SPECIMEN ASSESSMENT MATERIAL

GCSE
GEOGRAPHY

PAPER 2 CHALLENGES IN THE HUMAN ENVIRONMENT

Mark scheme

Specimen

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 and grammar (SPaG)
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 SPaG as follows:

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

Qu	Part	Marking guidance	Total marks

Question 1 Urban issues and challenges

01	1	Only credit differences between Africa and South America, although these may be implied. Two separate differences should be described. Credit use of the key to state specific figures, where relevant, eg • the percentage of population living in urban settlements is greater in South America than in Africa (1) • there is greater variation in the percentage of urban population in Africa than in South America, where figures are more uniform (1) • many countries (approximately 20) in Africa have less than 40% of the population living in urban settlements compared with only one in South America (1). No credit for descriptions of other continents or of global patterns. AO4 = 2 marks	2

01	2	One mark for each correct answer: **B** The urban population grew more rapidly than the rural population between 1950 and 2000 **D** The urban population increased by over 2000 million between 1950 and 2010. No credit if three or more statements are shaded. AO4 = 2 marks	2

01	3	Must refer to **two** reasons for slow urban growth rates, which can be implied, eg • in many HICs the process started earlier than LICs and NEEs so the vast majority of people moved to the cities when industry was developing (1) • many cities are already overcrowded in HICs so some people are tending to move to rural areas (1) • in some HICs, inner city industries collapsed, resulting in large scale unemployment. People wanted a better quality of life and to be able to live in a clean and quiet rural area (1) • it has become easier in many HICs for people to commute to work or work remotely from home in rural areas, using internet/email technology (1). AO2 = 2 marks	2

01	4		6

Level	Marks	Description
3 (Detailed)	5-6	AO3 Demonstrates thorough application of knowledge and understanding to the issue of opportunities for people in urban areas in LICs and/or NEEs. AO3 Demonstrates reasoned evaluation of the extent to which urban areas in LICs or NEEs provide social and economic opportunities for people.
2 (Clear)	3-4	AO1 Shows clear and accurate knowledge of places and processes in urban environments. AO2 Demonstrates sound understanding of how urban areas provide both social and economic opportunities.
1 (Basic)	1–2	AO1 Shows limited and partially accurate knowledge of places and processes in urban environments. AO2 Demonstrates some understanding of how urban areas provide both social and/or economic opportunities.
	0	No relevant content.

Indicative content

- Emphasis should be placed on social and economic opportunities. No direct credit for environmental aspects unless they impinge on living standards/economic opportunities.
- The command 'to what extent' requires an appraisal of the degree to which urban areas in LICs/NEEs provide social and economic opportunities for people.
- Answers may refer to a named city (although this is not essential) 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; children can go to school, which gives them a better opportunity to get a job.
- Credit responses which take the view that opportunities are restricted and that there is often a mismatch between perceived opportunities and the reality of life in urban areas in LICs or NEEs. Unplanned urbanisation may bring risk of social instability, pressure on infrastructure, potential water crises and the potential for spread of disease.

		• While moving to a city offers people more opportunities to improve their living conditions, the high cost of living and competition for jobs can also trap people in poverty. • Rapid and unplanned urbanisation can also contribute to urban violence and social unrest, particularly where there is inequality, competition for resources such as land, and weak government. • Responses may take a balanced view, recognising that there are both opportunities and challenges. 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
3 (Detailed)	5-6	AO3 Demonstrates thorough application of knowledge and understanding to analyse geographical information as shown on the Ordnance Survey map. AO3 Demonstrates application of knowledge and understanding to provide a well-developed discussion by analysing the issues relating to urban sprawl and its effects on people and the environment.
2 (Clear)	3-4	AO1 Demonstrates accurate knowledge of locations, places and environments. AO2 Shows sound geographical understanding of the effects of urban sprawl on people and environment.
1 (Basic)	1–2	AO1 Demonstrates limited knowledge of locations, places and environments. AO2 Shows limited geographical understanding of the effects of urban sprawl on people and/or environment. May give generic statements about the effects.
	0	No relevant content.

