GCSE
GEOGRAPHY

PAPER 2 CHALLENGES IN THE HUMAN ENVIRONMENT

Mark scheme

Specimen Assessment Material

Mark schemes are prepared by the Lead Assessment Writer and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation events which all associates participate in and is the scheme which was used by them in this examination. The standardisation process ensures that the mark scheme covers the students' responses to questions and that every associate understands and applies it in the same correct way. As preparation for standardisation each associate analyses a number of students' scripts. Alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, associates encounter unusual answers which have not been raised they are required to refer these to the Lead Assessment Writer.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of students' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

Further copies of this mark scheme are available from aqa.org.uk

Level of response marking instructions

Level of response mark schemes are broken down into levels, each of which has a descriptor. The descriptor for the level shows the average performance for the level. There are marks in each level.

Before you apply the mark scheme to a student's answer read through the answer and annotate it (as instructed) to show the qualities that are being looked for. You can then apply the mark scheme.

Step 1 Determine a level

Start at the lowest level of the mark scheme and use it as a ladder to see whether the answer meets the descriptor for that level. The descriptor for the level indicates the different qualities that might be seen in the student's answer for that level. If it meets the lowest level then go to the next one and decide if it meets this level, and so on, until you have a match between the level descriptor and the answer. With practice and familiarity you will find that for better answers you will be able to quickly skip through the lower levels of the mark scheme.

When assigning a level you should look at the overall quality of the answer and not look to pick holes in small and specific parts of the answer where the student has not performed quite as well as the rest. If the answer covers different aspects of different levels of the mark scheme you should use a best fit approach for defining the level and then use the variability of the response to help decide the mark within the level, ie if the response is predominantly level 2 with a small amount of level 3 material it would be placed in level 2 but be awarded a mark near the top of the level because of the level 3 content.

Step 2 Determine a mark

Once you have assigned a level you need to decide on the mark. The descriptors on how to allocate marks can help with this. The exemplar materials used during standardisation will help. There will be an answer in the standardising materials which will correspond with each level of the mark scheme. This answer will have been awarded a mark by the Lead Examiner. You can compare the student's answer with the example to determine if it is the same standard, better or worse than the example. You can then use this to allocate a mark for the answer based on the Lead Examiner's mark on the example.

You may well need to read back through the answer as you apply the mark scheme to clarify points and assure yourself that the level and the mark are appropriate.

Indicative content in the mark scheme is provided as a guide for examiners. It is not intended to be exhaustive and you must credit other valid points. Students do not have to cover all of the points mentioned in the Indicative content to reach the highest level of the mark scheme.

An answer which contains nothing of relevance to the question must be awarded no marks.

Assessment of spelling, punctuation, grammar and the use of specialist terminology (SPGST)
Accuracy of spelling, punctuation, grammar and the use of specialist terminology will be assessed via the indicated 9 mark questions. In each of these questions, three marks are allocated for SPGST as follows:

- **High performance –** 3 marks
- **Intermediate performance –** 2 marks
- **Threshold performance –** 1 mark

NOTE: The exam boards and Ofqual are working together to determine the marking expectations for spelling, punctuation, grammar and specialist terminology (SPGST) which will apply to all GCSE specifications in History, Geography and Religious Studies. The agreed wording will be included in the mark schemes for accredited sample assessment materials.

Qu	Part	Marking guidance	Total marks

Question 1 Urban issues and challenges

01	1	One mark for each correct answer: **B** The population of the suburbs grew more rapidly than the core between 1931 and 2011. **D** The total population of Kolkata, including its suburbs, was just over 14 million in 2011. No credit if three or more statements are shaded. AO4 = 2 marks	2

01	2	Award one mark for each part. *Natural increase* In the city there are likely to be lots of births/high birth rates and fewer deaths due to a youthful population (1). Credit a reason for large natural increase, eg limited contraception (1). No credit for stating high natural increase, or high birth rates in isolation. *Migration* Many people moving/migrating into the city in search of work (1). More people moving in than out (net migration) (1). No credit for stating large number of people migrating. AO2 = 2 marks	2

01	3	Must refer to two problems, eg poor building materials make homes unsafe (1), lack of open spaces for recreation (1), no roads making communication difficult (1), high density of settlement/small buildings making living conditions overcrowded (1), open drains/sewers run into river increasing risk of disease (1), waste/garbage/pollution in river creating eyesore and health problems (1). No credit for simple description without link to problems of living in this area, eg dirty water, houses made of bamboo. AO4 = 2 marks	2

