knowledge and understanding of human activities and the balance between incoming and outgoing energy through the atmosphere could potentially include:</p> <ul style="list-style-type: none"> <li>The balance between incoming and outgoing energy through the atmosphere is the global energy balance. If candidates use this term it can be credited, as can knowledge and understanding of the concept, whether written or in a diagram.</li> <li>Greenhouse gases are important in this balance</li> <li>With an increase in greenhouse gases there will be an increase in global temperatures.</li> <li>Human activities have released large volumes of greenhouse gases into the atmosphere over the last 200 years eg through consumption of fossil fuels</li> <li>Human activities cause land use changes such as deforestation, - reduce albedo and therefore increase energy absorption</li> </ul> <p><b>AO2 – 10 marks</b> Application of knowledge and understanding to analyse and evaluate the extent to which human activities have influenced the balance between incoming and outgoing energy through the atmosphere could potentially include</p> <p>Delicate balance between incoming and outgoing radiation which can be upset by human activities</p>

	<p>Demonstrates <b>comprehensive</b> application of knowledge and understanding to provide detailed and substantiated evaluation that offers secure judgements leading to rational conclusions that are evidence based as to the extent to which human activities influence the balance between incoming and outgoing energy through the atmosphere.</p> <p><b>Level 3 ( 5-7 marks)</b> Demonstrates <b>thorough</b> application of knowledge and understanding to provide a clear and developed analysis that shows how human activities influence the balance between incoming and outgoing energy through the atmosphere.</p> <p>Demonstrates <b>thorough</b> application of knowledge and understanding to provide a detailed evaluation that offers generally secure judgements, with some link between rational conclusions and evidence as to the extent to which human activities influence the balance between incoming and outgoing energy through the atmosphere.</p> <p><b>Level 2 (3-4 marks)</b> Demonstrates <b>reasonable</b> application of knowledge and understanding to provide a sound analysis that shows how human activities influence the balance between incoming and outgoing energy through the atmosphere.</p> <p>Demonstrates <b>reasonable</b> application of knowledge and understanding to provide a sound evaluation that offers generalised judgements and conclusions, with limited use of evidence as to the extent to which human activities influence the balance between incoming and outgoing energy through the atmosphere.</p>		<p><b>and</b> natural factors (eg solar output, natural absorption of CO<sub>2</sub>)</p> <ul style="list-style-type: none"> <li>• Evidence of temperature increases over the last 200 years point to the importance of human activities that increase GHGs, whereas climate changes in the geologic past can be explained by natural factors.</li> <li>• Once temperatures start to rise additional physical changes may occur eg <ul style="list-style-type: none"> <li>◦ Evaporation rates rise due to higher temperatures of both water and atmosphere. More latent heat transfers to the atmosphere; more water vapour in the atmosphere which further alters the global energy balance as water vapour is a key greenhouse gas.</li> <li>◦ Increasing temperatures lead to snow and ice melting. Less incoming solar radiation is reflected back to space but is absorbed by the land and sea therefore altering the global energy balance.</li> </ul> </li> <li>• Credit relevant evidence from AC/EDC case studies</li> <li>• Human activities can have a highly significant influence on the global energy balance (balance between incoming and outgoing energy through the atmosphere), whether directly or by triggering a physical knock-on effect.</li> </ul>
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		<p><b>Level 1 (1-2 marks)</b> Demonstrates <b>basic</b> application of knowledge and understanding to provide a simple analysis that shows how human activities influence the balance between incoming and outgoing energy through the atmosphere.</p> <p>Demonstrates <b>basic</b> application of knowledge and understanding to provide an un-supported evaluation that offers simple conclusions as to the extent to which human activities influence the balance between incoming and outgoing energy through the atmosphere.</p> <p><b>0 marks</b> No response or no response worthy of credit.</p> <p><b>Quality of extended response</b></p> <p><b>Level 4</b> There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.</p> <p><b>Level 3</b> There is a line of reasoning presented with some structure. The information presented is in the most-part relevant and supported by some evidence.</p> <p><b>Level 2</b> The information has some relevance and is presented with limited structure. The information is supported by limited evidence.</p> <p><b>Level 1</b> The information is basic and communicated in an unstructured way. The information is supported by limited evidence and the relationship to the evidence may not be clear.</p>		
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12		<p><b>'International organisations have been more successful in shaping the climate change debate than other interest groups.'</b> How far do you agree with this statement?</p>	20	<p><b>Indicative content</b> <b>AO1 – 10 marks</b></p>
		<p><b>AO1</b> <b>Level 4 (8-10 marks)</b> Demonstrates <b>comprehensive</b> knowledge and understanding of international organisations and other interest groups involved in shaping the climate change debate.</p> <p><b>Level 3 (5-7 marks)</b> Demonstrates <b>thorough</b> knowledge and understanding of international organisations and other interest groups involved in shaping the climate change debate.</p> <p><b>Level 2 (3-4 marks)</b> Demonstrates <b>reasonable</b> knowledge and understanding of international organisations and other interest groups involved in shaping the climate change debate.</p> <p><b>Level 1 (1-2 marks)</b> Demonstrates <b>basic</b> knowledge and understanding of international organisations and other interest groups involved in shaping the climate change debate.</p> <p><b>AO2</b> <b>Level 4 (8-10 marks)</b> Demonstrates <b>comprehensive</b> application of knowledge and understanding to provide a clear, developed and convincing analysis that is fully accurate of how international organisations and other interest groups have shaped the climate debate.</p>	AO1 X 10  AO2 X 10	<p>Knowledge and understanding of international organisations and other interest groups in shaping the climate change debate could potentially include:</p> <p>Content that relates to two or more international organisations AND other interest groups. For example:</p> <ul style="list-style-type: none"> <li>• UN <ul style="list-style-type: none"> <li>○ 1988 Intergovernmental Panel on Climate Change.</li> <li>○ 1992. UN Framework Convention on Climate Change. An international treaty signed by 41 countries at Rio Earth Summit.</li> <li>○ 1997. Kyoto protocol. A legally binding treaty with clear targets on how to reduce GHG emissions. 192 countries signed up. (China and USA did not).</li> </ul> </li> <li>• EU <ul style="list-style-type: none"> <li>○ has been an environmental leader as part of the 'European Climate Change Programme'</li> <li>○ Taking 1990 as the base year setting legally binding targets of a 20% cut in GHG emissions.</li> <li>○ Emissions Trading scheme <ul style="list-style-type: none"> <li>○ Cap-and-trade system</li> <li>○ World's first carbon market.</li> <li>○ Covers 45% of emissions</li> </ul> </li> <li>○ National Emissions Reduction Targets <ul style="list-style-type: none"> <li>○ Covers remaining 55%</li> <li>○ from agriculture, housing, waste</li> </ul> </li> </ul> </li> </ul>