Indicative content

- Urban sprawl is the expansion of an urban area into the countryside. Answers may concentrate on negative effects but expect positive effects as well. Discussion is likely to focus on the relative merits and demerits of urban sprawl and its social,

		economic and environmental repercussions. • The question requires analysis of the Ordnance Survey map, and responses should be supported by a case study in the UK. • 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	Credit **one** economic problem only. The problem identified must be economic in nature and show understanding of the issue. Credit one mark for basic explanation, eg • lorries are delayed in heavy traffic, which is costly in fuel and driver payments (1) • people are delayed by traffic congestion, resulting in late arrival for employment or business meetings (1). Second mark for developing the explanation of the economic problem: • lorries are delayed in heavy traffic, which is costly in fuel and driver payments and causes long delivery times for businesses, and these high delivery costs are passed on to the consumer (2) • people are delayed by traffic congestion, resulting in late arrival	2

		for employment or business meetings, which may be costly for the company (2). No credit for environmental problems unless linked to economic issues, eg • congestion leads to increased CO_2 and other emissions which are costly to remedy (1), and the increased CO_2 results in poorer air quality, which may cause poor health and increased costs of illness and health care (2). AO1 = 1 mark, AO2 = 1 mark	

01	8		9

Level	Marks	Description
3 (Detailed)	7–9	AO1 Demonstrates thorough and detailed knowledge of an urban transport scheme(s). AO2 Shows a comprehensive understanding of the effectiveness of an urban transport scheme(s) by demonstrating a detailed and balanced appreciation of its advantages and disadvantages. AO3 Demonstrates thorough application of knowledge and understanding in evaluating the effectiveness of an urban transport scheme(s).
2 (Clear)	4–6	AO1 Demonstrates reasonable knowledge of an urban transport scheme(s). AO2 Shows a clear understanding of the effectiveness of an urban transport scheme(s) by demonstrating some appreciation of its advantages and disadvantages. AO3 Demonstrates reasonable application of knowledge and understanding in evaluating the effectiveness of an urban transport scheme(s).
1 (Basic)	1–3	AO1 Demonstrates limited knowledge of an urban transport scheme(s). AO2 Shows limited understanding of the effectiveness of an urban transport scheme(s) by demonstrating limited appreciation of its advantages and disadvantages. AO3 Demonstrates limited application of knowledge and understanding in evaluating the effectiveness of an urban transport scheme(s).
	0	No relevant content.

<u>Indicative content</u>

- Answers should evaluate the effectiveness of a specific transport management scheme(s) and how successful it has

		been in helping to reduce the number of cars on the road, ease congestion, or improve efficiency of the transport system. • Transport management 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. • Exemplification is likely to refer to a named place(s) but may be a single scheme. • 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 encourage them 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. AO1 = 3 marks, AO2 = 3 marks, AO3 = 3 marks **Spelling, punctuation and grammar (SPaG)** **High performance** • Learners spell and punctuate with consistent accuracy • Learners use rules of grammar with effective control of meaning overall • Learners use a wide range of specialist terms as appropriate **Intermediate performance** • Learners spell and punctuate with considerable accuracy • Learners use rules of grammar with general control of meaning overall • Learners use a good range of specialist terms as appropriate **Threshold performance** • Learners spell and punctuate with reasonable accuracy • Learners use rules of grammar with some control of meaning and any errors do not significantly hinder meaning overall	**3** **2** **1**

		• Learners use a limited range of specialist terms as appropriate **No marks awarded** • The learner writes nothing • The learner's response does not relate to the question • The learner's achievement in SPaG does not reach the threshold performance level, for example errors in spelling, punctuation and grammar severely hinder meaning	**0**

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, eg • 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 (1). 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	Credit **one** reason only. Candidates should show an awareness of how using a single measure can be misleading. 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). Two marks for a developed idea, eg • a single measure may only measure the economic state of the country. Combined measures such as HDI take into account social indicators such as education levels (2) • using one measure can be misleading because it is an average for the country, eg Saudi Arabia where the GNI is high but most of the money is held by a very few extremely rich people (2) • some aspects of development change before others, such as death rate which falls before birth rate, so if you just looked at death rate you would not really be able to tell the stage of development of a country (2). AO2 = 2 marks	2

02	3		4

Level	Marks	Description
2 (Clear)	3–4	AO2 Shows sound understanding of one relevant measure of development. AO3 Demonstrates sound application of knowledge and understanding in interpreting how one indicator of development shows differences in quality of life.
1 (Basic)	1–2	AO2 Shows limited understanding of one relevant measure of development. AO3 Demonstrates limited application of knowledge and understanding in interpreting how one indicator of development shows differences in quality of life.
	0	No relevant content.

