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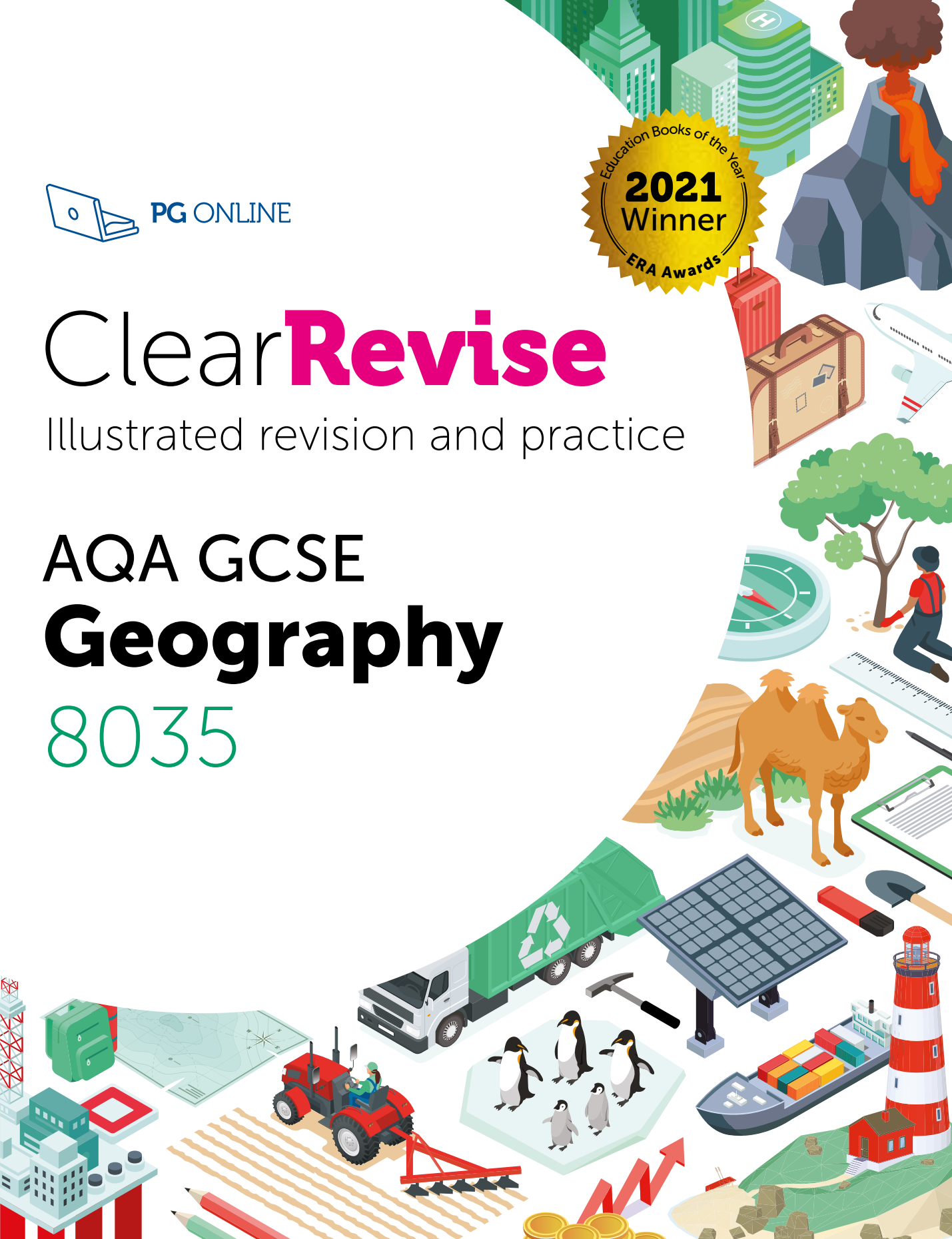

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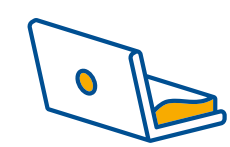

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PREFACE

Absolute clarity! That's the aim.

This is everything you need to ace the examined component in this course and beam with pride. Each topic is laid out in a beautifully illustrated format that is clear, approachable and as concise and simple as possible.

Each section of the specification is clearly indicated to help you cross-reference your revision. The checklist on the contents pages will help you keep track of what you have already worked through and what's left before the big day.

We have included worked exam-style questions with answers for almost every topic. This helps you understand where marks are coming from and to see the theory at work for yourself in an exam situation. There is also a set of exam-style questions at the end of each section for you to practise writing answers for. You can check your answers against those given at the end of the book.

LEVELS OF LEARNING

Based on the degree to which you are able to truly understand a new topic, we recommend that you work in stages. Start by reading a short explanation of something, then try and recall what you've just read. This has limited effect if you stop there but it aids the next stage. Question everything. Write down your own summary and then complete and mark a related exam-style question. Cover up the answers if necessary but learn from them once you've seen them. Lastly, teach someone else. Explain the topic in a way that they can understand. Have a go at the different practice questions – they offer an insight into how and where marks are awarded.

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THE SCIENCE OF REVISION

Illustrations and words

Research has shown that revising with words and pictures doubles the quality of responses by students.[1] This is known as 'dual-coding' because it provides two ways of fetching the information from our brain. The improvement in responses is particularly apparent in students when they are asked to apply their knowledge to different problems. Recall, application and judgement are all specifically and carefully assessed in public examination questions.

Retrieval of information

Retrieval practice encourages students to come up with answers to questions.[2] The closer the question is to one you might see in a real examination, the better. Also, the closer the environment in which a student revises is to the 'examination environment', the better. Students who had a test 2–7 days away did 30% better using retrieval practice than students who simply read, or repeatedly reread material. Students who were expected to teach the content to someone else after their revision period did better still.[3] What was found to be most interesting in other studies is that students using retrieval methods and testing for revision were also more resilient to the introduction of stress.[4]

Ebbinghaus' forgetting curve and spaced learning

Ebbinghaus' 140-year-old study examined the rate at which we forget things over time. The findings still hold true. However, the act of forgetting facts and techniques, and relearning them is what cements them into the brain.[5] Spacing out revision is more effective than cramming – we know that, but students should also know that the space between revisiting material should vary depending on how far away the examination is. A cyclical approach is required. An examination 12 months away necessitates revisiting covered material about once a month. A test in 30 days should have topics revisited every 3 days – intervals of roughly a tenth of the time available.[6]

Summary

Students: the more tests and past questions you do, in an environment as close to examination conditions as possible, the better you are likely to perform on the day. If you prefer to listen to music while you revise, tunes without lyrics will be far less detrimental to your memory and retention. Silence is most effective.[5] If you choose to study with friends, choose carefully – effort is contagious.[7]

1. Mayer, R. E., & Anderson, R. B. (1991). Animations need narrations: An experimental test of dual-coding hypothesis. *Journal of Education Psychology*, (83)4, 484–490.
2. Roediger III, H. L., & Karpicke, J.D. (2006). Test-enhanced learning: Taking memory tests improves long-term retention. *Psychological Science*, 17(3), 249–255.
3. Nestojko, J., Bui, D., Kornell, N. & Bjork, E. (2014). Expecting to teach enhances learning and organisation of knowledge in free recall of text passages. *Memory and Cognition*, 42(7), 1038–1048.
4. Smith, A. M., Floerke, V. A., & Thomas, A. K. (2016) Retrieval practice protects memory against acute stress. *Science*, 354(6315), 1046–1048.
5. Perham, N., & Currie, H. (2014). Does listening to preferred music improve comprehension performance? *Applied Cognitive Psychology*, 28(2), 279–284.
6. Cepeda, N. J., Vul, E., Rohrer, D., Wixted, J. T. & Pashler, H. (2008). Spacing effects in learning a temporal ridgeline of optimal retention. *Psychological Science*, 19(11), 1095–1102.
7. Busch, B. & Watson, E. (2019), *The Science of Learning*, 1st ed. Routledge.