	<p>Demonstrates <b>comprehensive</b> application of knowledge and understanding to provide detailed and substantiated evaluation that offers secure judgements leading to rational conclusions that are evidence based on whether international organisations have been more successful in shaping the climate change debate than other interest groups .</p> <p><b>Level 3 (5-7 marks)</b> Demonstrates <b>thorough</b> application of knowledge and understanding to provide a clear and developed analysis of level of how international organisations and other interest groups have shaped the climate debate.</p> <p>Demonstrates <b>thorough</b> application of knowledge and understanding to provide a detailed evaluation that offers generally secure judgements, with some link between rational conclusions and evidence on whether international organisations have been more successful in shaping the climate change debate than other interest groups.</p> <p><b>Level 2 (3-4 marks)</b> Demonstrates <b>reasonable</b> application of knowledge and understanding to provide a sound analysis of how international organisations and other interest groups have shaped the climate debate .</p> <p>Demonstrates <b>reasonable</b> application of knowledge and understanding to provide a sound evaluation that offers generalised judgements and conclusions, with limited use of evidence on whether international organisations have been more successful in shaping the climate change debate than other interest groups .</p>	<p>and transport.</p> <p>Other interest groups – for example:</p> <ul style="list-style-type: none"> <li>• Governments Freedom to develop policies at national level eg UK – climate change act 2008; taxes/grants to encourage switch to greener fuels; India – low energy consumption per head; National Action Plan on Climate Change (reduce emissions and improve energy efficiency).</li> <li>• Scientists Majority of climate change scientists believe in human-caused climate change. But their findings are published in reports etc that many people don't read.</li> <li>• Popular media outlets Form public opinion; information on all interest groups; often suggest climate change is more open to debate than it is.</li> <li>• Energy industries International oil, gas and mining companies, often opponents of climate change. Vested interest in maintaining profits.</li> </ul> <p><b>AO2 – 10 marks</b> Application of knowledge and understanding to analyse and evaluate whether international organisations have been more successful in shaping the climate change debate than other interest groups could potentially include</p> <ul style="list-style-type: none"> <li>• The climate change debate An international discussion about global warming based on agreement that it is a reality. Awareness of the role of CO<sub>2</sub> and debate about whether it is the main cause of global warming.</li> </ul>
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	<p><b>Level 1 (1-2 marks)</b>  Demonstrates <b>basic</b> application of knowledge and understanding to provide a simple analysis of how international organisations and other interest groups have shaped the climate debate.</p> <p>Demonstrates <b>basic</b> application of knowledge and understanding to provide an un-supported evaluation that offers simple conclusions on whether international organisations have been more successful in shaping the climate change debate than other interest groups.</p> <p><b>Quality of extended response</b></p> <p><b>Level 4</b>  There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.</p> <p><b>Level 3</b>  There is a line of reasoning presented with some structure. The information presented is in the most-part relevant and supported by some evidence.</p> <p><b>Level 2</b>  The information has some relevance and is presented with limited structure. The information is supported by limited evidence.</p> <p><b>Level 1</b>  The information is basic and communicated in an unstructured way. The information is supported by limited evidence and the relationship to the evidence may not be clear.</p>	<p>International organisations and interest groups have become involved in the debate by taking a stance and acting on it.</p> <p>Use AO1 K&amp;U to demonstrate how:</p> <ul style="list-style-type: none"> <li>international organisations have shaped the climate debate – based on agreement that GHG emissions are a root cause of global warming-climate change; treaties, protocols, agreements, programmes and targets including exceptions eg EDCs and LIDCs should not have to suffer economic loss by reducing GHGs.</li> <li>other interest groups have shaped the climate debate – scientists (research reports); national policies/government legislation including financial incentives (tax, subsidies, investment), protection of economies by rejecting emission targets; fossil fuel energy industries (protection of interests and power to influence); media and political leanings of different outlets (deliberate slant to content, strong influence on public opinion).</li> </ul> <p>Relative success of international organisations and other interest groups in shaping the climate change debate to include evidence based conclusions in answer to 'How far do you agree with this statement?' for example:</p> <ul style="list-style-type: none"> <li>the significance of international organisations and their requirements compared with outcomes of national decision making</li> <li>the economic cost of controlling GHGs leading to different national responses</li> <li>the power of international corporations (eg oil/gas companies) with a vested interest in</li> </ul>
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						their own success compared with individuals/ organisations that work towards GHG reduction (eg scientists, national governments) <ul style="list-style-type: none"><li>the success of the media in forming public opinion</li></ul>
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13		<p><b>Examine the extent to which communicable diseases are more prevalent in Low-Income Developing Countries (LIDCs) than in Advanced Countries (ACs).</b></p>	20	<p><b>AO1 X 10</b></p>	<p><b>Indicative content</b> <b>AO1 – 10 marks</b> Knowledge and understanding of communicable diseases could potentially include:</p>
		<p><b>AO1</b> <b>Level 4 (8-10 marks)</b> Demonstrates <b>comprehensive</b> knowledge and understanding of communicable diseases.</p> <p><b>Level 3 (5-7 marks)</b> Demonstrates <b>thorough</b> knowledge and understanding of communicable diseases.</p> <p><b>Level 2 (3-4 marks)</b> Demonstrates <b>reasonable</b> knowledge and understanding of communicable diseases.</p> <p><b>Level 1 (1-2 marks)</b> Demonstrates <b>basic</b> knowledge and understanding of communicable diseases.</p> <p><b>AO2</b> <b>Level 4 (8-10 marks)</b> Demonstrates <b>comprehensive</b> application of knowledge and understanding to provide a clear, developed and convincing analysis that is fully accurate of prevalence of communicable diseases in LIDCs compared with ACs</p> <p>Demonstrates <b>comprehensive</b> application of knowledge and understanding to provide detailed and substantiated evaluation that offers secure judgements leading to rational conclusions that are evidence based as to the extent to which communicable diseases are more prevalent in LIDCs than in ACs.</p>	<p><b>AO2 X 10</b></p>	<p><b>AO2 – 10 marks</b> Application of knowledge and understanding to analyse and evaluate the extent to which communicable diseases are more prevalent in LIDCs than ACs could potentially include:</p> <ul style="list-style-type: none"> <li>Historically infectious diseases have been a main cause of death.</li> </ul>	

	<p><b>Level 3 (5-7 marks)</b>  Demonstrates <b>thorough</b> application of knowledge and understanding to provide a clear and developed analysis of prevalence of communicable diseases in LIDCs compared with ACs.</p> <p>Demonstrates <b>thorough</b> application of knowledge and understanding to provide a detailed evaluation that offers generally secure judgements, with some link between rational conclusions and evidence as to the extent to which communicable diseases are more prevalent in LIDCs than in ACs.</p> <p><b>Level 2 (3-4 marks)</b>  Demonstrates <b>reasonable</b> application of knowledge and understanding to provide a sound analysis of prevalence of communicable diseases in LIDCs compared with ACs .</p> <p>Demonstrates <b>reasonable</b> application of knowledge and understanding to provide a sound evaluation that offers generalised judgements and conclusions, with limited use of evidence as to the extent to which communicable diseases are more prevalent in LIDCs than in ACs .</p> <p><b>Level 1 (1-2 marks)</b>  Demonstrates <b>basic</b> application of knowledge and understanding to provide a simple analysis of prevalence of communicable diseases in LIDCs compared with ACs.</p> <p>Demonstrates <b>basic</b> application of knowledge and understanding to provide an un-supported evaluation that offers simple conclusions as to the extent to which communicable diseases are more prevalent in LIDCs than in ACs.</p>	<ul style="list-style-type: none"> <li>Medical technologies available in the developed world, eg antibiotics, have eliminated the most dangerous contagious diseases (communicable diseases spread between people).</li> <li>Communicable diseases are more prevalent in LIDCs – they dominate mortality – for many reasons <ul style="list-style-type: none"> <li>Poverty of state governments with insufficient sustainable finances and lack of resources;</li> <li>Inadequate sanitation; Lack access to clean drinking water;</li> <li>Limited access to education;</li> <li>Poor diets (that can lead to malnutrition which makes people more susceptible to disease).</li> </ul> </li> </ul> <p>Example – Malaria  In 2013 Malaria killed 583,000 people worldwide and most of these deaths were in the poorest countries. Risk is greatest in the tropics. 90% deaths in Africa, notably Nigeria and DRC; Anopheles mosquito thrives in warm, humid environments ie 18-40°C.</p> <ul style="list-style-type: none"> <li>Whereas communicable diseases in ACs exist but are more easily managed and risk of infection is far lower than in LIDCs: <ul style="list-style-type: none"> <li>High standards of sanitation and water supply (UK clean drinking water via mains supply – no health risk)</li> <li>Public health measures (US southern states free from malaria through mosquito habitat control and elimination)</li> <li>Health services (eg TB curable with</li> </ul> </li> </ul>