01	4	<table><tr><th>Level</th><th>Marks</th><th>Description</th></tr><tr><td>2 (Clear)</td><td>4–6</td><td>Specific reference to a named city is required for access to level 2. Clear appreciation of how urban areas provide both social and economic opportunities. Use of example(s) to make points. Not always balanced but has clear development. Shows clear and accurate knowledge of places and processes in urban environments. Demonstrates good geographical understanding of the inter-relationships between places, environments and processes in the context of urban areas. Includes sound application of knowledge and understanding to interpret geographical information.</td></tr><tr><td>1 (Basic)</td><td>1–3</td><td>Basic points about obtaining employment and giving opportunities for improved living standards. May cover one element of the question only (either economic or social opportunities). May not mention a specific city, or may describe generically, without a clear sense of place. Shows limited and partially accurate knowledge of places and processes in urban environments. Demonstrates limited geographical understanding of the inter-relationships between places, environments and processes in the context of urban areas. Includes little or no application of knowledge and understanding to interpret geographical information.</td></tr></table> <u>Indicative content</u> Emphasis should be placed on social and economic opportunities. The question requires direct reference to a named city, which should be located in a newly emerging economy or poorer country. General description without a sense of place restricts the mark to level 1. Expect reference to a named city such as Rio de Janeiro in Brazil where people can earn more money and have regular jobs. Construction provides a big source of employment for large numbers of unskilled workers and many work in manufacturing such as food and making shoes and textiles. People can then afford to have better housing, which includes a clean water supply, sanitation and electricity. This increases the chance of a healthier life and reduces the risk of disease. Urban areas also have education and health opportunities;	6

		children can go to school, which gives them a better opportunity to get a job. No direct credit for environmental aspects unless they impinge on living standards/economic opportunities. No credit for description of city in economically advanced country, although general aspects, if relevant, may be credited. AO1 = 2 marks, AO2 = 2 marks, AO3 = 2 marks	

01	5	One mark for the correct answer: **D** 3934 No credit if two or more answers are shaded. AO4 = 1 mark	1

01	6		6

Level	Marks	Description
2 (Clear)	4–6	Developed statements showing an understanding of likely effects on people and/or environment as a result of urban sprawl. Uses named example and makes use of evidence from the Ordnance Survey map. Demonstrates accurate knowledge of locations, places and environments. Shows thorough and sound geographical understanding of the inter-relationships between places and processes in relation to the urban environment. Includes good application of knowledge and understanding to analyse geographical information shown on an Ordnance Survey map.
1 (Basic)	1–3	Simple statements which describe how urban sprawl has changed surrounding area and has affected people and/or environment. May make use of the Ordnance Survey map or give generic statements about the effects. Limited or no reference to named example. Demonstrates limited knowledge of locations, places and environments. Shows little geographical understanding of the inter-relationships between places and processes in relation to the urban environment. Includes little or no application of knowledge and understanding to analyse geographical

		information shown on an Ordnance Survey map.	

Indicative content

Urban sprawl is the expansion of an urban area into the countryside. The question requires reference to a major city in the UK as well as use of the Ordnance Survey map. Effects are likely to be negative but accept positive effects as well.

Advantages might include benefits to companies who have the opportunity to locate their companies in edge-of-town shopping centres and to people who can live in pleasant semi-rural areas. There may be cheaper land than in urban locations and better access to motorways and airports.

Disadvantages include loss of agricultural land and public open space, loss of trade in traditional city centres, increasing pollution and traffic congestion in rural–urban fringe. Accept ideas such as: loss of woodland/deforestation, loss of hedgerows and fields, habitats or ecosystems being destroyed, reclamation of wetlands/swamps leading to loss of species, air/water/river pollution, more commuting which increases journey time and congestion.

Expect reference to evidence from the map which shows the growth of Dundee into the countryside to the north of the city. Several housing estates have been built and land uses such as industry, hotels and dual carriageway roads have developed close to country parks and farmland, eg in 3632. Around the fringes of Glasgow smaller towns and villages have been swallowed up into a large urban conurbation, including Clydebank and Bishopbriggs. Credit negative aspects such as loss of farmland due to new housing developments and road construction, and atmospheric pollution from increased traffic, eg along the M8 and M77. Also credit positive impacts of urban sprawl, eg people can live in pleasant rural surroundings with quick access to services around the edge of Glasgow.

No credit for methods of controlling outward spread of cities such as creating green belts and using more brownfield sites.