Indicative content

- Responses should show understanding of one of the three indices in making comparisons between different countries. Expect direct interpretation of Figure 5 with developed ideas based on the data provided. Students should then apply their knowledge and understanding to explain how one indicator shows differences in quality of life.
- Eg *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 higher the quality of life as it may indicate better medical care. Rising living standards, environmental improvements, lifestyle changes and education are also important drivers. 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. China has an average life expectancy just 8 years less than Italy. By contrast, Sierra Leone, an LIC, records a low life expectancy (almost 40 years less than Italy) and therefore has a poor quality of life.
- *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, rising living standards and higher quality of life. Italy, with higher literacy rates, is more developed and the population is more likely to have higher quality of life. Countries such as Italy and China 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 and with developing technology. Literacy has an impact on people's ability to participate in society and to understand important public issues. Illiteracy, however, is an obstacle to a better quality of life, as people are excluded and unable to exchange ideas. By contrast Sierra

		Leone has a low literacy rate. Lack of educational opportunity results in poor quality of life. • No additional credit for considering more than one indicator. AO2 = 2 marks, AO3 = 2 marks	

02	4	One mark for correct answer: 4.6 km (1). Allow 4.0–5.0 km. AO4 = 1 mark	1

02	5	<table><tr><th>Level</th><th>Marks</th><th>Description</th></tr><tr><td>2 (Clear)</td><td>3–4</td><td>AO3 Demonstrates clear application of knowledge and understanding of locational factors to analyse geographical information shown on the map. AO4 Uses map skills thoroughly to investigate questions.</td></tr><tr><td>1 (Basic)</td><td>1–2</td><td>AO3 Demonstrates limited application of knowledge and understanding of locational factors to analyse geographical information shown on the map. AO4 Uses map skills in a basic way to investigate questions.</td></tr><tr><td></td><td>0</td><td>No relevant content.</td></tr></table> Indicative content • Responses should analyse 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; quick and easy access to other major settlements, especially London. • Situation on the outskirts of Cambridge near the junction of the A10 and A14, and 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	4

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)	2

		• 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	

02	7	One mark for comparison of percentage, eg • 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). One mark for correct calculation: • £234.4 million (increase) (1). Allow range of values from £234 million to £235 million (1). AO4 = 2 marks	2

02	8	Credit **one** way only. One mark for stating a way of dealing with unequal development, eg • fairtrade gives farmers a guaranteed price for their products (by setting up co-operatives) (1) • profits from fair wages are spent in the country (1). Second mark for development of the idea, eg • fairtrade gives farmers a guaranteed price for their products (by setting up co-operatives); this money can provide the basic needs for their families (2) • profits from fair wages are spent in the country and these can be invested in health, education and infrastructure (2). No credit for second way. AO2 = 2 marks	2

02	9	Credit **one** reason only. One mark for stating a reason, eg • prices of Fairtrade products are often more expensive (1) • large companies such as TNCs may control production of a commodity (1).	2

		Second mark for elaboration and development of the reason, eg • prices of Fairtrade products are often more expensive, so people may not buy them as much (2) • large companies such as TNCs may control production of a commodity, so there is less opportunity to introduce Fairtrade schemes (2). AO2 = 2 marks	

02	10	<table><tr><th>Level</th><th>Marks</th><th>Description</th></tr><tr><td>3 (Detailed)</td><td>7–9</td><td>AO1 Demonstrates comprehensive and specific knowledge of the characteristics of one or more TNCs. AO2 Shows thorough and accurate geographical understanding of the advantages and disadvantages of TNCs for host countries. AO3 Demonstrates effective application of knowledge and understanding in making a judgement about the issues and reaching a substantiated conclusion. Justification is detailed and balanced.</td></tr><tr><td>2 (Clear)</td><td>4–6</td><td>AO1 Demonstrates reasonable knowledge of the characteristics of one or more TNCs. AO2 Shows clear geographical understanding of the advantages and disadvantages of TNCs for host countries. AO3 Includes reasonable application of knowledge and understanding in making a judgement about the issues and reaching a conclusion. Justification is clear and well supported.</td></tr><tr><td>1 (Basic)</td><td>1–3</td><td>AO1 Demonstrates limited knowledge of the characteristics of one or more TNCs. Answers may be largely generic. AO2 Shows some geographical understanding of the advantages and disadvantages of TNCs for host countries. AO3 May either include limited application of knowledge and understanding in making a judgement about the issues and/or reach a conclusion. Justification is limited to one or more simple points.</td></tr><tr><td></td><td>0</td><td>No relevant content.</td></tr></table> <u>Indicative content</u> • Responses will apply knowledge and understanding of the	9

		issues associated with TNCs and their effects, making a judgement based on relative advantages and disadvantages. • The command word is 'justify', so answers should reach a conclusion and substantiate the choice made. Credit responses which highlight one side of the argument, as well as those which take a more balanced approach before reaching a conclusion. • 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 and 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. Eg Coca-Cola in India, drop in level of water table due to considerable extraction for manufacturing process, with knock-on effects for local people, who now have to walk long distances 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. No credit if impacts on source country are discussed. AO1 = 3 marks, AO2 = 3 marks, AO3 = 3 marks	