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		<p><b>Quality of extended response</b></p> <p><b>Level 4</b> There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.</p> <p><b>Level 3</b> There is a line of reasoning presented with some structure. The information presented is in the most-part relevant and supported by some evidence.</p> <p><b>Level 2</b> The information has some relevance and is presented with limited structure. The information is supported by limited evidence.</p> <p><b>Level 1</b> The information is basic and communicated in an unstructured way. The information is supported by limited evidence and the relationship to the evidence may not be clear.</p>		antibiotics, UK immunisation programmes against infectious diseases such as measles)
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14		<p><b>Assess the effectiveness of strategies used to minimise impacts of a named disease in a country that has experienced a natural hazard.</b></p> <p><b>AO1</b> <b>Level 4 (8-10 marks)</b> Demonstrates <b>comprehensive</b> knowledge and understanding of a named disease in a country that has experienced a natural hazard.</p> <p><b>Level 3 (5-7 marks)</b> Demonstrates <b>thorough</b> knowledge and understanding of a named disease in a country that has experienced a natural hazard.</p> <p><b>Level 2 (3-4 marks)</b> Demonstrates <b>reasonable</b> knowledge and understanding of a named disease in a country that has experienced a natural hazard.</p> <p><b>Level 1 (1-2 marks)</b> Demonstrates <b>basic</b> knowledge and understanding of a named disease in a country that has experienced a natural hazard.</p> <p><b>AO2</b> <b>Level 4 (8-10 marks)</b> Demonstrates <b>comprehensive</b> application of knowledge and understanding to provide a clear, developed and convincing analysis that is fully accurate of the strategies used to minimise impacts of a named disease in a country that has experienced a natural hazard.</p> <p>Demonstrates <b>comprehensive</b> application of knowledge and understanding to provide detailed and substantiated evaluation that offers secure judgements</p>	20 AO1 X 10 AO2 X 10	<p><b>Indicative content</b> <b>AO1 – 10 marks</b> Knowledge and understanding of a named disease in a country that has experienced a natural hazard could potentially include:</p> <ul style="list-style-type: none"> <li>• Natural hazards pose risks to health leading to outbreaks of disease: <ul style="list-style-type: none"> <li>○ Death (as a direct result of the hazard or from infection)</li> <li>○ Disruption of sanitation and water supplies - increased risk of spread of water borne diseases</li> <li>○ Damaged transport infrastructure reducing accessibility to emergency services, food supplies</li> <li>○ Homelessness – overcrowded camps, inadequate shelter</li> </ul> </li> <li>• Diseases that thrive in these conditions are cholera, diarrhoea, hepatitis.</li> <li>• Candidates will choose their own country and disease eg <ul style="list-style-type: none"> <li>○ Bangladesh flooding 2007 (800 drowned). Epidemic of diarrhoea (70000 infected + acute dehydration) and water borne diseases such as typhoid.</li> <li>○ Haiti cholera outbreak following the 2010 earthquake (when 220000 killed); started 10 months after the January 2010 earthquake; more than 6% Haitians acquired the disease and by Nov 2014, 8700 deaths from cholera</li> </ul> </li> </ul> <p><b>AO2 – 10 marks</b> Application of knowledge and understanding to analyse and evaluate the effectiveness of strategies</p>
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	<p>leading to rational conclusions that are evidence based on the effectiveness of strategies used to minimise the impacts of a named disease in a country that has experienced a natural hazard.</p> <p><b>Level 3 (5-7 marks)</b> Demonstrates <b>thorough</b> application of knowledge and understanding to provide a clear and developed analysis of the strategies used to minimise impacts of a named disease in a country that has experienced a natural hazard.</p> <p>Demonstrates <b>thorough</b> application of knowledge and understanding to provide a detailed evaluation that offers generally secure judgements, with some link between rational conclusions and evidence on the effectiveness of strategies used to minimise the impacts of a named disease in a country that has experienced a natural hazard.</p> <p><b>Level 2 (3-4 marks)</b> Demonstrates <b>reasonable</b> application of knowledge and understanding to provide a sound analysis of the strategies used to minimise impacts of a named disease in a country that has experienced a natural hazard.</p> <p>Demonstrates <b>reasonable</b> application of knowledge and understanding to provide a sound evaluation that offers generalised judgements and conclusions, with limited use of evidence on the effectiveness of strategies used to minimise the impacts of a named disease in a country that has experienced a natural hazard.</p> <p><b>Level 1 (1-2 marks)</b> Demonstrates <b>basic</b> application of knowledge and understanding to provide a simple analysis of the</p>	<p>used to minimise impacts of a named disease in a country which has experienced a natural hazard could potentially include:</p> <ul style="list-style-type: none"> <li>• Strategies used to: <ul style="list-style-type: none"> <li>○ minimise immediate impacts such as short term emergency relief, clean water (bottled), medical supplies/care</li> <li>○ reduce risks in future eg education programmes, improved water supplies</li> </ul> </li> <li>• Effectiveness of strategies – may differ between short term and long term</li> <li>• Bangladesh - diarrhoea <ul style="list-style-type: none"> <li>○ emergency relief – government and international</li> <li>○ food distribution – government</li> <li>○ providing essential drugs, water purification tablets, mobile health teams (UNICEF)</li> <li>○ drilling new tube wells in Bangladesh; damaged wells repaired (longer term)</li> <li>○ open water flooding, especially in N. Bangladesh, partly coincides with areas of greatest poverty so effectiveness of strategies may depend on other factors such as reducing poverty.</li> </ul> </li> <li>• Haiti - cholera <ul style="list-style-type: none"> <li>○ Emergency clean drinking water to 300,000 people in Port-au-Prince capital of Haiti (NGOs involved eg Red Cross);</li> <li>○ 75% of Haitian households still lack running water and thousands still live in camps. Both ideal breeding grounds for cholera.</li> <li>○ hygiene programme; UN appeal for funds</li> </ul> </li> </ul>
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		<p>strategies used to minimise impacts of a named disease in a country that has experienced a natural hazard.</p> <p>Demonstrates <b>basic</b> application of knowledge and understanding to provide an un-supported evaluation that offers simple conclusions on the effectiveness of strategies used to minimise the impacts of a named disease in a country that has experienced a natural hazard.</p> <p><b>Quality of extended response</b></p> <p><b>Level 4</b> There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.</p> <p><b>Level 3</b> There is a line of reasoning presented with some structure. The information presented is in the most-part relevant and supported by some evidence.</p> <p><b>Level 2</b> The information has some relevance and is presented with limited structure. The information is supported by limited evidence.</p> <p><b>Level 1</b> The information is basic and communicated in an unstructured way. The information is supported by limited evidence and the relationship to the evidence may not be clear.</p>		<ul style="list-style-type: none"> <li>o to fight the disease</li> <li>o building latrines, (sanitation still inadequate in Haiti - cholera will be difficult to eradicate until the sanitation systems are in better condition)</li> <li>o medical supplies</li> <li>o treating 18700 cases of cholera in La Piste camp in Port-au-Prince and in Port-a-Piment camp, SW Haiti</li> <li>o raising awareness and education on how to avoid/recognise cholera ie to change behaviour and to understand the importance of hand washing and cooking food thoroughly</li> <li>o by 2014 only 2200 new cases per month</li> <li>o still a threat (recurring increase with rainy season) + a leading cause of infant mortality;</li> <li>o Much of the population of Port-au-Prince originally lived in shanty towns/slums so effectiveness of strategies may depend on other factors such as improving housing and infrastructure</li> </ul> <p>If a candidate includes two case studies of a named disease in a country that has experienced a natural hazard credit the better of the two.</p>