AO1 = 2 marks, AO2 = 2 marks, AO3 = 2 marks

01	7	Two separate problems should be stated. The problems can be economic, social or environmental in nature. No credit for vague statements such as too many cars on the road or makes people late, eg increased air pollution/greenhouse gas emissions (1), poor efficiency of transport/long delivery times for businesses (1), delays which may result in late arrival for employment, meetings, and education etc. (1), blocked traffic may interfere with the passage of emergency vehicles (1), higher chance of collisions due to tight spacing and constant stopping-and-going (1), stressed and frustrated motorists, encouraging road rage and reduced health (1). AO1 = 1 mark, AO2 = 1 mark	2

01	8			9

Level	Marks	Description
3 (Detailed)	7–9	Detailed explanation of how the strategies in one named location help to reduce or manage congestion problems. Credit only one case study or example. The figure should be used, but coverage of stimulus and case study may be unbalanced. Provides a response that is well explained using accurate knowledge and sound thorough understanding, and is applied effectively to the context of traffic congestion issues. A comprehensive and place-specific answer. Is well organised and develops one or more strategies that are relevant to the issues.
2 (Clear)	4–6	Linked statements describing strategies, with some explanation of how congestion is reduced. A case study is named and the explanation is relevant to the location. Some use of the figure should be evident in the answer. Provides a reasonable explanation showing some knowledge and clear understanding with some application to the context of traffic congestion issues. Response shows some organisation and development.
1 (Basic)	1–3	Simple suggestions for reducing congestion. Perhaps list-like with little or no reference to an example. May depend entirely on the information in the source or ignore it altogether, relying on background knowledge. May be largely descriptive with limited link to management of congestion or reduction in number of journeys. Shows slight knowledge and little understanding of the issue and how it might be managed; the explanation is limited and lacks application to the context of traffic congestion issues and their management. Answer may be partial, incomplete and poorly organised. Place-specific information is vague or absent. Limited structure to answer and basic use of geographical terminology.

		Indicative content Emphasis should be placed on how the method helps to reduce the number of cars on the road or ease congestion. Candidates should refer to the schemes shown in the photographs. Solutions to the problem might include improving public transport, eg the trams of Manchester; introducing park and ride schemes, eg Oxford; pedestrianisation, eg Exeter and Oxford; encouraging people to share cars into work; building ring roads, eg Watford; introducing congestion charging, eg London, vehicle-exclusion zones and permit-only parking schemes; bus lanes; increasing car park charges; introducing flexitime and staggered working times. The case study is likely to refer to a named place but may be a single scheme. Credit only one case study or example, although the example could be a whole city or large urban area. Expect a range of strategies to be described in the context of the chosen city such as London, including the introduction of a congestion charge where drivers are now charged to drive into the centre of London. The idea is to discourage people from using cars and onto public transport. Bike hire means that people can borrow bikes for a short period at minimal cost. Bike lanes are being created to make using a bike safer and easier. Trams that run on train tracks in the road have been reintroduced to south London. They are environmentally good because they run on electricity and do not release greenhouse gases. In the underground system new lines have been recently built or upgraded. The Jubilee Line was the latest big extension and extends from central London out to east London. London is currently undertaking one of the biggest engineering projects in Europe by building a railway from east to west London under the city. This railway, called Crossrail, will decrease travel times and cut congestion as more people use public transport. No credit for simply describing the problems. Maximum one mark for a list of management methods. AO1 = 3 marks, AO2 = 3 marks, AO3 = 3 marks **Spelling, punctuation, grammar and use of specialist terminology (SPGST)** **High performance** In the context of the level of demand of the question, learners spell, punctuate and use grammar with consistent accuracy and also use specialist terminology with consistent accuracy. **Intermediate performance** In the context of the level of demand of the question, learners spell, punctuate and use grammar with considerable accuracy and also use specialist terminology with considerable accuracy. **Threshold performance** In the context of the level of demand of the question, learners spell, punctuate and use grammar with reasonable accuracy and also use specialist terminology with reasonable accuracy; any errors do not hinder meaning in the response.	**3** **2** **1**

Question 2 The changing economic world

02	1	Responses should focus on differences in HDI values between Africa and South America. Expect statements backed up by data from the map. HDI values in South America are generally higher than in Africa (1). The vast majority of countries in South America have values above 0.7 whereas most countries in Africa show HDI values under 0.6 (1). The highest figures for HDI are in the extreme north and south of Africa showing values exceeding 0.6. The highest in South America are in the southern part, with values above 0.8 (1). Credit reference to individual countries where relevant. No credit for statements about other parts of the world. AO4 = 2 marks	2