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Section C Physical landscapes in the UK

Paper 2 Challenges in the human environment

Section A Urban issues and challenges

Section B The changing economic world

Section C The challenge of resource management

Paper 3 Geographical applications

MARK ALLOCATIONS

Green mark allocations[1] on answers to in-text questions through this guide help to indicate where marks are gained within the answers. A bracketed '1' e.g. [1] = one valid point worthy of a mark. There are often many more points to make than there are marks available so you have more opportunity to max out your answers than you may think.

Higher mark questions require extended responses. Marks are not given as the answers should be marked as a whole in accordance with the levels of response guidance on **pages 178-179**.

TOPICS FOR PAPER 1

Living with the physical environment

Information about Paper 1

Written exam: 1 hour 30 minutes
88 marks (including 3 marks for spelling, punctuation, grammar and specialist terminology (SPaG). SPaG will only be assessed in a single extended response question where indicated).

Section A: All questions are mandatory (33 marks)
Section B: All questions are mandatory (25 marks)
Section C: Answer any two questions (30 marks)

Option of earthquakes or volcanoes in Q1
Option of hot deserts or cold environments in Q2
Two options from river landscapes in the UK, coastal landscapes in the UK, and glacial landscapes in the UK.

35% of qualification grade

Specification coverage

The challenge of natural hazards, the living world, physical landscapes in the UK, geographical skills.

The content for this assessment will be drawn from the essential subject content in sections 3.1.1–3.1.3 and 3.4 of the specification.

Questions

A mix of multiple-choice, short answer and extended-writing questions assessing knowledge, understanding and skills in contextual scenarios.

TECTONIC HAZARDS

Earth's surface is constantly moving as a result of the physical processes that lie beneath the surface. These processes lead to tectonic hazards such as earthquakes and volcanic eruptions.

Structure of the Earth

Inner core

The solid centre of the Earth made up of iron and nickel, with temperatures up to 5,500°C.

Outer core

The liquid layer that surrounds the inner core, it is also made of iron and nickel.

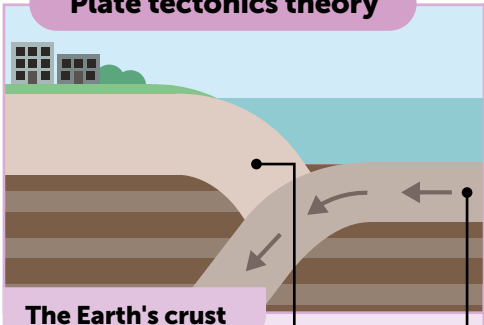
Why does oceanic crust subduct underneath continental crust? [3]

Oceanic crust is denser due to the heavier minerals[1] that are part of its composition, such as iron,[1] whereas the continental crust is less dense due to it being more silica rich,[1] which is a lighter mineral.[1]

Mantle

The mantle is the Earth's thickest layer. It can be split into further layers such as the **asthenosphere** (the semi-molten, upper layer of the mantle) and **lithosphere** (the rigid upper mantle and crust).

Plate tectonics theory



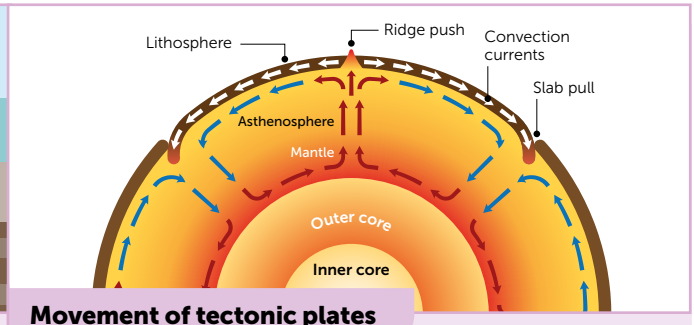
The Earth's crust

Continental crust

- Thicker (30–50km).
- Less dense, doesn't subduct.
- Silica rich rocks.

Oceanic crust

- Thinner (5–10km).
- Very dense, does subduct.
- Iron rich rocks.



Movement of tectonic plates

It is not fully understood how tectonic plates move, but there are two dominant theories. **Convection currents** was the initial theory that was used to explain tectonic movement. It is believed that the heat from the core heats up the semi-liquid mantle and the movement of this magma in a circular motion causes friction to move the tectonic plates along. In recent years a new theory has become more favoured; this is the theory of **slab pull** and **ridge push**. Slab pull is where the weight of the plate being subducted 'pulls' the rest of the plate down. Ridge push is where the new oceanic lithosphere being formed at a mid-ocean ridge 'pushes' the plate along.

2010 CHILE (HIC)

Named example: Earthquakes

An earthquake is a sudden or violent movement within the Earth's crust followed by a series of shocks. Earthquakes are common across the globe.

The country

- HIC – HDI 0.85 (42nd out of 189 countries).
- GDP per capita: $15,000.

The tectonic setting

Destructive plate boundary – Nazca plate subducts beneath the South American plate.

The earthquake event

- Magnitude 8.8.
- Shallow focus (22 miles / 35 Km).

Effects of a tectonic hazard

Earthquake hazards have both **primary effects** (death, building collapse) and **secondary effects** (disease, landslides) upon the surrounding environment.

Primary effects

- 520 deaths.
- 1.5 million made homeless.
- 220,000 homes damaged.
- Damage estimated to be around $30 billion.
- Santiago airport and Highway 5 (the road running the length of Chile) were badly damaged.

Secondary effects

1500 km of roads damaged by landslides, cutting off communities for days.

Tsunami waves (15m) damaged ports (e.g. Talcahuano), killing 150 and leaving regions without water, light and gas for several days. However many lives were saved due to warning systems.

Responses to a tectonic hazard

The response to an earthquake can have a significant role to play in the overall impacts. **Immediate responses** are as the disaster happens, and in the immediate aftermath (evacuation, search and rescue) with **long-term responses** being in the weeks, months and years after (rebuilding infrastructure).

Immediate responses

- Highway 5 temporarily repaired within a day, allowing aid to be distributed.
- President Bachelet arranged for food retailers to distribute necessities free of charge.
- 10,000 Chilean army troops dispatched to keep the peace and reduce looting.
- 30,000 small emergency shelters funded by a national appeal, whilst 90% of homes had water and power restored in 14 days.

Long-term responses

- 220,000 homes rebuilt by 2014.
- Government was ordered to fund $2.7 million to families of tsunami victims (due to poor information and warnings).

WEATHER HAZARDS

Weather hazards exist in many forms across the world. To understand the distribution and patterns of these hazards, it is important to understand how the air within the atmosphere circulates on a global scale.

Global atmospheric circulation

Hadley cells

This atmospheric cell is found between the Equator and the tropics (0°–30° latitude). Hot, moist air rises at the Equator. This is due to the highest concentration of solar energy (intense insolation).

Ferrel cells

This atmospheric cell is found between the tropics and the polar region (30° - 60°). This cell is driven by convection of the Hadley cell and the Polar cell. The air coming from the tropics is warm and moist.

Polar cells

This atmospheric cell is found in the polar region (60° - 90°), and it is driven by cold dry air descending at the poles.

Hadley, Ferrel and Polar cells occur in both hemispheres.

How global atmospheric circulation affects weather

Surface winds

These winds form as air moves from areas of high pressure to low pressure to balance out the pressure gradient. There are two main types of surface winds, **trade winds** (found from 30° N and S to the Equator), and the **Westerlies** (found from 30° N and S to the poles).