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15		<p><b>Examine the extent to which an oil spill can pose a threat for the physical environment and marine ecosystems.</b></p> <p><b>AO1</b> <b>Level 4 (8-10 marks)</b> Demonstrates <b>comprehensive</b> knowledge and understanding of an oil spill.</p> <p><b>Level 3 (5-7 marks)</b> Demonstrates <b>thorough</b> knowledge and understanding of an oil spill.</p> <p><b>Level 2 (3-4 marks)</b> Demonstrates <b>reasonable</b> knowledge and understanding of an oil spill.</p> <p><b>Level 1 (1-2 marks)</b> Demonstrates <b>basic</b> knowledge and understanding of an oil spill.</p> <p><b>0 marks</b> No response or no response worthy of credit.</p> <p><b>AO2</b> <b>Level 4 (8-10 marks)</b> Demonstrates <b>comprehensive</b> application of knowledge and understanding to provide a clear, developed and convincing analysis that is fully accurate of the threat to the physical environment and marine ecosystems posed by an oil spill.</p> <p>Demonstrates <b>comprehensive</b> application of knowledge and understanding to provide a detailed and substantiated evaluation that offers secure judgements leading to rational conclusions that are evidence based as to the extent to which an oil spill can pose a threat for the physical environment and marine ecosystems.</p>	20	<p><b>AO1 X 10</b></p> <p><b>AO2 X 10</b></p>	<p><b>Indicative content</b> <b>AO1 – 10 marks</b> Knowledge and understanding of an oil spill and the physical environment and marine ecosystems could potentially include:</p> <p>Oil spill – from a tanker (harbour spills, cleaning, major incidents eg Sanchi tanker, E China Sea, Jan 2018; Braer, Shetland, UK, Jan 1993); – from a platform, well eg Deepwater Horizon Disaster</p> <p>A case study of one oil spill is all that is required.</p> <p>Physical environment – beaches, coral reefs, salt marshes</p> <p>Marine ecosystems – food chain, birds, mammals, fish,</p> <p><b>AO2 – 10 marks</b> Application of knowledge and understanding to analyse and evaluate the extent to which an oil spill can pose a threat for the physical environment and marine ecosystems could potentially include:</p> <p>Points below that will be applied to the candidate's case study of an oil spill.</p> <ul style="list-style-type: none"> <li>• Impacts on physical environment and marine ecosystems vary from serious threat in the short term to minor threat in the long term.</li> <li>• These threats trigger further problems eg knock on socio-economic impacts to humans such as loss of livelihood.</li> </ul> <p>Threat means damage</p> <ul style="list-style-type: none"> <li>◦ short term, including crude oil contaminating beaches, crude oil smothering birds etc with loss of life,</li> </ul>
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	<p><b>Level 3 (5–7 marks)</b>  Demonstrates <b>thorough</b> application of knowledge and understanding to provide a clear and developed analysis that shows accuracy of the threat to the physical environment and marine ecosystems posed by an oil spill.</p> <p>Demonstrates <b>thorough</b> application of knowledge and understanding to provide a detailed evaluation that offers generally secure judgements, with some link between rational conclusions and evidence as to the extent to which an oil spill can pose a threat for the physical environment and marine ecosystems.</p> <p><b>Level 2 (3–4 marks)</b>  Demonstrates <b>reasonable</b> application of knowledge and understanding to provide a sound analysis that shows some accuracy of the threat to the physical environment and marine ecosystems posed by an oil spill.</p> <p>Demonstrates <b>reasonable</b> application of knowledge and understanding to provide a sound evaluation that offers generalised judgements and conclusions, with limited use of evidence as to the extent to which an oil spill can pose a threat for the physical environment and marine ecosystems.</p> <p><b>Level 1 (1–2 marks)</b>  Demonstrates <b>basic</b> application of knowledge and understanding to provide a simple analysis that shows limited accuracy of the threat to the physical environment and marine ecosystems posed by an oil spill.</p> <p>Demonstrates <b>basic</b> application of knowledge and</p>	<p>fishing industry ceases, tourism stops.</p> <ul style="list-style-type: none"> <li>○ long term, including salt marsh damage, coral reef killed, residual negative effect on tourism, damage to credibility of organisations involved eg BP</li> <li>● Ecosystem disturbance with the exploitation of oil eg noise pollution, stirring up the sea bed, pollution – linked to the process of extracting oil but not directly linked to an oil spill.</li> <li>● An oil spill will be a threat to natural capital (ie wealth that is not manufactured but has value to humans) eg clean beach, pleasant coastal area that does not smell of oil fumes and looks attractive ie unpolluted view with no rig/tankers etc</li> <li>● Weather can increase or reduce the threat for the physical environment and marine ecosystems eg wind direction blows oil slick onshore or towards deeper water.</li> <li>● Management of an oil spill can reduce the threat for the physical environment and marine ecosystems eg beach cleaning, skimming surface oil, dispersants.</li> </ul> <p>A candidate's conclusion could</p> <ul style="list-style-type: none"> <li>● Weigh up whether the impacts of an oil spill that directly affect the physical environment and marine ecosystems are greater or less important than other effects (on local economy, threats caused by factors to do with exploitation but not linked to an oil spill etc).</li> <li>● Compare the threat to the physical</li> </ul>
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		<p>understanding to provide an un-supported evaluation that offers simple conclusions as to the extent to which an oil spill can pose a threat for the physical environment and marine ecosystems.</p> <p><b>0 marks</b> No response or no response worthy of credit.</p> <p><b>Quality of extended response</b></p> <p><b>Level 4</b> There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.</p> <p><b>Level 3</b> There is a line of reasoning presented with some structure. The information presented is in the most-part relevant and supported by some evidence.</p> <p><b>Level 2</b> The information has some relevance and is presented with limited structure. The information is supported by limited evidence.</p> <p><b>Level 1</b> The information is basic and communicated in an unstructured way. The information is supported by limited evidence and the relationship to the evidence may not be clear.</p>		<p>environment with the threat to marine ecosystems</p> <ul style="list-style-type: none"><li>• Evaluate the significance of time – short v long term threats</li></ul>
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16		<p><b>Examine the extent to which light and temperature explain ocean biodiversity.</b></p> <p><b>AO1</b> <b>Level 4 (8-10 marks)</b> Demonstrates <b>comprehensive</b> knowledge and understanding of light and temperature in oceans.</p> <p><b>Level 3 (5-7 marks)</b> Demonstrates <b>thorough</b> knowledge and understanding of light and temperature in oceans.</p> <p><b>Level 2 (3-4 marks)</b> Demonstrates <b>reasonable</b> knowledge and understanding of light and temperature in oceans.</p> <p><b>Level 1 (1-2 marks)</b> Demonstrates <b>basic</b> knowledge and understanding of light and temperature in oceans.</p> <p><b>0 marks</b> No response or no response worthy of credit.</p> <p><b>AO2</b> <b>Level 4 (8-10 marks)</b> Demonstrates <b>comprehensive</b> application of knowledge and understanding to provide a clear, developed and convincing analysis that is fully accurate of light and temperature in oceans and ocean biodiversity.</p> <p>Demonstrates <b>comprehensive</b> application of knowledge and understanding to provide a detailed and substantiated evaluation that offers secure judgements leading to rational conclusions that are evidence based as to the extent to which light and temperature explain</p>	20	<p><b>AO1 X 10</b></p> <p><b>AO2 X 10</b></p>	<p><b>Indicative content</b></p> <p><b>AO1 – 10 marks</b></p> <p>Knowledge and understanding of light and temperature in oceans could potentially include:</p> <ul style="list-style-type: none"> <li>• Variations/changes in ocean light levels <ul style="list-style-type: none"> <li>◦ Depth</li> <li>◦ Latitude and seasons at the surface</li> </ul> </li> <li>• Horizontal and vertical variations/changes in ocean temperatures <ul style="list-style-type: none"> <li>◦ Thermocline</li> <li>◦ Warm and cold surface currents.</li> <li>◦ Effect of winds</li> <li>◦ Hydrothermal vents</li> <li>◦ Upwelling of water from beneath the thermocline</li> </ul> </li> <li>• Biodiversity (number of different species) in the oceans – about 80% of all life on earth found in the oceans; 250,000 different species identified so far.</li> </ul> <p><b>AO2 – 10 marks</b></p> <p>Application of knowledge and understanding to analyse and evaluate the extent to which light and temperature explain ocean biodiversity could potentially include:</p> <ul style="list-style-type: none"> <li>• Ocean biodiversity linked to light: <ul style="list-style-type: none"> <li>◦ food webs and chains start with producers, organisms (eg phytoplankton) capable of trapping sunlight;</li> <li>◦ remains of organisms living near the surface transferred downwards as ‘marine snow’ – basis of food chains for deep water ecosystems</li> </ul> </li> </ul>