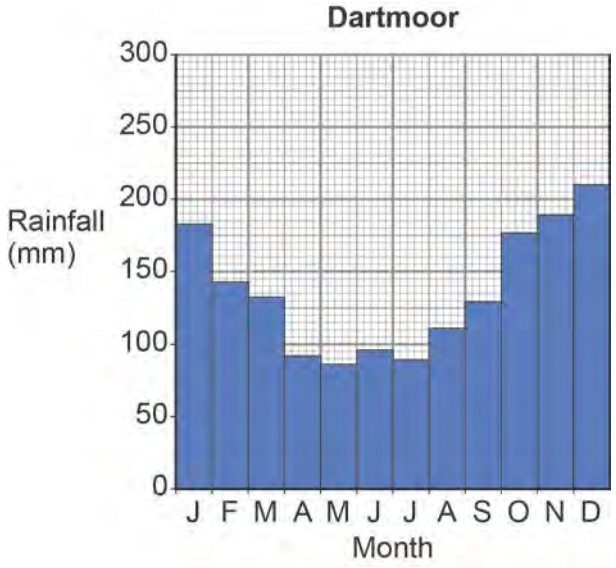
Question 3 The challenge of resource management

03	1	One mark for valid reason. 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	Must be a description of distribution. Credit observations based on the map. Credit specific locations if relevant to wider distribution. One mark for basic description relating to distribution shown on map, eg • widely distributed, with some large patches (1) • large areas with licences along eastern England (1) • smaller clusters scattered in many places (1). Second mark for developed point using detail from map, eg • widely distributed, with some large patches, such as south London, South Wales, North West England (2) • large areas with licences along eastern England between Hull and Nottingham (2) • smaller clusters scattered in many places, such as south east Kent, Bristol area, Scottish border (2). No credit for describing distribution of areas that are not licensed for fracking. AO4 = 2 marks	2

03	3	<table><tr><th>Level</th><th>Marks</th><th>Description</th></tr><tr><td>3 (Detailed)</td><td>5-6</td><td>AO3 Demonstrates application of knowledge and understanding by making thorough analysis of the resource, fully deconstructing information about how fracking for gas in the UK may lead to conflict between different interest groups. AO3 Demonstrates thorough application of knowledge and understanding of the likely conflicts by providing a well-focused and balanced evaluation of the issues involved.</td></tr><tr><td>2 (Clear)</td><td>3-4</td><td>AO2 Develops one or more of the key issues that are relevant to the exploitation of shale gas, showing reasonable awareness of the economic versus environmental debate. AO3 Demonstrates application of knowledge and understanding by making reasonable analysis of the resource, deconstructing some information about how fracking for gas in the UK may lead to conflict between different interest groups.</td></tr><tr><td>1 (Basic)</td><td>1–2</td><td>AO2 Demonstrates limited development of one or more of the key issues that are relevant to the exploitation of shale gas, showing some awareness of the economic versus environmental debate. AO3 Demonstrates application of knowledge and understanding by making limited analysis of the resource, deconstructing basic information about how fracking for gas in the UK may lead to conflict between different interest groups.</td></tr><tr><td></td><td>0</td><td>No relevant content.</td></tr></table> <u>Indicative content</u> • Candidates should apply their knowledge and understanding of the energy debate to make an appraisal of the issues relating to fracking in the UK, analysing the information provided in Figures 8 and 9 to substantiate the response. 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. Fracking of shale gas could contribute significantly to the UK's future energy needs. It appears from Figure 9 that there are extensive resources which	6

		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. • Arguments against fracking include the fact 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. 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 = 4 marks	

03	4	One mark for the correct answer. Height of bar correctly drawn. Shading not needed.  AO4 =1 mark	1

03	5	One mark for the correct answer: **A** 140 mm. No credit if two or more answers are shaded. AO4 = 1 mark	1

03	6	Responses should make use of both figures in order to explain the reasons for water transfer. Candidates should apply their knowledge and understanding in interpreting the two sources. 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 (1). 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). No credit for simply describing one or both maps in isolation. AO3 = 3 marks	3

Question 4 Food

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. One mark for basic description relating to distribution shown on the map eg • large parts of tropical Africa have high levels of undernourishment both north and south of the equator (1) • there are six countries with very high levels of undernourishment (1) • there are six countries with very high levels of undernourishment (1). Second mark for developed point using detail from the map, eg • large parts of tropical Africa have high levels of undernourishment both north and south of the equator, such as Chad and Tanzania (2) • there are six countries with very high levels of undernourishment, four to the north of the equator, such as the Central African Republic, and two to the south, Zambia and Namibia (2) • many parts of coastal east Africa have high levels of undernourishment, such as Tanzania and Mozambique (2). No credit for listing names of countries or for describing the areas with low levels of undernourishment. AO4 = 2 marks	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			6