Weather in the UK

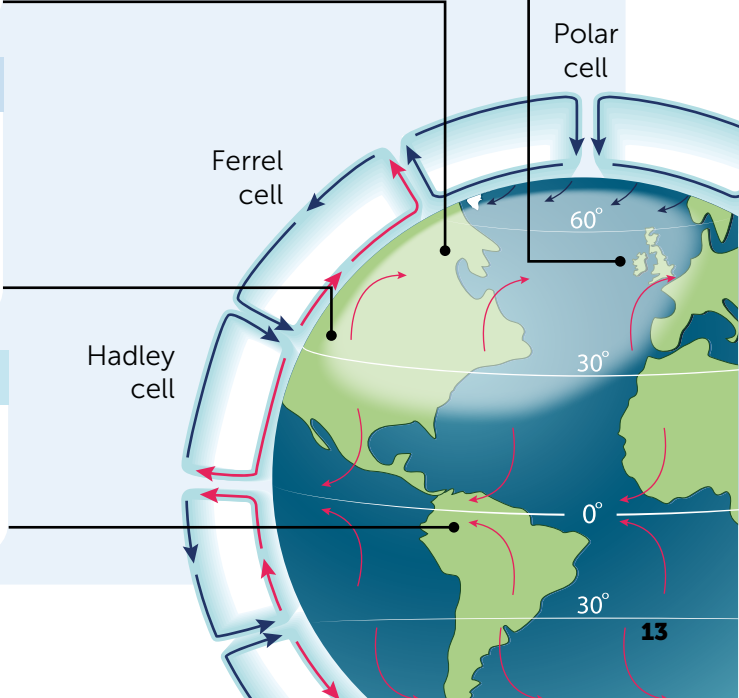
The UK experiences lots of cloud and rain formation as it is at 60° north; the point at which the **Ferrel cell** (warm, moist air) and **polar cell** (cold, dry air) meet as **surface winds**. This causes lots of frontal rainfall, pressure changes and instability in the air above us.

Deserts

Most deserts occur at 30° north and south on a **high-pressure belt**, where air from both the **Hadley** (equatorial) and **Ferrel** (subtropical) cells is sinking. Clouds cannot form as this warm dry air descends to the ground, creating high daytime temperatures with very little rain.

Rainforests

Rainforests sit on a **low-pressure belt**, as the hot, moist air at the Equator is rising. This rising air quickly cools and condenses whilst still at the Equator, causing intense rainfall.



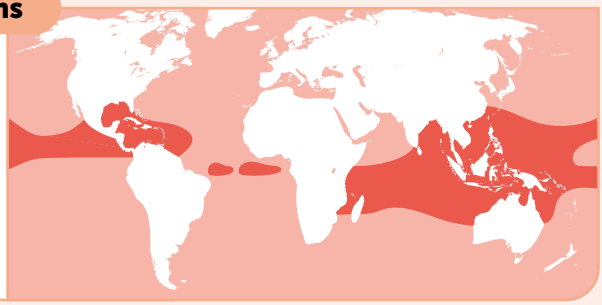
TROPICAL STORMS

A tropical storm is a huge storm created by intense low pressure. These storms spiral around a calm centre and can bring powerful hurricane force winds (of at least 75 mph) and heavy rain.

Global distribution of tropical storms

Tropical storms are called **hurricanes**, **typhoons** or **cyclones** depending upon which ocean they form. They form only in the tropics (5–30° N/S of the Equator) where they have the right conditions during later summer and early autumn.

Areas prone to tropical storms

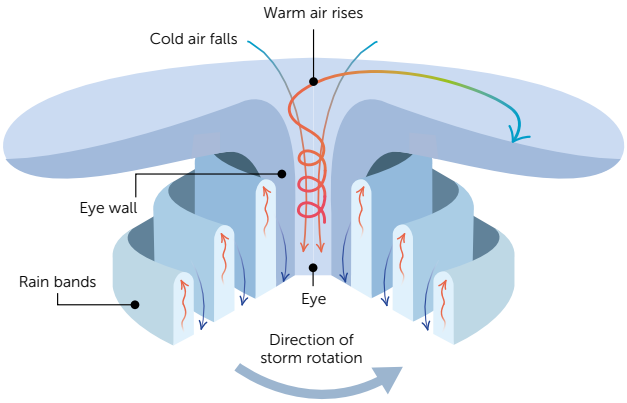


Give **two** reasons for the distribution of tropical storms as shown in the map above. [2]

Tropical storms only occur in tropical oceans where sea surface temperatures regularly exceed 27°C.[1] These areas are also hot and humid,[1] which promotes cloud formation. The Coriolis Effect is strong enough in the tropics to create a spinning effect on the storm.[1]

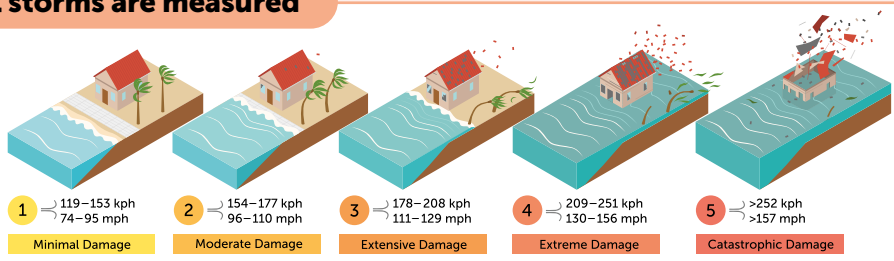
The structure of a tropical storm

Tropical storms are very large systems, and can be up to 300 miles across. The shape of a tropical storm is roughly symmetrical. The centre of the storm is called the **eye**. Here, cool, dry air descends leading to dry and calm conditions. The eye wall, which borders the eye of the storm is the most violent part of the storm, with the highest wind speeds, due to the intense pressure differences between the wall and the eye. Beyond the eye wall there are repeated bands of thunderstorms, which get gradually weaker the further from the eye.



How tropical storms are measured

Tropical storms are measured using the **Saffir-Simpson scale**.



EVIDENCE FOR CLIMATE CHANGE

Longer term evidence for climate change

Tree rings

Each year a tree grows (dependent on the climate) tree rings are created. The width of the rings can be used to show when a year has been warmer (more growth) or cooler (less growth). This can be used to get a generic idea of how the Earth's climate has changed year on year.

Ice cores

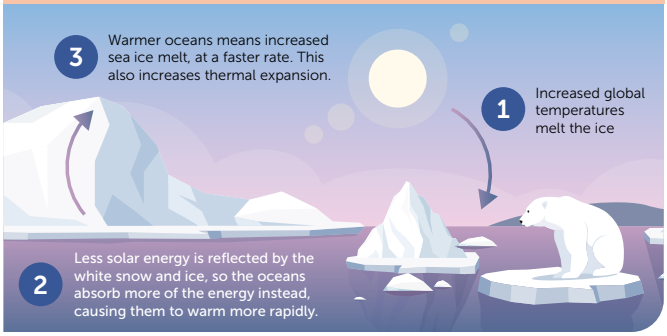
When ice forms, small concentrations of atmospheric gases are trapped. These can be used to reveal the composition of the atmosphere at that point in time, and an average temperature can then be worked out. Ice core data can go back up to 800,000 years. This has been used to show natural variations in the Earth's climate over time, with a rapid increase in recent years.

Sediment layers

Similar to ice cores, gases trapped in ocean sediments, as well as mineral and chemical composition can be used to show the makeup of the atmosphere at time of deposition. This can help reconstruct Earth's climate over time.

Recent evidence

Rising ocean levels

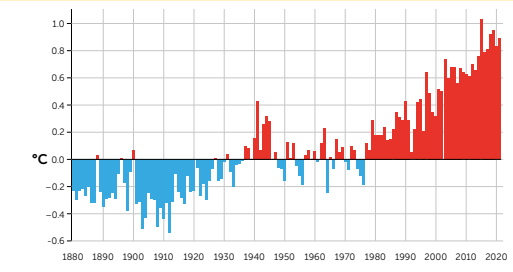


Shrinking glaciers and melting sea ice

There is photographic evidence that shows that glaciers are in retreat all over the world. This is caused when the rate of ice melting is quicker than the rate of ice accumulation. They are decreasing due to changes in climate and increasing global temperatures decreasing the level of snowfall in many areas.

Thermometer readings

Since records began, there has been a steady increase in the average global temperature recorded and the average air temperature has increased by around 1°C since records began in 1900. However, over the last decade, we have seen an increasing number of years classified as the 'hottest recorded'.