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	<p>ocean biodiversity .</p> <p><b>Level 3 (5–7 marks)</b> Demonstrates <b>thorough</b> application of knowledge and understanding to provide a clear and developed analysis that shows accuracy of light and temperature in oceans and ocean biodiversity.</p> <p>Demonstrates <b>thorough</b> application of knowledge and understanding to provide a detailed evaluation that offers generally secure judgements, with some link between rational conclusions and evidence as to the extent to which light and temperature explain ocean biodiversity .</p> <p><b>Level 2 (3–4 marks)</b> Demonstrates <b>reasonable</b> application of knowledge and understanding to provide a sound analysis that shows some accuracy of light and temperature in oceans and ocean biodiversity.</p> <p>Demonstrates <b>reasonable</b> application of knowledge and understanding to provide a sound evaluation that offers generalised judgements and conclusions, with limited use of evidence as to the extent to which light and temperature explain ocean biodiversity.</p> <p><b>Level 1 (1–2 marks)</b> Demonstrates <b>basic</b> application of knowledge and understanding to provide a simple analysis that shows limited accuracy of light and temperature in oceans and ocean biodiversity.</p> <p>Demonstrates <b>basic</b> application of knowledge and understanding to provide an un-supported evaluation that offers simple conclusions as to the extent to which light and temperature explain ocean biodiversity .</p>	<ul style="list-style-type: none"> <li>• Biodiversity linked to temperature <ul style="list-style-type: none"> <li>○ Different species evolve in oceans at different temperatures (eg Antarctic penguins, tropical fish)</li> <li>○ Cold water allows more oxygen to dissolve in the ocean – beneficial to marine life eg Antarctic deep water/low temperature ecosystem where phytoplankton productivity is high in the summer (Nov-Mar), simple food chains, comparatively low biodiversity</li> </ul> </li> <li>• Biodiversity linked to nutrient supply <ul style="list-style-type: none"> <li>○ Light in oceans is lower at depth, NPP higher at depth: Net primary productivity in grams of carbon per unit area per year (how much energy from the sun has been captured) – coastal regions have 20% of marine NPP, deep ocean regions have 80% of marine NPP. Explanation – nutrient supply is lower at the surface and higher in deeper water. But some areas of deep oceans have little or no nutrient supply – effectively ‘deserts’ in terms of biodiversity.</li> <li>○ Intertidal ecosystems eg salt marsh – shallow water so variations in light and temperature mainly seasonal. Highly productive linked to nutrient levels – minerals etc from land sources and from tidal movement. Plant succession - zoned changes with associated different fauna.</li> </ul> </li> <li>• Ocean biodiversity explained by factors as well as light and temperature, <ul style="list-style-type: none"> <li>○ Especially nutrients, themselves often</li> </ul> </li> </ul>
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		<p><b>0 marks</b> No response or no response worthy of credit.</p> <p><b>Quality of extended response</b></p> <p><b>Level 4</b> There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.</p> <p><b>Level 3</b> There is a line of reasoning presented with some structure. The information presented is in the most-part relevant and supported by some evidence.</p> <p><b>Level 2</b> The information has some relevance and is presented with limited structure. The information is supported by limited evidence.</p> <p><b>Level 1</b> The information is basic and communicated in an unstructured way. The information is supported by limited evidence and the relationship to the evidence may not be clear.</p>		<p>linked to light and temperature.</p> <ul style="list-style-type: none"><li>○ Food chain damage by<ul style="list-style-type: none"><li>▪ Human exploitation eg overfishing – biological resources used unsustainably</li><li>▪ Climate change – probable impact on krill</li></ul></li></ul>
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17		<p><b>Examine the view that land ownership is the most important factor influencing food security.</b></p>	20	
		<p><b>AO1</b>  <b>Level 4 (8-10 marks)</b>  Demonstrates <b>comprehensive</b> knowledge and understanding of land ownership and food security.</p> <p><b>Level 3 (5-7 marks)</b>  Demonstrates <b>thorough</b> knowledge and understanding of land ownership and food security.</p> <p><b>Level 2 (3-4 marks)</b>  Demonstrates <b>reasonable</b> knowledge and understanding of land ownership and food security.</p> <p><b>Level 1 (1-2 marks)</b>  Demonstrates <b>basic</b> knowledge and understanding of land ownership and food security.</p> <p><b>0 marks</b>  No response or no response worthy of credit.</p> <p><b>AO2</b>  <b>Level 4 (8-10 marks)</b>  Demonstrates <b>comprehensive</b> application of knowledge and understanding to provide a clear, developed and convincing analysis that is fully accurate of the influence of land ownership on food security.</p> <p>Demonstrates <b>comprehensive</b> application of knowledge and understanding to provide a detailed and substantiated evaluation that offers secure judgements leading to rational conclusions that are evidence based as to whether land ownership is the most important factor influencing food security.</p> <p><b>Level 3 (5-7 marks)</b></p>	<b>AO1 X 10</b> <b>AO2 X 10</b>	<p><b>Indicative content</b>  <b>AO1 – 10 marks</b>  Knowledge and understanding of land ownership and food security could potentially include:</p> <p>Land ownership:</p> <ul style="list-style-type: none"> <li>Different types including owner-occupiers, state-owned, commercial ownership (including land grabbing).</li> <li>Plus different arrangements for labourers eg tenants, landless labourers, employees, migrant or seasonal workers.</li> </ul> <p>Food security:</p> <ul style="list-style-type: none"> <li>Definition – All people at all times have physical and economic access to sufficient safe, nutritious food that meets dietary needs for an active and healthy life.</li> <li>Three ‘pillars’ – availability, access, utilisation</li> <li>Stability also important ie access to food must not fail through adverse weather, political or economic instability.</li> </ul> <p><b>AO2 – 10 marks</b>  Application of knowledge and understanding to analyse and evaluate the view that land ownership is the most important factor influencing food security could potentially include:</p> <ul style="list-style-type: none"> <li>Production can be higher and food security improved if the people who work the land <ul style="list-style-type: none"> <li>can benefit from the produce (food and also income through sales) eg through ownership of the land</li> <li>are not exploited eg through effective tenancy agreements</li> </ul> </li> <li>Examples of land ownership and food security <ul style="list-style-type: none"> <li>Russia, mostly state owned, more</li> </ul> </li> </ul>

		<p>Demonstrates <b>thorough</b> application of knowledge and understanding to provide a clear and developed analysis that shows accuracy of the influence of land ownership on food security.</p> <p>Demonstrates <b>thorough</b> application of knowledge and understanding to provide a detailed evaluation that offers generally secure judgements, with some link between rational conclusions and evidence as to whether land ownership is the most important factor influencing food security.</p> <p><b>Level 2 (3–4 marks)</b> Demonstrates <b>reasonable</b> application of knowledge and understanding to provide a sound analysis that shows some accuracy of the influence of land ownership on food security.</p> <p>Demonstrates <b>reasonable</b> application of knowledge and understanding to provide a sound evaluation that offers generalised judgements and conclusions, with limited use of evidence as to whether land ownership is the most important factor influencing food security.</p> <p><b>Level 1 (1–2 marks)</b> Demonstrates <b>basic</b> application of knowledge and understanding to provide a simple analysis that shows limited accuracy of the influence of land ownership on food security.</p> <p>Demonstrates <b>basic</b> application of knowledge and understanding to provide an un-supported evaluation that offers simple conclusions as to whether land ownership is the most important factor influencing food security.</p> <p><b>0 marks</b></p>		<ul style="list-style-type: none"> <li>productive in some areas where farmers have purchased their land.</li> <li>○ China, food security improved after 1982 when commune system abolished and farmers contracted with government to farm rent free and to sell surplus after quotas met.</li> <li>○ Bangladesh, share cropping – farmers pay rent ‘in kind’ ie 50% or more of their produce, leading to food insecurity.</li> <li>○ Land grabbing – in some areas improvements to infrastructure, agricultural technology and creation of local food surpluses increase food security; in some target countries local farmers displaced and land used to provide crops for overseas countries – increased food insecurity</li> </ul> <p>Influence of factors other than land ownership on food security</p> <ul style="list-style-type: none"> <li>• Economic <ul style="list-style-type: none"> <li>○ lack of capital in LIDCs (labour intensive farming methods) limits food security</li> <li>○ competition for scarce resources eg land lost to urbanisation, government decision to use food producing land for biofuels reduces food security</li> <li>○ food markets dominated by large retailers who force prices down and reduces farmers’ income increasing food insecurity</li> <li>○ unequal competition between ACs and LIDCs as ACs subsidise food production creating lower global prices which can disadvantage food production in poorer regions</li> <li>○ the higher a country’s GDP the greater the</li> </ul> </li> </ul>