02	2	Candidates should show an awareness of how using a single measure can be misleading. Credit one reason only. Two marks for a developed idea, eg • A single measure may only measure the economic state of the country (1). Combined measures such as HDI take into account social indicators such as education levels (1). • Using one measure can be misleading because it is an average for the country (1), eg Saudi Arabia where the GNI is high but most of the money is held by a very few extremely rich people (1). • Some aspects of development change before others such as death rate which falls before birth rate (1), so if you just looked at death rate you would not really be able to tell the stage of development of a country (1). One mark for a basic statement, eg • A single measure might just consider income and nothing else (1). • Average figures of one indicator are misleading because of huge differences in a country (1). AO2 = 2 marks	2

02	3	<table><tr><th>Level</th><th>Marks</th><th>Description</th></tr><tr><td>2 (Clear)</td><td>3–4</td><td>Linked statements with clear links to levels of development. Explanations of both indicators. Use of Figure 6 is apparent either directly or indirectly. Shows sound understanding of relevant measures of development and their significance. Includes good application of relevant geographical knowledge and understanding to the issue and appropriate use of data to support the response.</td></tr><tr><td>1 (Basic)</td><td>1–2</td><td>Simple statements which are merely descriptive of the features of one or two different indicators without any clear attempt to relate them to levels of development. May make direct use of the data in Figure 6. Shows limited understanding of relevant measures of development and their significance. Includes little or no application of relevant geographical knowledge and understanding to the issue, and makes restricted use of data to support the response.</td></tr></table> <u>Indicative content</u> There should a real attempt to comment on the two different indicators for access to level 2. Responses should explain the usefulness of the 2 measures of development in making comparisons between different countries. Life expectancy is the average lifespan of someone born in a country. This can be affected by factors such as wars, natural disasters and disease. The higher the life expectancy the more developed the country. Adult literacy is the percentage of the adult population able to read and write. Higher literacy rates tend to be associated with higher levels of development, and can be linked to economic growth and rising living standards. Expect direct use of Figure 6 with developed ideas based on the data provided. Countries with high life expectancies such as Italy tend to be more developed reflecting higher quality diet and nutritional standards. Life expectancy increases due to healthcare improvements such as the introduction of vaccines and the development of drugs. Similarly those countries with higher literacy rates are more developed. These countries tend to invest more in education, and if more and more citizens of a country are literate, the country can cope with the fast changing world, with developing technology. AO2 = 2 marks, AO3 = 2 marks	4

02	4	4.6 km (1) Allow 4.0–5.0 km AO4 = 1 mark	1

02	5	**Level**	**Marks**	**Description**	4
		2 (Clear)	3–4	Locational advantages are explained using map evidence. Likely to use both figures in providing clear explanation. A minimum of two locational advantages should be explained. Shows clear application of ideas and information to the question. Uses map skills competently to investigate questions. The answer as a whole is clear, developed and well organised.	
		1 (Basic)	1–2	Simple statements which make some use of map evidence. The comments may be random, lacking development or clarity. The locational advantages are not explicit. Shows limited application of ideas and/or information to the question. Uses map skills in a basic way to investigate questions. The answer as a whole lacks clarity, and may be poorly organised.	
			0	No relevant content.	
		<u>Indicative content</u> Responses should make use of one or both maps in determining the advantages of science park location. Credit the advantages of the broader location, such as the position at the end of the M11 motorway, which links with the rest of the network, the situation on the outskirts of Cambridge near the junction of the A10 and A14, quick and easy access to other major settlements, especially London, close proximity to housing areas for workforce. No credit for generic factors which cannot be ascertained from the maps. AO3 = 2 marks, AO4 = 2 marks			

02	6	Two reasons should be given, eg They help to support new and growing businesses through research and new ideas (1). Many of the firms located in science parks are connected with information, high-technology and electronic industries. (1). The growth in demand for new products such as mobile phones means that new technology needs to be developed, which builds on research in science parks (1). They have grown in the UK because of the high reputation of some university science research departments (1). No credit for vague statements such as growing demand for products, highly skilled labour supply, close to universities, money to develop parks, etc. AO1 = 2 marks	2

02	7	• The Fairtrade farmer receives double that of the non- Fairtrade producer (1). The Fairtrade farmer receives 14% whereas the non-Fairtrade farmer receives 7% (1). • £234.4 million (increase). Allow range of values from £234 million to £235 million (1). AO4 = 2 marks	2