Describe the trend of the average global surface temperature on the graph. [2]

The trend is showing that global surface temperatures are increasing.[1] This can be seen from the 1990s onwards where most years are above the average temperature.[1]

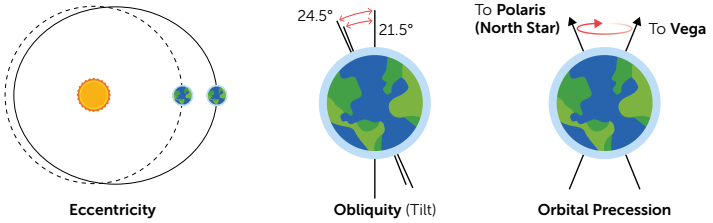
Award one mark for describing the trend, and a 2nd mark for using data from the graph to support it.

CAUSES OF CLIMATE CHANGE

Natural causes of climate change

Orbital variations – Milankovitch Cycles

Changes in the Earth's distance to the sun has an impact on whether the Earth is going through a period of warming or cooling.



Eccentricity

Every 100,000 years, Earth's orbit goes from being almost circular, to more elliptical. The more elliptical, the more solar energy that reaches the Earth, causing warming.

Axial tilt

Every 41,000 years, the Earth's axis tilts from 21.5° to 24.5°. The steeper the tilt, the more extreme the seasons are as more solar energy reaches the hemispheres in summer.

Precession

Every 26,000 years the Earth's axis wobbles (like a spinning top toy). This can cause greater seasonal extremes for the different hemispheres.

Solar output

The sun goes through an approximate 11-year cycle where sunspot activity (dark patches with reduced surface temperature), and solar flares (increased surface temperatures) change. This has an impact on the solar heat energy reaching Earth, and therefore impacts Earth's climate.

Volcanic activity

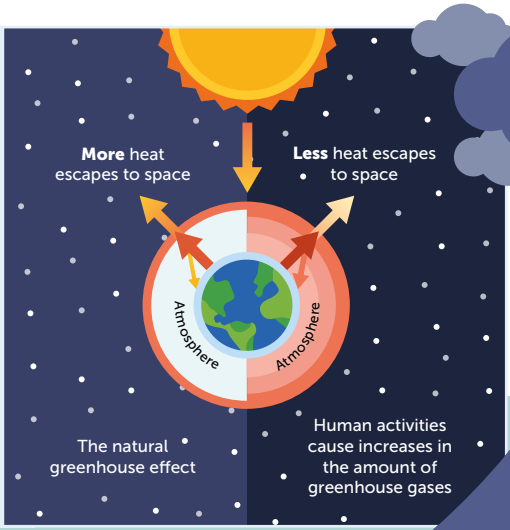
Volcanic ash and certain volcanic gases can block out/reflect solar energy from reaching the Earth's surface. This will therefore have a short term cooling effect on the planet.

Human causes of climate change

Greenhouse effect vs Enhanced greenhouse effect.

The greenhouse effect is naturally occurring as gases such as carbon dioxide and methane keep the Earth naturally insulated at a liveable temperature. With the human enhanced greenhouse effect, we are seeing human activities causing an increase in the concentration of these greenhouse gases.

- Burning of fossil fuels as an energy source releases CO_2.
- Deforestation removes an important carbon sink allowing more CO_2 in the atmosphere.
- Increased agriculture such as livestock and rice farming releases more methane. Farming is needed to provide food to increasing populations around the globe.

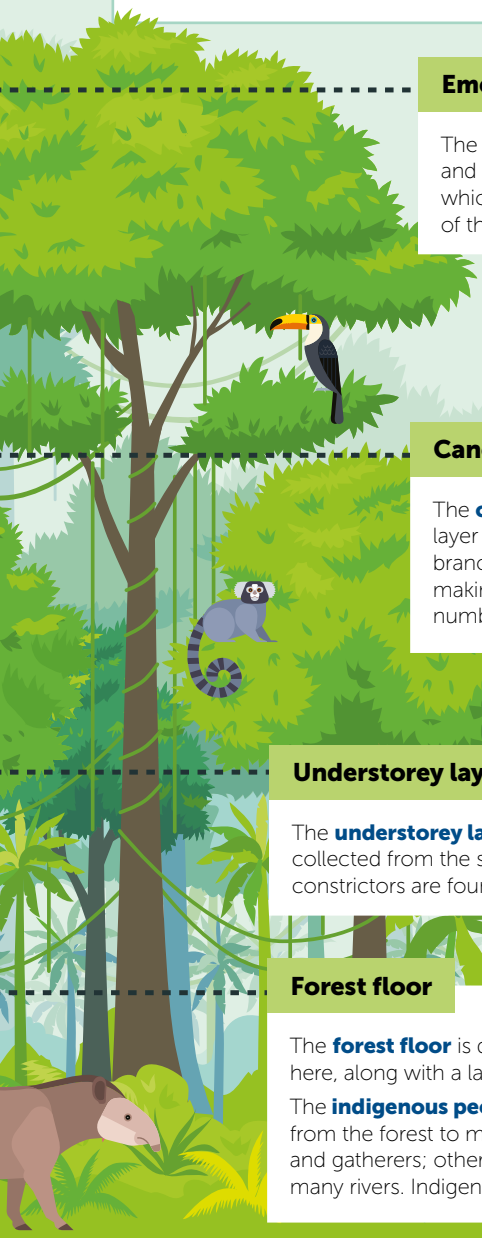


TROPICAL RAINFOREST CHARACTERISTICS

Tropical rainforests (TRF) are hot all year around as there is intense insolation (heating from the sun) at the Equator. They are wet because of the band of low pressure at the Equator giving heavy daily rainfall.

Rainforest layers

Rainforest layers provide a habitat for different plants and animals that have **adapted** to live there.



Emergent layer 50–80m

The tallest trees form the **emergent layer**, where conditions are hot, wet and windy and so less hospitable for animals. These tall trees have massive **buttress roots** which spread out across the forest floor to keep them stable and to make the most of the nutrients in the top layer of the soil.

Canopy layer 30–50m

The **canopy** is where the branches and leaves of most trees are found and is the layer with the greatest **biodiversity** as it has most sunlight. Epiphytes grow on the branches of trees so they can reach the sunlight and lianas (vines) climb the trees, making it easier for animals such as monkeys and sloths to move around. Huge numbers of insects live in this layer, including many butterflies.

Understorey layer 1–30m

The **understorey layer** includes bushes, vines and small trees with large leaves to maximise energy collected from the sun for photosynthesis as the canopy blocks most sunlight. Snakes such as boa constrictors are found here.

Forest floor

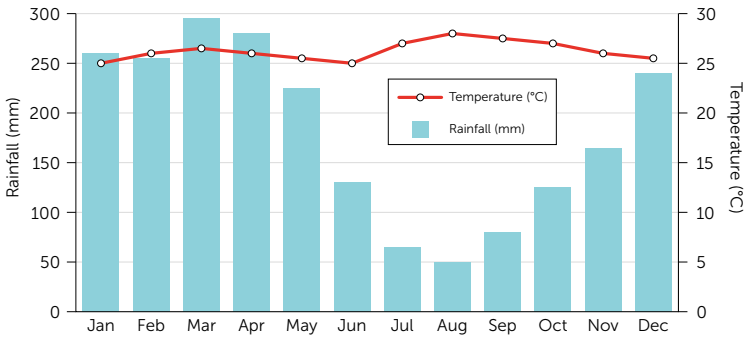
The **forest floor** is dark and humid. The largest animals in the rainforest, such a tapirs, are found here, along with a large number of decomposers such as leaf cutter ants.

The **indigenous people** of the rainforest make their homes on the forest floor and use resources from the forest to meet their needs. Different groups have different lifestyles; some are hunters and gatherers; others use slash and burn to clear land for farming whilst some rely on fishing in the many rivers. Indigenous cultures maintain balance in the ecosystem by using resources **sustainably**.

Climate graph

Revisit your work on the global atmospheric circulation system on page 13.

A typical rainfall/temperature graph for an equatorial tropical trainforest



Interdependence of climate, water, soils, plants, animals and people

Water is rapidly cycled in tropical rainforests (**TRF**) as it is so hot. Most rain is **intercepted** by vegetation and then evaporates from its leaves through **evapotranspiration**. Rain reaching the forest floor will **infiltrate**, some will be used by vegetation through its roots and some will become part of the **groundwater** store which feeds into the many rivers found in TRF.