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		<p>No response or no response worthy of credit.</p> <p><b>Quality of extended response</b></p> <p><b>Level 4</b> There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.</p> <p><b>Level 3</b> There is a line of reasoning presented with some structure. The information presented is in the most-part relevant and supported by some evidence.</p> <p><b>Level 2</b> The information has some relevance and is presented with limited structure. The information is supported by limited evidence.</p> <p><b>Level 1</b> The information is basic and communicated in an unstructured way. The information is supported by limited evidence and the relationship to the evidence may not be clear.</p>		<p>investment in advanced technology eg mechanisation, fertilisers, irrigation which improve food security. Food security can be improved in poorer rural areas using small scale schemes eg bore holes, drip irrigation</p> <ul style="list-style-type: none"> <li>• Social           <ul style="list-style-type: none"> <li>○ Rural-urban differences within countries eg urban Ghana (Accra) where urban food production is relatively low and what food there is tends to be bought by the wealthy</li> <li>○ Internally displaced groups eg Colombia where internal conflict has displaced 6.2 million of whom 95% are food insecure</li> </ul> </li> </ul> <p>Conclusion – candidates' answers should show evidence of evaluating the relative importance of land ownership compared with other factors that affect food security.</p>
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18		<p><b>Assess the extent to which the theories of Malthus and Boserup are relevant to food security today.</b></p> <p><b>AO1</b> <b>Level 4 (8-10 marks)</b> Demonstrates <b>comprehensive</b> knowledge and understanding of the theories of Malthus and Boserup.</p> <p><b>Level 3 (5-7 marks)</b> Demonstrates <b>thorough</b> knowledge and understanding of the theories of Malthus and Boserup.</p> <p><b>Level 2 (3-4 marks)</b> Demonstrates <b>reasonable</b> knowledge and understanding of the theories of Malthus and Boserup.</p> <p><b>Level 1 (1-2 marks)</b> Demonstrates <b>basic</b> knowledge and understanding of the theories of Malthus and Boserup.</p> <p><b>0 marks</b> No response or no response worthy of credit.</p> <p><b>AO2</b> <b>Level 4 (8-10 marks)</b> Demonstrates <b>comprehensive</b> application of knowledge and understanding to provide a clear, developed and convincing analysis that is fully accurate of the theories of Malthus and Boserup and food security.</p> <p>Demonstrates <b>comprehensive</b> application of knowledge and understanding to provide a detailed and substantiated evaluation that offers secure judgements leading to rational conclusions that are evidence based as to the extent to which the theories of Malthus and Boserup are relevant to food security today.</p>	20	<p><b>AO1 X 10</b></p> <p><b>AO2 X 10</b></p> <p><b>Indicative content</b> <b>AO1 – 10 marks</b> Knowledge and understanding of the theories of Malthus and Boserup could potentially include:</p> <p><b>Malthus (pessimism)</b></p> <ul style="list-style-type: none"> <li>○ 1798, essay on population growth and food supply;</li> <li>○ Based on observation of population growth rates (geometric, 1, 2, 4, 8, 16 etc) and growth of food supply (arithmetic, 1, 2, 3, 4, 5 etc), so population would quickly outstrip food supply;</li> <li>○ Food is essential for population survival so if it is limited population will stabilise or fall;</li> <li>○ Ways to limit population growth include 'natural checks' (famine, war, disease) and 'preventive checks' (later marriage, abstinence) that reduce numbers of births.</li> </ul> <p><b>Boserup (optimism)</b></p> <ul style="list-style-type: none"> <li>○ 1965, an alternative to Malthus's theory;</li> <li>○ Population – will increase;</li> <li>○ Demand for food – will increase leading to price rises;</li> <li>○ Farmers therefore motivated to raise production;</li> <li>○ So more land cultivated, more advanced technology used, production intensified;</li> <li>○ Therefore demand for food met without population 'checks'.</li> </ul> <p><b>AO2 – 10 marks</b> Application of knowledge and understanding to analyse and evaluate the extent to which the theories of Malthus and Boserup are relevant to food security today could potentially include:</p>
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	<p><b>Level 3 (5–7 marks)</b>  Demonstrates <b>thorough</b> application of knowledge and understanding to provide a clear and developed analysis that shows accuracy of the theories of Malthus and Boserup and food security.</p> <p>Demonstrates <b>thorough</b> application of knowledge and understanding to provide a detailed evaluation that offers generally secure judgements, with some link between rational conclusions and evidence as to the extent to which the theories of Malthus and Boserup are relevant to food security today.</p> <p><b>Level 2 (3–4 marks)</b>  Demonstrates <b>reasonable</b> application of knowledge and understanding to provide a sound analysis that shows some accuracy of the theories of Malthus and Boserup and food security.</p> <p>Demonstrates <b>reasonable</b> application of knowledge and understanding to provide a sound evaluation that offers generalised judgements and conclusions, with limited use of evidence as to the extent to which the theories of Malthus and Boserup are relevant to food security today.</p> <p><b>Level 1 (1–2 marks)</b>  Demonstrates <b>basic</b> application of knowledge and understanding to provide a simple analysis that shows limited accuracy of the theories of Malthus and Boserup and food security.</p> <p>Demonstrates <b>basic</b> application of knowledge and understanding to provide an un-supported evaluation that offers simple conclusions as to the extent to which the theories of Malthus and Boserup are relevant to food security today.</p>	<p><b>Malthus and food security</b></p> <ul style="list-style-type: none"> <li>○ In theory his population checks were his way of ensuring enough food, ie food security,</li> <li>○ but in 1798 Malthus did not anticipate farming improvements such as high yielding crops, agrochemicals, polytunnels</li> <li>○ some of his 'natural checks' exist eg war and famine but they are often the cause rather than the result of food insecurity</li> </ul> <p><b>Boserup and food security</b></p> <ul style="list-style-type: none"> <li>○ Theory was based on food security continuing to be stable</li> <li>○ Agricultural methods depended on the size of the population (pressure on available food supplies)</li> <li>○ Changes (eg irrigation, multi cropping, intensification) would increase food supply to match population growth</li> </ul> <ul style="list-style-type: none"> <li>• Relevance to food security today <ul style="list-style-type: none"> <li>○ Food security is affected by a range of factors including wealth/poverty, physical conditions for farming (drought) and the political situation in a country or region (war).</li> <li>○ Outcomes include some of Malthus's checks, famine and disease leading to death particularly of the vulnerable (babies and children)</li> <li>○ Governments and NGOs introduce changes (Boserup) designed to raise food security (from short term aid to irrigation and infra-structure improvements)</li> </ul> </li> </ul> <p><b>Examples</b></p> <ul style="list-style-type: none"> <li>• India – decline in food production/reduced food security eg Punjab wheat growing area:</li> </ul>
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		<p><b>0 marks</b> No response or no response worthy of credit.</p> <p><b>Quality of extended response</b></p> <p><b>Level 4</b> There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.</p> <p><b>Level 3</b> There is a line of reasoning presented with some structure. The information presented is in the most-part relevant and supported by some evidence.</p> <p><b>Level 2</b> The information has some relevance and is presented with limited structure. The information is supported by limited evidence.</p> <p><b>Level 1</b> The information is basic and communicated in an unstructured way. The information is supported by limited evidence and the relationship to the evidence may not be clear.</p>	<p>drought/failure of monsoon rains, higher temperatures/climate change, soil erosion; high yielding crop varieties – benefits/some disadvantages eg costs to small farmers; government policy to subsidise wheat purchase rather than improving infra structure and storage (to prevent wastage).</p> <p>East Africa - food security problems</p> <ul style="list-style-type: none"> <li>○ 2015 to 2016 — A strong El Niño affected almost all of East and Southern Africa, causing food insecurity for more than 50 million people.</li> <li>○ Drought and conflict: Somalia 2010-2012: nearly 260,000 die of hunger. Areas of S Sudan 2008 localised famine.</li> <li>○ Drought: Niger, 2010: Food shortages affected more than 7m. after crops failed; 2005 - thousands die following drought and locust invasion;</li> <li>○ By 2017 to 2018 — 25 million people, including 15 million children, in need of humanitarian assistance in East Africa</li> </ul>