02	8	One mark for stating a way of dealing with unequal development. Second mark for development of the idea. No credit for second way. Examples of developed statements: • Fairtrade gives farmers a guaranteed price for their products (by setting up co-operatives) (1). This money can provide the basic needs for their families (1). • Profits from fair wages are spent in the country (1). These can be invested in health, education and infrastructure (1). AO2 = 2 marks	2

02	9	Credit one idea only. One mark for stating a reason. Second mark for elaboration and development of the reason. Examples of developed statements: • Prices of Fairtrade products are often more expensive (1), so people may not buy them as much (1). • Large companies such as TNCs may control production of a commodity (1) so there is less opportunity to introduce Fairtrade schemes (1). AO2 = 2 marks	2

02	10			9

Level	Marks	Description
3 (Detailed)	7–9	Detailed information with reference to a named case study that covers economic and environmental impacts. Social aspects may be credit worthy if linked to economic advantages/disadvantages. The discussion can be based on a single country if relevant and it covers all aspects of the question. Expect some discussion of the relevant issues, with clear support. Demonstrates comprehensive and specific knowledge of places, processes, and environments. Shows thorough and accurate geographical understanding of the inter-relationships between places, environments and processes. Includes effective application of knowledge and understanding to analyse geographical issues. Discussion is clear and balanced.
2 (Clear)	4–6	Some accurate information relating to a named country. Considers both aspects of the question although may be unbalanced. Linked statements showing understanding. Demonstrates reasonable knowledge of places, processes, and environments. Shows some geographical understanding of the inter-relationships between places, environments and processes. Includes good application of knowledge and understanding to analyse geographical issues. Some discussion is evident in the response.
1 (Basic)	1–3	Simple points. Likely to be generic. Little development of ideas. A case study may be named but the impacts discussed are not specific to the TNC(s) or the country. Demonstrates limited knowledge of places, processes and environments. Shows little or no geographical understanding of the inter-relationships between places, environments and processes.

		Includes some application of knowledge and understanding to analyse geographical issues. Discussion of issues is largely absent or poorly focused.	

Indicative content

A named case study is required to access level 2. The case study should be relevant (an LIC or NEE). (Credit reference to social, economic and environmental effects). The command word is 'discuss' so expect consideration of different types of impact and some evaluation of advantages and/or disadvantages. At least two advantages and disadvantages are needed for access to level 3.

Advantages to the host country might include improvements to education and work skills, development of mineral wealth and energy production, better roads and airports, improved services, provision of employment, money trickling into the local economy.

Disadvantages include poor wages/exploitation of labour, little development of industry as raw materials are exported, limited development of skills for local people, most profits go abroad, unpredictability of TNCs suddenly pulling out, lack of attention given to health and safety, environmental problems caused by air and water pollution.

Expect specific discussion of issues in relation to named countries and/or companies. An example is Coca-Cola, which is well established in many countries. In India there are 27 company-owned bottling operations. In Kerala Coca-Cola drew large amounts of water each day from boreholes and open wells. In the time that Coca-Cola has been operating in Kerala, water tables have decreased from 12 m to 35 m below ground level. Wells are almost empty – local villagers now have to walk nearly 5 km twice a day to fetch water. However, there are some economic benefits to India. Coca-Cola offers training and education to those who have received little already. The company runs some community schemes and has invested large amounts of money in the economy; this includes the construction of manufacturing plants and improving the local infrastructure. Many of the bottling firms are local companies so much of the profit stays in the host country.

Maximum level 1 if impacts on source country are discussed.
Credit only one example or case study of a poorer country/newly emerging economy, although comment need not be restricted to one company.

AO1 = 3 marks, AO2 = 3 marks, AO3 = 3 marks

Question 3 The challenge of resource management

03	1	Credit one reason only, eg Recent massive discoveries of shale gas reserves underground (1), exhaustion of other energy sources (North Sea) (1), fracking may reduce the need for expensive imports (1), realisation that renewables are insufficient to meet demand (1), US developments have been successful (1). AO1 = 1 mark	1

03	2	Credit observations based on the map. Must be a description of distribution. Can be a developed point or two separate points relating to distribution. Credit specific locations if relevant to wider distribution: Widely distributed, with some large patches (1), eg south of London, South Wales, North West England (1). Large area with licences along eastern side of England near Hull. (1) Smaller clusters scattered in many places (1), eg in south-east Kent, Bristol area, Scottish border (1). No credit for describing distribution of areas that are not licensed for fracking. AO3 = 1 mark, AO4 = 1 mark	2