Rainforest soils (**latosols**) are deep due to the supply of **litter** (dead organic matter) and rapid decomposition because of the humidity. Water infiltrating **leaches** the nutrients from the soil, leaving it infertile, except for in the top layer where the litter is being broken down.

Study the photographs below.

(a) Look at **Figure A**. How does the dung beetle shown contribute to the nutrient cycle in the TRF? [2]

(b) Look at **Figures B** and **C**. How have plants adapted to use the sunlight? [4]

Figure A

Figure C

Figure B

(a) The dung beetle is a decomposer.[1] It breaks down litter and mixes it into the soil.[1]

(b) Buttress roots keep trees stable as they grow tall to reach the sunlight. Plants on the forest floor have large dark green leaves to maximise photosynthesis. Lianas climb trees to reach the sunlight. Level 2 – Clear: 4 marks.

This question should be marked in accordance with the levels-based mark scheme on page 178.

SECTION B

EXAMINATION PRACTICE

In this section, you should study and revise ecosystems, tropical rainforests and one from hot deserts or cold environments.

1. Study the world map showing the main biomes on **page 29**. Using this map, which one of the following statements is true? [1]
   - A. ☐ There is more taiga in the Southern Hemisphere than in the Northern Hemisphere
   - B. ☐ Deserts are found along the Equator
   - C. ☐ There are no deserts in Asia
   - D. ☐ There are areas of mixed and deciduous forest in six of the seven continents

2. Outline **one** reason for the distribution of deserts. [2]

Tropical rainforests

3. Study the climate graph for a tropical rainforest on **page 31**. What is the range of temperature shown? [1]

4. Study the climate graph for a tropical rainforest on **page 31**. In which month is rainfall the lowest? [1]

5. To what extent do you agree that the economic benefits of development are greater than the environmental costs in a tropical rainforest you have studied? [9]

Hot deserts option

6. Outline **one** distinctive characteristic of the desert climate. [1]

7. Study the photographs showing uses of the Sahara desert below and on **pages 38–39**. Using at least one of these photographs and your own understanding, explain how deserts can be used in more and less sustainable ways. [6]

A room in an ecological hotel in Siwa, Egypt

Desert caves in the Matmata region of Berbers in Tunisia

8. Study the photograph showing mango trees being planted and cared for on **page 41**. Using this photograph, suggest how planting trees can reduce the risk of desertification. [2]

9. Outline how **either** water and soil management **or** appropriate technology can reduce the risk of desertification. [2]

Cold environments option

10. Give **one** reason why cold environments are so cold. [1]

11. Study the photographs below. Using at least one of these photographs and your own understanding, explain how cold environments can be used in more and less sustainable ways. [6]

12. Study the photograph showing the Trans Alaskan pipeline below.
Using this photograph, suggest **one** way in which technology can be used to conserve cold environments. [2]

13. Explain how international treaties reduce the risk of damage in cold environments. [2]

DISTINCTIVE COASTAL LANDFORMS

Coastal landforms are created by the action of physical processes. They vary according to the nature of the coastline, with geological structure and rock type playing an important role.

Influence of geological structure and rock type

Geological structure

Geological structure refers to the way the rocks in the coastline fit together. Sedimentary rocks are laid down in layers, but these layers may change over time due to the movement of the Earth through:

Faulting

Cracks in the layers along lines of weakness.

Folding

Layers are tilted (see photograph above).

Rock type

Rock type varies around the UK coastline. Rocks such as granite, slate and limestone are more resistant to erosion, whereas clays and sands are less resistant to erosion. In areas with coastlines made from glacial deposits (such as till) the material is unconsolidated (loose) so it is easily eroded.

This photograph shows a cliff on the Norfolk coastline. This coastline consists of sand, clay and glacial till, so the cliffs are rapidly eroded.

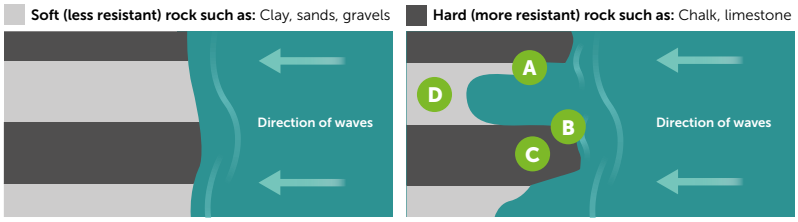
The photograph shows Old Harry Rocks in Dorset. Explain how landforms like this form. [4]

The photograph shows an arch and a stack. These have formed in a headland when processes such as hydraulic action and abrasion[1] have eroded a weak point such as a crack.[1] If a crack widens to form a cave and the cave cuts through the headland an arch will form.[1] When the roof of the arch collapses it forms a stack like Old Harry.[1]

Landforms of erosion

Headlands and bays

Headlands and **bays** often form on discordant coastlines. This is when there are bands of more and less resistant rock, as shown in the diagram.



A Once formed, bays are then sheltered by the headlands so their erosion is slowed down

B Once formed, headlands are more likely to be eroded as the energy of the waves become focused here

C Headlands remain jutting out as they erode more slowly

D The less resistant rocks erode more quickly, forming bays

Cliffs and wave cut platforms

Cliffs and **wave cut platforms** are formed when:

1. The base of the cliff is eroded through hydraulic action and abrasion forming a wave cut notch.
2. Eventually the rock above the notch will fall (mass movement) and the cliff will move back (retreat).
3. This leaves behind a wave cut platform (where the cliff used to be).

Example

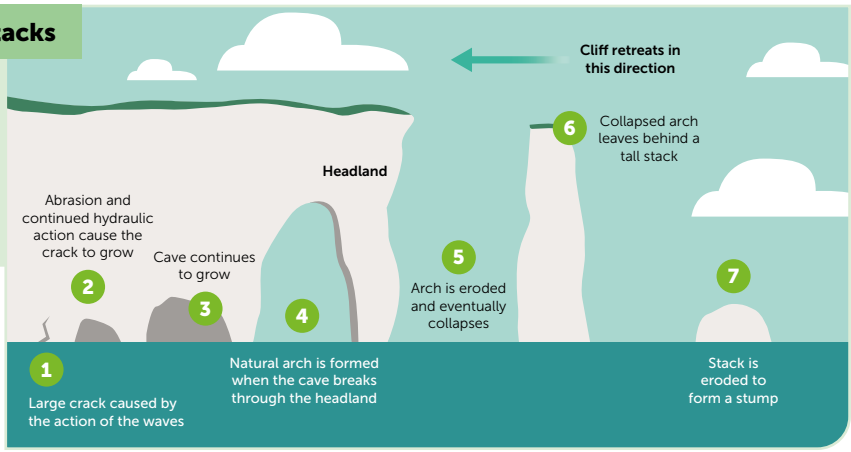
This photograph shows the cliff and wave cut platform at Kilve Beach in Somerset.

The base of the limestone cliffs is eroded, forming a wave cut notch. The limestone in the cliffs is strong enough to stay up when it is undercut. You can also see the folding of the rock in the cliffs in the photograph, which influences how erosion affects this coastline.

Eventually the cliff will collapse, leaving behind a wave cut platform.

Caves, arches and stacks

Caves, **arches** and **stacks** can form when headlands are eroded, as shown in the diagram.



TOPICS FOR PAPER 2

Challenges in the human environment

Information about Paper 2

Written exam: 1 hour 30 minutes
88 marks (including 3 marks for spelling, punctuation, grammar and specialist terminology (SPaG). SPaG will only be assessed in a single extended response question where indicated).

Section A: All questions are mandatory (33 marks)
Section B: All questions are mandatory (30 marks)
Section C: Answer question 3 and any one question from 4, 5 or 6 (25 marks)

Option of Food, Water or Energy in Q4-6

35% of qualification grade

Specification coverage

Urban issues and challenges, the changing economic world and the challenge of resource management.

The content for this assessment will be drawn from the essential subject content in sections 3.2.1–3.2.3 and 3.4 of the specification.