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19	<p><b>To what extent do other physical factors contribute to hazards caused by volcanic eruptions?</b></p> <p><b>AO1</b> <b>Level 4 (8-10 marks)</b> Demonstrates <b>comprehensive</b> knowledge and understanding of hazards caused by eruption of volcanic materials.</p> <p><b>Level 3 (5-7 marks)</b> Demonstrates <b>thorough</b> knowledge and understanding of hazards caused by eruption of volcanic materials.</p> <p><b>Level 2 (3-4 marks)</b> Demonstrates <b>reasonable</b> knowledge and understanding of hazards caused by eruption of volcanic materials.</p> <p><b>Level 1 (1-2 marks)</b> Demonstrates <b>basic</b> knowledge and understanding of the hazards caused by eruption of volcanic materials.</p> <p><b>0 marks</b> No response or no response worthy of credit.</p> <p><b>AO2</b> <b>Level 4 (8-10 marks)</b> Demonstrates <b>comprehensive</b> application of knowledge and understanding to provide a clear, developed and convincing analysis that is fully accurate of how other physical factors combine with volcanic materials to produce hazards.</p> <p>Demonstrates <b>comprehensive</b> application of knowledge and understanding to provide a detailed and substantiated evaluation that offers secure judgements leading to rational conclusions that are evidence based as to whether hazards caused by eruption of volcanic</p>	20	<p><b>AO1 X 10</b></p> <p><b>AO2 X 10</b></p>	<p><b>Indicative content</b></p> <p><b>AO1 – 10 marks</b></p> <p>Knowledge and understanding of hazards caused by eruption of volcanic materials could potentially include:</p> <ul style="list-style-type: none"> <li>• Hazards – occur when eruptions interact with human communities/activities – can be minor or severe. Mainly relatively short term. Risk to humans measured by levels of disruption, number of deaths.</li> <li>• Eruption of volcanic materials – focus on materials (not type of eruption/shape of volcanic cone etc).</li> <li>• Volcanic materials <ul style="list-style-type: none"> <li>○ Gas and ash, often forced into the air then descend to the ground,</li> <li>○ Lava, often flows over the surface from vent/fissure.</li> </ul> </li> <li>• Hazards caused by eruption of volcanic materials: <ul style="list-style-type: none"> <li>○ Include lava flows, pyroclastic flows, gas emissions, tephra and ash.</li> <li>○ Linked to magnitude and intensity of eruption</li> </ul> </li> </ul> <p><b>AO2 – 10 marks</b></p> <p>Application of knowledge and understanding to analyse and evaluate the view that hazards caused by eruption of volcanic materials produce a higher risk to humans when combined with other physical could potentially include:</p> <ul style="list-style-type: none"> <li>• Other physical factors that combine with volcanic materials include: <ul style="list-style-type: none"> <li>○ Wind direction, rainfall, snow/ice melt, location of eruption eg in the ocean.</li> <li>○ Leading to serious hazards lahar/mud flow, flooding, acid rain, ash in the upper atmosphere, tsunami</li> </ul> </li> </ul>
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		<p>materials produce a higher risk to humans when combined with other physical factors.</p> <p><b>Level 3 (5–7 marks)</b> Demonstrates <b>thorough</b> application of knowledge and understanding to provide a clear and developed analysis that shows accuracy of how other physical factors combine with volcanic materials to produce hazards.</p> <p>Demonstrates <b>thorough</b> application of knowledge and understanding to provide a detailed evaluation that offers generally secure judgements, with some link between rational conclusions and evidence as to whether hazards caused by eruption of volcanic materials produce a higher risk to humans when combined with other physical factors</p> <p><b>Level 2 (3–4 marks)</b> Demonstrates <b>reasonable</b> application of knowledge and understanding to provide a sound analysis that shows some accuracy of how other physical factors combine with volcanic materials to produce hazards.</p> <p>Demonstrates <b>reasonable</b> application of knowledge and understanding to provide a sound evaluation that offers generalised judgements and conclusions, with limited use of evidence as to whether hazards caused by eruption of volcanic materials produce a higher risk to humans when combined with other physical factors.</p> <p><b>Level 1 (1–2 marks)</b> Demonstrates <b>basic</b> application of knowledge and understanding to provide a simple analysis that shows limited accuracy of how other physical factors combine with volcanic materials to produce hazards.</p>	<ul style="list-style-type: none"> <li>• Hazards caused by eruption of volcanic materials: <ul style="list-style-type: none"> <li>- Lava flows – everything in its path burned, bulldozed, buried. Rarely cause injuries/fatalities. Basic (runny, basaltic) – cover large distances/areas eg in Hawaii, acidic (thick, rhyolitic) slow moving.</li> <li>- Pyroclastic flows – high speed (100km/h) ash, rock and gases. Destroy everything eg El Chichon volcano in Mexico 1982. Instant death through inhalation, 19 killed on Montserrat in 1994.</li> <li>- Tephra – material ejected into the air ranging in size from ash (eg 2010, Iceland's Eyjafjallajokull – disruption to air travel; Mt Pinatubo 1991 – global cooling effect) to large 'volcanic bombs'. Hazardous, burying farms etc, disruption of transport. May cause breathing problems.</li> <li>- Toxic gases – silent and invisible threat to humans (CO, CO<sub>2</sub>, SO<sub>2</sub>), Lake Nyos, crater lake, Cameroon 1986 asphyxiation of 1700 people (CO<sub>2</sub> emitted from a magma chamber then leaked from under the lake).</li> </ul> </li> <li>• Hazards caused by volcanic materials combined with other physical factors.</li> <li>- Addition of water – melted snow/ice, rain: <ul style="list-style-type: none"> <li>○ Lahars/mudflows: Ash, soil rock fragments with meltwater caused by an eruption produce fast flowing (50km/h) 'liquid cement' that buries/destroys everything in its path (1984 Colombia, Nevado del Ruiz eruption, town Armero engulfed, 23,000 deaths). <ul style="list-style-type: none"> <li>▪ Similar effect with rain on ash-covered slopes in SE Asia.</li> </ul> </li> </ul> </li> </ul>
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	<p>Demonstrates <b>basic</b> application of knowledge and understanding to provide an un-supported evaluation that offers simple conclusions as to whether hazards caused by eruption of volcanic materials produce a higher risk to humans when combined with other physical factors.</p> <p><b>0 marks</b> No response or no response worthy of credit.</p> <p><b>Quality of extended response</b></p> <p><b>Level 4</b> There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.</p> <p><b>Level 3</b> There is a line of reasoning presented with some structure. The information presented is in the most-part relevant and supported by some evidence.</p> <p><b>Level 2</b> The information has some relevance and is presented with limited structure. The information is supported by limited evidence.</p> <p><b>Level 1</b> The information is basic and communicated in an unstructured way. The information is supported by limited evidence and the relationship to the evidence may not be clear.</p>	<ul style="list-style-type: none"> <li>○ Floods: eruption beneath an icefield or glacier triggers rapid melting eg Iceland (well documented), floods called jökulhlaups (from <u>Vatnajökull</u>, Iceland's large ice cap). 1996 eruption of the Grimsvotn volcano caused a peak flow of 50,000 cubic metres /sec. Rare loss of life as can be predicted. Also occurred in 2010, when Iceland's Eyjafjallajökull erupted.</li> <li>- Ocean location: Tsunami caused by violent eruption of island volcanoes. Waves at up to 600km/h reach coast and wave height dramatically increases transferring huge amounts of water+energy inland eg 1883 Krakatoa in Indonesia – about 36,000 drowned</li> </ul> <p>Conclusions about the view that hazards caused by eruption of volcanic materials produce a higher risk to humans when combined with other physical factors:</p> <ul style="list-style-type: none"> <li>○ Eruption of volcanic materials will cause hazards.</li> <li>○ The impact, and therefore the risk, varies according to the hazard.</li> <li>○ When combined with other physical factors the impact can be far greater such as deaths from lahars (high) compared with lava flows (usually low).</li> <li>○ But other examples point to volcanic materials alone causing a higher risk eg gases – asphyxiation; ash disruption to air travel.</li> </ul>