03	3	**Level**	**Marks**	**Description**	6
		2 (Clear)	4–6	Some development of arguments for and against. Likely to show awareness of the economic versus environmental debate. Idea of conflict explained. Linked statements, balanced consideration of issues. Uses Figures 9 and 10, and own knowledge. Develops one or more of the key issues that are relevant to the question, showing sound understanding of relevant geographical concepts and principles. Demonstrates good application of relevant ideas. Some well-focused evaluation with logical chain of reasoning. Uses skills effectively. Makes clear use of data to support the response.	
		1 (Basic)	1–3	Arguments mainly based on source with little development. Likely to consist of assertions and/or direct lifts	

		from Figure 9 and/or Figure 10 without showing understanding. Advantages and disadvantages listed but limited or no comment on why there might be conflict. Limited development of one or more of the key issues that are relevant to the question, showing little or no understanding of relevant geographical concepts and principles. Demonstrates simple application of relevant ideas. Very limited evaluation of the issues involved. Uses skills in a basic way. Makes some use of data to support the response.

<u>Indicative content</u>

Expect use of Figures 9 and 10, with heavy reliance at level 1. The focus of the question is on conflict, so responses should consider opposing points of view, with some development of the reasons for differences of opinion. The environmental versus economic debate causes much controversy and disagreement between different interest groups.

Arguments in favour might include the idea that fracking allows drilling firms to access difficult-to-reach resources of oil and gas. In the USA it has significantly boosted domestic oil production and driven down gas prices. It is estimated to have offered gas security to the USA and Canada for about 100 years. Fracking of shale gas could contribute significantly to the UK's future energy needs. Reserves are thought to be enough to give the UK self-sufficiency for between 10 and 15 years. It appears from Figure 10 that there are extensive resources which can be tapped in the future. It is also possible to generate electricity at half the CO_2 emissions of coal. Shale gas, like natural gas is much cleaner than oil and has a smaller carbon footprint. It can also generate substantial amounts of energy relatively cheaply in contrast to some renewable sources as the technology is well tried and tested and so less investment is needed.

Against fracking is that it uses huge amounts of water that must be transported to the fracking site, at significant environmental cost. Potentially carcinogenic chemicals used may escape and contaminate groundwater around the fracking site. There are also worries that the fracking process can cause small earth tremors. Two small earthquakes of 1.5 and 2.2 magnitude hit the Blackpool area in 2011 following fracking. Environmental campaigners say that fracking is simply distracting energy firms and governments from investing in renewable sources of energy, and encouraging continued reliance on fossil fuels.

AO2 = 2 marks, AO3 = 2 marks, AO4 = 2 marks

03	4	One mark for each correct answer: **C** Large parts of eastern England have annual rainfall below 640mm. **E** The largest area with high annual rainfall (over 1290 mm) is in north and west Scotland. No credit if three or more statements are shaded. AO3 = 1 mark, AO4 =1 mark	2

03	5	Responses should make use of both figures in order to explain the reasons for water transfer. Expect recognition of the areas of potential surplus and deficit based on the rainfall map. The population density map indicates that the main cities are located more towards the south and east, which are areas of low rainfall, so potential deficit. No credit for simply describing one or both maps in isolation. The north and west of the UK receive the heaviest rainfall but are sparsely populated so are likely to have a water surplus (1). The more densely populated areas are found in the south and east where the rainfall is lower, so these areas are likely to have a water deficit (1). Hence the need for water to be transferred from the north and west to the south and east (1). AO3 = 2 marks, AO4 = 1 mark	3

Question 4 Food resources

04	1	One mark for the correct answer: **C** 25%–35% No credit if two or more answers are shaded. AO4 = 1 mark	1

04	2	The question focuses on distribution of areas with high/very high levels of undernourishment. No credit for listing names of countries or for describing the areas with low levels of undernourishment. Either two separate points regarding distribution or one developed observation based on the map, eg Large parts of tropical Africa have high levels of undernourishment, both north and south of the equator (1). Many parts of central and east Africa have high levels of undernourishment (1). Some countries in coastal west Africa have high levels of undernourishment (1) . There are three countries with very high levels of undernourishment, one immediately north of the equator (the Central African Republic), the others to the south (Zambia and Namibia) (1). AO3 = 1 mark, AO4 = 1 mark	2