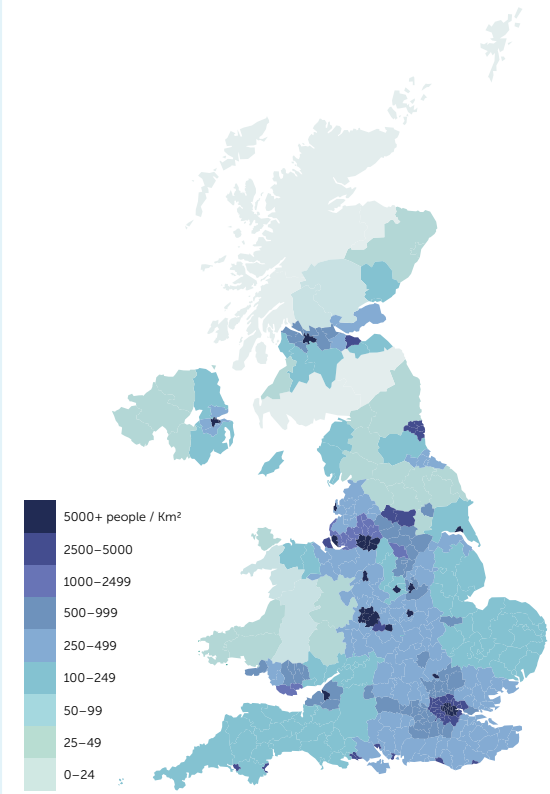
Questions

A mix of multiple-choice, short answer and extended-writing questions assessing knowledge, understanding and skills in contextual scenarios.

POPULATION DISTRIBUTION AND MAJOR CITIES IN THE UK

Population density

Population density is the number of people living in each square kilometre in an area. As the **choropleth map** below shows, population density varies greatly across the UK, with **dense** populations found in the South East and the Midlands and **sparse** populations in areas such as the highlands of Scotland.



Development of major cities

The major cities in the UK developed as the country industrialised. Some were administration centres, others were ports and/or areas of manufacturing. Industrial cities initially grew up near sources of raw materials such as coal and iron ore.

Using the map above, describe the distribution of major cities across the UK. [2]

Most cities are located in the centre of the UK, including Birmingham, Sheffield and Manchester.[1] Cities not in this cluster are on or near the coast, such as Bristol, Cardiff and Belfast.[1]

CASE STUDY BRISTOL

A major city in the UK

Location and importance

Bristol is a city in the west of England. It is located on the River Avon.

Bristol is a well connected city, with the M5 motorway to the west, the M4 to the north and the M32 leading into the city centre. Temple Meads railway station is a transport hub for the city and Bristol International Airport is to the south west of the city.

This city is important in the UK as it is a centre for aerospace, technology, banking and insurance. There are two universities, the University of Bristol and the University of the West of England (UWE).

Bristol developed as a port and played an important role in world trade. Bristol was the leading slaving port in the UK in the late 1730s and many of the factories that developed in the city at this time processed goods such as cotton and sugar obtained through enslaved labour. When the slave trade ended, slave owners received compensation for their losses, leading to a boom in investment in Bristol and new building works. Bristol harbour is now used for leisure and tourism in the city centre, whilst the port of Avonmouth and Royal Portbury Docks still play a role in global trade. Bristol is the seventh most popular city for international tourists in the UK.

Georgian buildings such as those in Queen Square were often homes to merchants who benefitted from slavery.

THE CHANGING ECONOMIC WORLD

Organisations attempt to classify different parts of the world into different categories of development.

Global variations in economic development and quality of life

The World Bank classifies countries according to their **Gross National Income** (**GNI**) **per capita**:

Low-income economies	$1,035 or less in 2020
Lower-middle income economies	$1,036 to $4,045
Upper-middle income economies	$4,046 to $12,535
High-income economies	$12,536 or more

GCSE Geography considers both **higher income** and **lower income countries**. It also includes a classification of **Newly Emerging Economies (NEEs)**.

AQA defines NEEs as *"Countries that have begun to experience higher rates of economic development, usually with higher levels of industrialisation. They differ from LICs in that they no longer rely primarily on agriculture, have made gains in infrastructure and industrial growth, and are experiencing increasing incomes and high levels of investment, e.g. Brazil, Russia, China and South Africa (the so-called BRICS countries)."*

This classification considers **economic development**, but it is also important to think about quality of life in different places. Some countries are wealthy but don't share the benefits of this wealth across their population, leading to **inequalities**. This is why it is also important to look at **social indicators**.

Economic and social measures of development

Gross National Income (GNI) per head/capita

GNI includes the value of goods and services in an area and also income from investments overseas. GNI per head is GNI divided by the number of people in the area.

Infant mortality rate

Average number of deaths of children under 1 year old per 1000 live births in a year.

Birth and death rates

Births/deaths per 1000 people in a year.

People per doctor

The number of people in a place divided by the number of doctors.

Life expectancy

The average number of years a person might be expected to live.

Human Development Index (HDI) (See page 106.)

An index created using GDP (Gross Domestic Product) per capita, life expectancy and adult literacy/years in school.

Access to safe water

% of people who can access enough clean water.

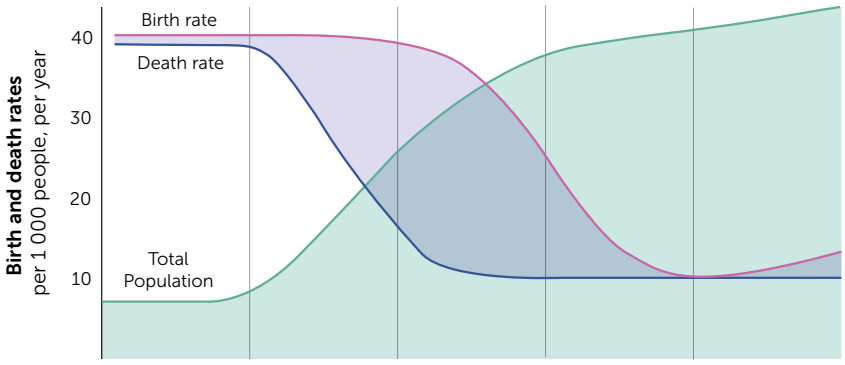
Literacy rate

Adults able to read and write.

Limitations of economic and social measures

Using only one indicator gives a limited view of development in a place. Using a range of social and economic indicators, or an index such as the **HDI**, gives a fuller picture. However, there are still limitations as indicators are averages for an area, so they cover up differences between different places within the area or different groups of people. Some people also criticise the focus on economic growth as this may harm the environment.

The Demographic Transition Model (DTM) and development



	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5
Birth rate	High	High	Falling	Low	Rising again
Death rate	High	Falls rapidly	Falls more slowly	Low	Low
Natural increase	Stable increase	Very rapid increase	Increase slows	Falling then stable	Stable increase
Population pyramid					

The DTM shows how population changes as a place moves through different stages of development. It shows how **birth and death rates** change and resulting changes in the **natural increase**.

Look at the diagram showing the DTM on this page. Describe how natural increase changes as a country becomes more developed. [3]

At Stage 1 a country is at a low level of development and the population isn't increasing.[1] *As it moves into Stages 2 to 4 there is a large difference between the birth rate and death rate so there is rapid natural increase.*[1] *By Stage 5, the country is highly developed, and the natural increase stabilises.*[1]

RWANDA

An example of how the growth of tourism helps to reduce the development gap in a LIC

Rwanda has four national parks, six volcanoes, 23 lakes and several rare species including mountain gorillas to attract tourists. In the last decade, it has marketed itself as a place to hold conferences and events.

Tourism in Rwanda

Tourism contributed 15.1% to Rwanda's **Gross Domestic Product (GDP)** in 2019, a large increase from 4.7% in 2000. Tourism **revenues** totalled $498 million in 2019, with over 1.63 million visitors coming to the country. 90 000 jobs have been created by tourism (13% of employment in the country).

Rwanda has built a world class conference centre in Kigali and successfully attracted **TNCs** including Marriott, Radisson and Sheraton to build hotels there. The visa process has been moved online making it easier for tourists to apply to visit and the national airline, RwandAir, saw rapid growth.