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20	<p><b>To what extent do other physical factors contribute to hazards caused by earthquakes?</b></p> <p><b>AO1</b> <b>Level 4 (8-10 marks)</b> Demonstrates <b>comprehensive</b> knowledge and understanding of hazards caused by earthquakes and other physical factors that may combine with them.</p> <p><b>Level 3 (5-7 marks)</b> Demonstrates <b>thorough</b> knowledge and understanding of hazards caused by earthquakes and other physical factors that may combine with them.</p> <p><b>Level 2 (3-4 marks)</b> Demonstrates <b>reasonable</b> knowledge and understanding of hazards caused by earthquakes and other physical factors that may combine with them.</p> <p><b>Level 1 (1-2 marks)</b> Demonstrates <b>basic</b> knowledge and understanding of hazards caused by earthquakes and other physical factors that may combine with them.</p> <p><b>0 marks</b> No response or no response worthy of credit.</p> <p><b>AO2</b> <b>Level 4 (8-10 marks)</b> Demonstrates <b>comprehensive</b> application of knowledge and understanding to provide a clear, developed and convincing analysis that is fully accurate of how other physical factors combine with earthquakes to produce hazards.</p> <p>Demonstrates <b>comprehensive</b> application of knowledge and understanding to provide a detailed and</p>	20	AO1 X 10	<p><b>Indicative content</b> <b>AO1 – 10 marks</b> Knowledge and understanding of hazards caused by earthquakes and other physical factors that may combine with them could potentially include:</p> <p>Hazards – occur when earthquakes interact with human communities/activities – can be minor or severe. Risk to humans measured by levels of disruption, number of deaths.</p> <p><b>Earthquakes</b></p> <ul style="list-style-type: none"> <li>- cause vertical and horizontal displacement of the ground;</li> <li>- leading to shaking and displacement that can damage buildings/infrastructure and water supplies (eg through movement of groundwater in aquifers);</li> <li>- severity is linked to earthquake magnitude, distance from epicentre, local geology.</li> </ul> <p>Other physical factors that combine with earthquakes:</p> <ul style="list-style-type: none"> <li>- Consolidation of surface layers</li> <li>- Water content of surface layers</li> <li>- Nature of surface materials</li> <li>- Gradient of slopes in earthquake zone</li> <li>- Location of earthquake – on land or under sea/ocean</li> </ul> <p><b>AO2 – 10 marks</b> Application of knowledge and understanding to analyse and evaluate the view that hazards caused by earthquakes produce a higher risk to humans when combined with other physical factors could potentially include:</p> <p>Earthquake hazards caused by the combination of</p>
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	<p>substantiated evaluation that offers secure judgements leading to rational conclusions that are evidence based as to whether hazards caused by earthquakes produce a higher risk to humans when combined with other physical factors.</p> <p><b>Level 3 (5–7 marks)</b> Demonstrates <b>thorough</b> application of knowledge and understanding to provide a clear and developed analysis that shows accuracy of how other physical factors combine with earthquakes to produce hazards.</p> <p>Demonstrates <b>thorough</b> application of knowledge and understanding to provide a detailed evaluation that offers generally secure judgements, with some link between rational conclusions and evidence as to whether hazards caused by earthquakes produce a higher risk to humans when combined with other physical factors.</p> <p><b>Level 2 (3–4 marks)</b> Demonstrates <b>reasonable</b> application of knowledge and understanding to provide a sound analysis that shows some accuracy of how other physical factors combine with earthquakes to produce hazards.</p> <p>Demonstrates <b>reasonable</b> application of knowledge and understanding to provide a sound evaluation that offers generalised judgements and conclusions, with limited use of evidence as to whether hazards caused by earthquakes produce a higher risk to humans when combined with other physical factors.</p> <p><b>Level 1 (1–2 marks)</b> Demonstrates <b>basic</b> application of knowledge and understanding to provide a simple analysis that shows limited accuracy of how other physical factors combine with earthquakes to produce hazards.</p>	<p>seismic shock and other physical factors:</p> <ul style="list-style-type: none"> <li>○ Liquefaction: earthquake in an area with a high water content and fine-grained materials causes surface to lose its strength so slopes collapse. <ul style="list-style-type: none"> <li>- eg Kobe earthquake Japan 1995 where much of the port, built on reclaimed land, was destroyed.</li> </ul> </li> <li>○ Landslides/avalanches: areas of steep slopes eg Himalayas, where a combination of ground shaking and liquefaction occurs. Other contributing factors eg lack of vegetation (deforestation). Landslides block transport routes and also rivers by forming temporary dams+lakes causing serious flood waters when dams burst.</li> <li>○ Tsunamis: caused by <ul style="list-style-type: none"> <li>- Earthquakes under water - sea bed rises. Long wavelength wave generated, not noticeable out at sea but at coast causes 'drawdown', ie retreating sea, before the massive wave forces huge volumes of water onshore eg 1000 tons of water per metre of shoreline in Aceh province, Sumatra, Indonesia, caused by the December 2004 Indian Ocean earthquake.</li> <li>- Underwater landslides can cause significant local tsunamis with limited warning so risks high eg 1998, 2200 villagers killed in Papua New Guinea.</li> </ul> </li> </ul> <p>Evidence based answers to this question may be based on case studies: eg</p> <ul style="list-style-type: none"> <li>● Japan 2011 Tsunami 9Mw Earthquake on boundary of N American and Pacific plates, 70km NE of Honshu. Earthquake effects: physical movement eg coastline dropped by 0.6m, Honshu moved 2.4m east, seabed</li> </ul>
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	<p>Demonstrates <b>basic</b> application of knowledge and understanding to provide an un-supported evaluation that offers simple conclusions as to whether hazards caused by earthquakes produce a higher risk to humans when combined with other physical factors.</p> <p><b>0 marks</b> No response or no response worthy of credit.</p> <p><b>Quality of extended response</b></p> <p><b>Level 4</b> There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.</p> <p><b>Level 3</b> There is a line of reasoning presented with some structure. The information presented is in the most-part relevant and supported by some evidence.</p> <p><b>Level 2</b> The information has some relevance and is presented with limited structure. The information is supported by limited evidence.</p> <p><b>Level 1</b> The information is basic and communicated in an unstructured way. The information is supported by limited evidence and the relationship to the evidence may not be clear.</p>	<p>rose by 7.0m and shifted 40-50m westwards. Undersea location of e'quake caused very large tsunamis triggered up to 40.5m in places. Affected many areas bordering the Pacific, most seriously Japan's NE Honshu region especially around Sendai. Massive infrastructure destruction including the Fukushima Daiichi nuclear power station. Very high loss of life – over 16,000 deaths, 90% caused by drowning, (and over 6,000 injured). Conclusion – dramatic movements caused by this very large earthquake combined with its occurrence under the sea and it was this that led to the tsunami that posed such a high risk to humans.</p> <ul style="list-style-type: none"> <li>• Nepal Gorkha earthquake 2015 Located where Indo-Australian plate meets the Eurasian plate. Earthquakes occur frequently. Seismic risk increased by geology especially relatively recent sediments in valleys that are soft, amplify earthquake waves and cause liquefaction. Gorkha earthquake – 7.8Mw, epicenter 90km NE of Kathmandu, caused landslides and snow/ice avalanches. 8,800 deaths, over 22,000 injured. Over 2.8 million displaced from their homes. Homes on higher slopes particularly badly affected – remote, inaccessible and high landslide risk. Conclusion – location of the earthquake in a mountainous area. Physical features that contributed to hazards such as liquefaction and landslides. This combination posed such a high risk to humans.</li> </ul> <p>General conclusions about the view that hazards caused by earthquakes produce a higher risk to humans when combined with other physical factors could include:</p>
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					<ul style="list-style-type: none"> <li>○ Earthquake alone (ground shaking and displacement) causes disruption etc with some (usually low) loss of life.</li> <li>○ Whereas when combined with other physical factors the risk to humans can be far greater eg large number of deaths in a short space of time from tsunamis.</li> </ul>
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### Assessment Objectives (AO) grid

Candidates answer either question 1, 2, 3, 4 or 5, either question 6, 7, 8, 9 or 10 and one of questions 11, 12, 13, 14, 15, 16, 17, 18, 19 or 20.

Question	AO1	AO2	AO3	Marks
1, 2, 3, 4 or 5 (a)(i)	4			4
1, 2, 3, 4 or 5 (b)	3	3		6
1, 2, 3, 4 or 5 (c)(i)			4	4
1, 2, 3, 4 or 5 (c)(ii)		3	3	6
1, 2, 3, 4 or 5 (d)	6	6		12
6, 7, 8, 9 or 10 (a)	4	4		8
6, 7, 8, 9 or 10 (b)	4	4		8
11, 12, 13, 14, 15, 16, 17, 18, 19 or 20	10	10		20
<b>Total</b>	<b>31</b>	<b>30</b>	<b>7</b>	<b>68</b>

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