Level	Marks	Description
3 (Detailed)	5-6	AO2 Shows thorough understanding of the interrelationships between environments and processes in the context of food security issues. AO2 Demonstrates in detail how improvements can help to provide a secure source of food.
2 (Clear)	3-4	AO1 Demonstrates specific and accurate knowledge of ways of improving food security at different scales. AO2 Shows sound understanding of the interrelationships between environments and processes in the context of food security issues.
1 (Basic)	1–2	AO1 Demonstrates limited knowledge of ways of improving food security at different scales. AO2 Shows simple understanding of the interrelationships between environments and processes in the context of food security issues.
	0	No relevant content.

<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; preventing 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 is 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 western 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

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. One mark for basic description relating to the distribution shown on the map, eg • two countries in tropical Africa have less than 1000 cubic metres of water per person per year (1) • 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). Second mark for developed point using detail from the map, eg • two countries in tropical Africa have less than 1000 cubic metres of water per person per year, one in the east (Kenya), the other in the west (Burkina Faso) (2) • 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, such as Libya and South Africa (2) • five countries stretching across the whole of North Africa have total water per capita of 1000 cubic metres or less such as Morocco and Tunisia (2). No credit for listing names of countries or for describing the areas with high water availability. AO4 = 2 marks	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	<table><tr><th>Level</th><th>Marks</th><th>Description</th></tr><tr><td>3 (Detailed)</td><td>5-6</td><td>AO2 Shows thorough understanding of the interrelationships between environments and processes in the context of water security issues. AO2 Demonstrates in detail how improvements can help to provide a secure supply of water.</td></tr><tr><td>2 (Clear)</td><td>3-4</td><td>AO1 Demonstrates specific and accurate knowledge of ways of improving water security at different scales. AO2 Shows sound understanding of the interrelationships between environments and processes in the context of water security issues.</td></tr><tr><td>1 (Basic)</td><td>1–2</td><td>AO1 Demonstrates limited knowledge of ways of improving water security at different scales. AO2 Shows simple understanding of the interrelationships between environments and processes in the context of water security issues.</td></tr><tr><td></td><td>0</td><td>No relevant content.</td></tr></table> <u>Indicative content</u> • An understanding of water security should be indicated in the answer (defined as sufficient access to meet people's water needs while limiting negative consequences of this water withdrawal). • 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 and the building of wells and tanks. A range of other techniques may be	6

		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

06	1	One mark for the correct answer: **A** 30–49%. 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. One mark for basic description relating to the distribution shown 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 on either side of the equator have a high percentage of electricity produced from hydroelectricity (1) • two countries in the western part of the continent have figures over 85% (1). Second mark for developed point using detail from the map, eg • the majority of countries with over 85% electricity from hydroelectric power are situated in Central and East Africa, such as Democratic Republic of Congo and Zimbabwe (2) • a group of countries on either side of the equator have a high percentage of electricity produced from hydroelectricity extending from Ethiopia southwards to Mozambique (2) • two countries in the western part of the continent have figures over 85%, Namibia and Cameroon (2). No credit for listing names of countries or for describing the areas with low hydroelectric power generation. AO4 = 2 marks	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).	2

		AO1 = 2 marks	

06	4	<table><tr><th>Level</th><th>Marks</th><th>Description</th></tr><tr><td>3 (Detailed)</td><td>5-6</td><td>AO2 Shows thorough understanding of the interrelationships between environments and processes in the context of energy security issues. AO2 Demonstrates in detail how improvements can help to provide a secure source of energy.</td></tr><tr><td>2 (Clear)</td><td>3-4</td><td>AO1 Demonstrates specific and accurate knowledge of ways of improving energy security at different scales. AO2 Shows sound understanding of the interrelationships between environments and processes in the context of energy security issues.</td></tr><tr><td>1 (Basic)</td><td>1–2</td><td>AO1 Demonstrates limited knowledge of ways of improving energy security at different scales. AO2 Shows simple understanding of the interrelationships between environments and processes in the context of energy security issues.</td></tr><tr><td></td><td>0</td><td>No relevant content.</td></tr></table> <u>Indicative content</u> • Energy security is defined as 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 and USA oil sands and shale gas provide an alternative source of oil when other conventional sources are unavailable for political or access reasons. They 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	6

		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 gas pollution. AO1 = 2 marks, AO2 = 4 marks	

16 February 2016