Tourism has helped reduce the development gap in Rwanda by encouraging **investment**, providing employment and increasing the GDP. It can cause a **multiplier effect** i.e. by wages from tourism being spent in other businesses and by local businesses supplying goods to TNCs.

Rwanda was forced to close its borders to passenger flights on March 20th 2020 because of the COVID 19 pandemic, which had a massive impact on the tourist industry.

CASE STUDY NIGERIA

Rapid economic development of a NEE

Some LICs and NEEs are experiencing rapid economic development which leads to significant social, environmental and cultural change.

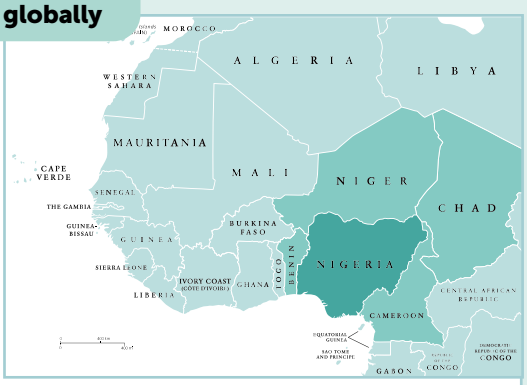
See **page 86** for examples of how aspects of Nigerian culture such as Nollywood have spread around the world.

Location and importance of Nigeria, regionally and globally

Nigeria is a NEE, located in West Africa and bordered by Niger, Chad, Cameroon and Benin. Its coastline is on the Atlantic Ocean.

The country is important in West Africa as it is the largest economy and often takes leadership roles, for example in forming the African Union.

Nigeria is important globally through its role in world trade, and in 2021 Nigerian economist Ngozi Okonjo-Iweala became the first woman and the first African to lead the World Trade Organisation.



The Nigerian diaspora (spread of people) is also important globally, with 1.24 million Nigerians living in other countries.

The main areas of Nigeria

250 minority groups make up a third of Nigeria's population, each with their own languages and traditions.

North

Mainly **Hausa-Fulani** people live in this area and are Muslim. There is **desert** in the north and **grassland** in the south. About half of Nigeria's population live here.

South West

Yoruba people live in this area. It is the most developed area, including Lagos. It is hot and wet with **forests**.

South East

Igbo people come from this area, but many have migrated as it has few resources. This area is hot, wet and **forested**.

GAS

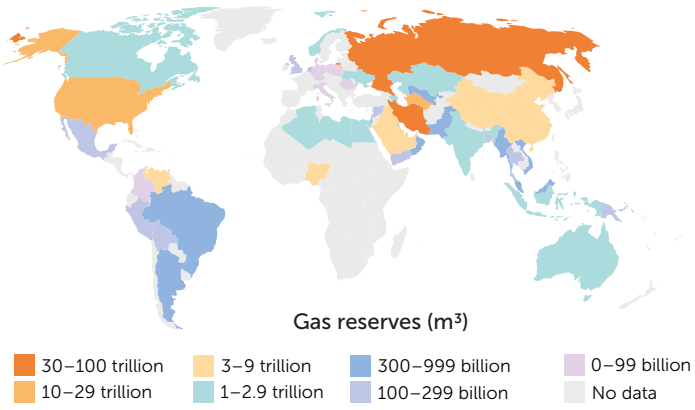
An example of fossil fuel extraction

Natural gas forms from the remains of plants and animals buried in ocean sediments over millions of years. Extreme heat and pressure break the organic compounds down into hydrocarbons, releasing methane in the process. Gas is then extracted from these reservoirs, typically found deep underground.

Global reserves of natural gas

Reserves of natural gas are found all over the world, with the majority of remaining reserves found in Russia, Iran and Qatar. Supplies are expected to last until at least 2060, or longer if new reserves are found.

Shale gas is the newest form of gas to be extracted. The largest reserves are believed to be in China, Argentina and Algeria.



Advantages of extracting natural gas

There are several advantages of using gas over other fossil fuels:

- Natural gas is the cleanest fossil fuel, producing less CO_2 than oil and coal.
- Natural gas is more easily transported and stored than other fossil fuels.
- Natural gas is often seen as safe energy.

Disadvantages of extracting natural gas

Large reserves of natural gas are located in countries that are politically unstable.

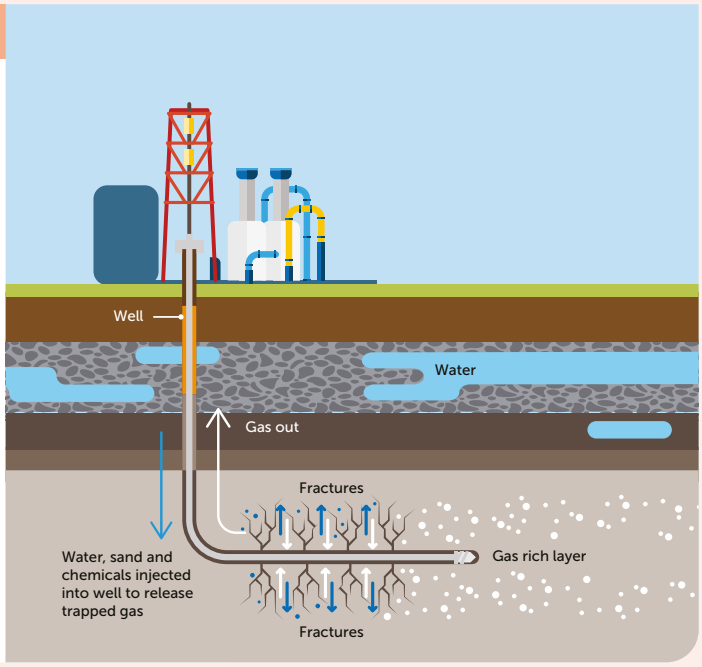
Despite being the cleanest form of fossil fuel, it still causes pollution through CO_2 and methane emissions.

Fracking is a highly controversial form of gas extraction due to environmental concerns, such as water contamination and earthquakes.

Extracting shale gas in the UK

Shale gas is extracted from shale rocks using a water, chemical and aggregates solution that is pumped under pressure into the rocks. This helps open cracks in the rock so the gas can be pumped out. This process is known as hydraulic fracturing, more commonly known as fracking.

In the UK, shale gas exploitation has been proposed for many years, however there is currently no commercial shale gas drilling due to a moratorium from the government. This is because of environmental concerns such as groundwater pollution, use of protected landscapes and small magnitude earthquakes.



The first shale gas plant in the UK opened in the Bowland Basin in Lancashire. It was drilled briefly, however some small magnitude earthquake events led to a pause to the drilling.

1. Which **one** of the following statements describes an economic cost of natural gas extraction? [1]

   A: Carbon capture technology can be used to offset the pollution.

   B: Gas reserves being found in politically unstable areas.

   C: Increase of jobs in an area with natural gas reserves.

   D: Infrastructure associated with extracting natural gas is expensive.

2. 'Extraction of fossil fuels can bring both advantages and disadvantages.'

   Explain this statement using an example you have studied. [6]

1. D. [1]

2. Name of fossil fuel: Natural gas.

Natural gas can be extracted from the ground through the use of hydraulic fracturing. This method can have advantages economically and environmentally, but it can also have economic and environmental disadvantages. Some of the advantages are that natural gas will provide a wide range of jobs in areas which produce natural gas. This is because many specialist skills are needed in the extraction of these gases, and this can also have a positive economic multiplier effect within an area with other jobs being created to support the new industry. Another advantage is that natural gas is the cleanest fossil fuel and is far better than coal and oil because its CO_2 emissions are lower. However, there are also quite a few disadvantages, economically it is extremely expensive to develop gas extraction facilities. The costs also increase when additional infrastructure is needed to be built to accommodate the industrial development. Environmentally, gas extraction is still fundamentally unsatisfactory, as it contributes towards human enhanced climate change. There is also the risk of pollution to local populations such as groundwater pollution from chemicals used in the process. *See mark bands provided on page 179.*

TOPICS FOR PAPER 3

Geographical applications

Information about Paper 3

This examination is synoptic – this means that you need to show knowledge, understanding and skills from across the full GCSE course. You will be able to show how well you understand how different areas of geography interrelate.