04	3	Two causes of food insecurity should be stated. These can be related to physical/environmental factors or to human/economic factors, eg Meteorological events such as droughts, floods, severe frosts, hurricanes (1); natural disasters such as earthquakes, tsunamis, volcanic eruptions (1); crop and animal diseases, locust swarms (1); human diseases, reducing ability to work (1); poorly organised farming systems (1); war, reducing food production (1) etc; over-cultivation as fields are not given fallow time (1); overgrazing due to keeping too many cattle (1);lack of investment in irrigation/fertilisers(1). AO1 = 2 marks	2

04	4	**Level**	**Marks**	**Description**	6
		2 (Clear)	4–6	Linked statements showing an understanding of how food insecurity issues can be addressed. At least two methods of improving food security should be included for top of Level 2. Credit case studies where relevant. Exhibits specific and accurate knowledge of ways of improving food security at different scales.	

		Demonstrates clear understanding of the inter-relationships between environments and processes in the context of food security issues.
1 (Basic)	1–3	Simple statements, perhaps listed points, stating ways that food production can be increased or food security improved. Exhibits limited knowledge of ways of improving food security at different scales. Demonstrates simple understanding of the inter-relationships between environments and processes in the context of food security issues.

<u>Indicative content</u>
An understanding of food security should be indicated in the answer (defined as when people have physical and economic access to enough safe, sufficient and nutritious food to meet their dietary needs and food preferences for an active and healthy lifestyle).

Responses should focus on how improvements can be made to food security, eg

Increased mechanisation including harvesters/tractors; greater use of fertilisers; more irrigation; increased yields; high yield variety (HYV) seeds such as IR8 rice; use of pesticides/herbicides; prevent destruction of crops by insects; terracing; draining soil/marshes; education about farming techniques; genetically modified (GM) crops. Expect some development of at least one strategy to improve food security.

GM foods could change food production methods and improve food security. They allow more food to be produced in a smaller area using fewer resources. Some people are against the idea and question whether it will reduce hunger in developing countries.

Limited irrigation is a practical solution to improve food security. Mulch and other cover crops can help retain water so the soil stays moist longer. It's also possible to set up a system that collects rainwater and feeds it into the irrigation system. Some farms even set up recycling systems so they can reuse municipal waste water for irrigation.

Farming practices in the Sahel in West Africa have included the use of 'magic stones', where water and soil are trapped by stones placed regularly along the contours. Farmers have also introduced drought-resistant crops, which has led to an increase in food production, and has helped to conserve the soil.

AO1 = 2 marks, AO2 = 4 marks

Question 5 Water resources

05	1	One mark for the correct answer: **B** 1000–2500 cubic metres per person per year. No credit if two or more answers are shaded. AO4 = 1 mark	1

05	2	The question focuses on distribution of areas with less than 1000 cubic metres of water per capita. No credit for listing names of countries or for describing the areas with high water availability. Either two separate points regarding distribution or one developed observation based on the map, eg • Areas of water scarcity (1000 cubic metres or less per person per year) are mainly found in the extreme north and south of the continent (1). • Five countries stretching across the whole of north Africa have total water per capita of 1000 cubic metres or less (1). • Two countries in tropical Africa, one in the east (Kenya), the other in the west (Burkina) have less than 1000 cubic metres of water per person per year (1). AO3 = 1 mark, AO4 = 1 mark	2

05	3	Two causes of water insecurity should be stated. These can be related to physical/environmental factors or to human/economic factors, eg Population growth and increasing demand (1); increased affluence which means more water consumption (1); improvements in sanitation leading to rising demand (1); expansion of business activity including manufacturing, tourism and entertainment (1); rapid urbanisation and investment in water infrastructure (1); climate change, which creates increased drought risk in some areas (1); political factors, including water-based disagreements (1); pollution of rivers, aquifers and lakes reducing safe water availability (1). AO1 = 2 marks	2

05	4	**Level**	**Marks**	**Description**	6
		2 (Clear)	4–6	Linked statements showing an understanding of how water insecurity issues can be addressed. At least two methods of improving water security should be included for top of level 2. Credit case studies where relevant. Exhibits specific and accurate knowledge of	

		ways of improving water security at different scales. Demonstrates clear understanding of the inter-relationships between environments and processes in the context of water security issues.
1 (Basic)	1–3	Understands how improvements can help to provide a secure source of water. Points simple and separate. Limited development. Exhibits limited knowledge of ways of improving water security at different scales. Demonstrates simple understanding of the inter-relationships between environments and processes in the context of water security issues.

Indicative content

Answers may focus on the effectiveness of one or more techniques in providing a reliable and long-lasting supply of water, ie improving water security. Likely to refer to large dam and reservoir schemes, desalinisation schemes, the building of wells and tanks, etc. A range of other techniques may be explored, eg increasing the use of rainwater harvesting, and grey water recycling for agriculture, industry and commercial use, making new homes more water efficient, installing water meters in all homes, reducing water leakage from pipes and reservoirs, considering the needs of the environment, wildlife, fisheries and recreation when allocating water resources, sharing water resources where there is a surplus, making appliances such as washing machines and dishwashers more efficient, charging more for water to encourage people to use it in a sustainable way.

Expect some development of at least one strategy to improve water security.

Small-scale sustainable solutions to managing water supply involve the work of non-governmental organisations (NGOs), such as WaterAid and Practical Action, in assisting small communities to improve water security. NGOs often use appropriate or intermediate technology that is simple, effective and can be maintained, repaired and renewed by local people using the water service (eg basic guttering and tank made of bamboo, a local resource that is easily grown and harvested).

Greywater systems filter water and recycle it for use in toilets or outdoors where small amounts of pollutants are safe. This can help to reduce problems of water insecurity, particularly in drought-stricken areas where clean water is scarce.

AO1 = 2 marks, AO2 = 4 marks

Question 6 Energy resources

06	1	One mark for the correct answer: **A** 30–49% (1). No credit if two or more answers are shaded. AO4 = 1 mark	1

06	2	The question focuses on distribution of areas where the percentage of electricity from hydroelectric sources is 85% or more. No credit for listing names of countries or for describing the areas with low hydroelectric power generation. Either two separate points regarding distribution or one developed observation based on the map, eg • The majority of countries with over 85% electricity from hydroelectric power are situated in Central and East Africa (1). • A group of countries extending from Ethiopia southwards to Mozambique, on either side of the equator, have a high percentage of electricity produced from hydroelectric sources (1). Two countries in the western part of the continent have figures over 85%: Namibia and Cameroon (1). AO3 = 1 mark, AO4 = 1 mark	2

06	3	Two causes of energy insecurity should be stated – these can be related to physical/environmental factors or to human/economic/political factors, eg Unequal distribution of fossil fuel sources (1); depletion of coal and oil reserves (1); volatile oil and gas prices (1); potential for political instability between various countries and oil-producing states (1); global warming and renewable energy concerns (1); restrictions on over-use of coal for energy (1); concerns over nuclear safety and waste, plus cost of building nuclear plants (1); energy consumption rising – in developing world expected to double by 2050 (1). AO1 = 2 marks	2

06	4	**Level**	**Marks**	**Description**	6
		2 (Clear)	4–6	Linked statements showing an understanding of how energy insecurity issues can be addressed. At least two methods of improving energy security should be included for top of Level 2.	

		Credit case studies where relevant. Exhibits specific and accurate knowledge of ways of improving energy security at different scales. Demonstrates clear understanding of the inter-relationships between environments and processes in the context of energy security issues.
1 (Basic)	1–3	Simple statements, perhaps listed points, stating ways that energy production can be increased or energy security improved. Exhibits limited knowledge of ways of improving energy security at different scales. Demonstrates simple understanding of the inter-relationships between environments and processes in the context of energy security issues.

Indicative content

Energy security is the extent to which an affordable, reliable and stable energy supply can be achieved. A number of improvements to security may be explained, including the fact that renewable energy is sustainable and so will never run out. Renewable energy facilities generally require less maintenance than traditional generators. They produce little or no waste products such as carbon dioxide or other chemical pollutants, so have minimal impact on the environment. Credit other ways of improving security, eg in Canada oil sands provide an alternative source of oil when other conventional sources are unavailable for political or access reasons. They could meet 16% of North America's demand for oil by 2020, and help to reduce dependence on overseas imports.

Expect some development of at least one strategy to improve energy security.

Wind farms and solar farms in the UK make a contribution to electricity supplies and help to reduce greenhouse gas emissions. The UK has possibilities for large tidal barrages which could meet a small percentage of the UK's need for electricity. Renewable energy can be cost-effective and efficient, although in itself will not solve energy insecurity.

Industry and domestic users of energy should use it more efficiently (ie stop wasting it). Being efficient with energy will reduce household and business energy bills, reduce the amount of energy needed to be generated and cut energy related greenhouse pollution.

AO1 = 2 marks, AO2 = 4 marks

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