Written exam: 1 hour 30 minutes
88 marks (including 6 marks for spelling, punctuation, grammar and specialist terminology (SPaG)

Pre-release resources are made available 12 weeks before the exam

30% of qualification grade

Section A: All questions are mandatory (37 marks)

Section B: All questions are mandatory (39 marks)

Specification coverage

Issue evaluation, fieldwork and geographical skills.

Questions

A mix of multiple-choice, short answer and extended-writing questions assessing the application of knowledge, understanding and skills in contextual scenarios.

SECTION A: ISSUE EVALUATION

The first section of Paper 3 is an Issue Evaluation. A pre-release booklet is made available 12 weeks before the examination so that you can prepare for this element. You will be expected to show off your geographical skills and also apply your knowledge.

Pre-release information

A pre-release booklet will include a set of resources focusing on one issue. This issue could be related to:

- The challenge of natural hazards
- The living world
- Urban issues and challenges
- The changing economic world
- The challenge of resource management (core topic only)

! Note

The issue will be synoptic, meaning that you may have to draw on your understanding of several topics. You may also be given resources which are about places you haven't studied (unseen contexts).

When your teacher gives you the resource booklet, you should take time to read it through and think carefully about the issue concerned. You can write notes on the booklet – you will not be able to take this into the exam, but you will be given a new booklet along with the exam paper. The booklet could include:

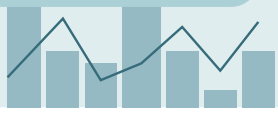
Maps

Statistics

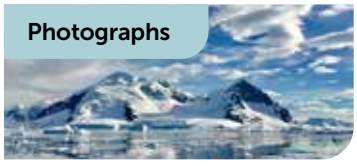
.37 25.5
3.43 43.25 102.4
1.52 13.43 123.4

Satellite images

Diagrams and graphs



Photographs



Sketches

Extracts from articles or books

Quotes from interest groups

SECTION B: FIELDWORK

The fieldwork enquiry process

What could you be asked about?

Choosing a geographical question

- What needs to be considered when choosing a question.
- The theory/concept behind the enquiry.
- Where the fieldwork is being carried out (location).
- Sources of primary and secondary evidence.
- What risks may be involved in the fieldwork and how these can be minimised.

Selecting, measuring and recording data

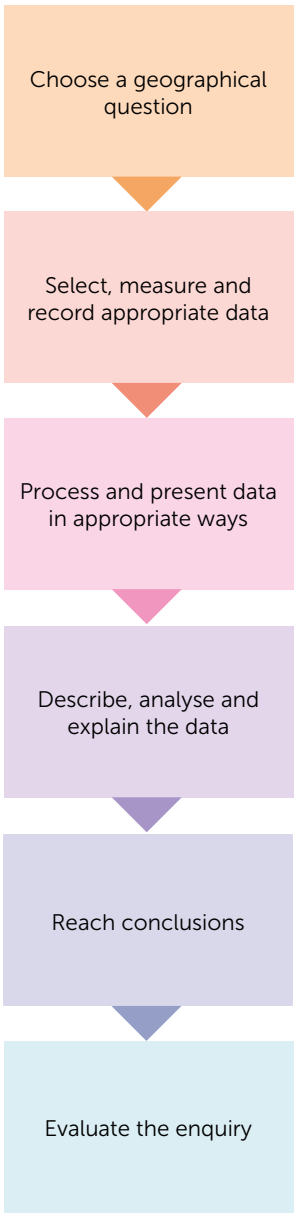
- The difference between primary and secondary data.
- How appropriate data has been identified and selected.
- How data has been measured and recorded using different sampling methods.
- Why certain data collection methods have been used.

Processing and presenting data

- A range of visual, graphical and mapping (cartographic) methods used to present data.
- How to select and accurately use appropriate presentation methods.
- Questions often ask you to complete a graph or map using data provided.

Describing, analysing and explaining data

- Describe, analyse or explain findings.
- Make links between sets of data.
- Use statistical techniques (such as mean, median, mode and range).
- Identify anomalies in data (odd ones out).



GEOGRAPHICAL SKILLS

Use this checklist to make sure you know the geographical skills you are expected to have.

Cartographic (map) skills

✓ **Atlas maps**

Including coordinates, distribution and patterns of features, different scales, interrelationships between human and physical factors.

☐ **Ordnance Survey maps**

Including different scales, coordinates, distance and direction, gradient, contours and spot heights, landscape and relief features, cross-sections and transects.

☐ **Maps used alongside photographs**

Including comparing maps, sketch maps, interpreting photographs, describing landscapes, labelling and annotating diagrams, maps, graphs, sketches and photos.

Examples

Distribution of plate margins **p4**

Biome map **p29**

OS map showing River Tees **p69**

OS maps showing the edge of Bristol **p125**

Interpreting photos **p10**

Topographical map of the UK **p52**

Graphical skills

☐ **Choose and draw appropriate graphs and charts to present data**

Line charts, bar charts, pie charts, pictograms, histograms with equal class intervals, divided bar, scattergraphs and population pyramids. Suggest which type of graph would be appropriate for data provided.

☐ **Interpret and take information from...**

...maps, graphs and charts including population pyramids, choropleth maps, flow-line maps and dispersion graphs

☐ **Complete graphs and maps...**

...choropleth, isoline, dot maps, desire lines, proportional symbols and flow lines.

Examples

Line graph **p20**

Bar graph **p22**

Climate graph **p31**

Hydrograph **p71**

Population pyramids **p105**

Choropleth maps **p127**

Contour lines on OS map **p69**

Interpreting information from a graph **p102**

☐ **Use and understand isoline maps**

e.g. contour lines – gradient, contour and value.

☐ **Plot information on graphs**

Where the axes and scales have been provided.

☐ **Suggest which type of graph would be appropriate for data provided.**

EXAMINATION PRACTICE

Paper 1 Section A

1. Primary responses happen in the immediate aftermath of an event, whereas secondary responses happen in the weeks, months or years after an event. [1]

2. D. Warm moist air. [1]

3. Answers in order: state (1), winds (1), air (1). [3]

4. Earthquakes. [1]

5. Indicative content: Discussion around the difference between immediate and secondary impacts. Primary: Buildings collapse (E), infrastructure destroyed (E&V), people killed (Y). Secondary impacts: Tsunami (Y), disease spread (Y), economic decline (Y). This list is not exhaustive. Award credit for other reasonable responses.

   This question should be marked in accordance with the levels-based mark scheme on page 179. Max level 2 if a named example isn't used.

   Example of an answer scoring 9 marks:

   Immediate impacts of a tectonic hazard, such as earthquakes and volcanoes, would happen during or in the immediate aftermath of an event. Examples of immediate impacts will be deaths and damage to roads or infrastructure. In Nepal 2015, immediate impacts included over 9,000 deaths due to the earthquake event, and significant damage to the large parts of Nepal including the capital city Kathmandu.

   Secondary impacts will happen in the days, weeks, months and years after an event has taken place. Examples of secondary impacts could be economic decline and the spread of disease. The Chile earthquake in 2010 had secondary impacts such as large landslides which blocked access to remote regions impacted by the earthquake, as well as a tsunami that devastated some coastal towns.

   Overall, I somewhat agree with the statement. The immediate impacts are often more devastating and destructive, however it depends on the circumstances of the event. For example a tsunami may be more devastating in an area compared to the earthquake. [9]

6. Weather that is different from the norm. (1) / Weather that can threaten/damage to lives or livelihoods. (1) [1]

7. Credit any extreme weather case study, e.g., Somerset Levels Flooding (2014), Storm Eunice (2022). [1]

8. The UK climate can be impacted by several different air masses, each of these air masses brings a different dominating weather type (1). An example of this is the tropical continental air mass which brings hot dry weather in the summer (1). [2]

9. There is lots of evidence suggesting that UK weather systems are going to become more extreme due to human enhanced climate change, in the UK we can expect heatwaves to become more intense and last longer. (1) This can cause damage to infrastructure, as well as cause deaths to the most vulnerable in society. (1) Another way in which the UK's weather is going to become more extreme is storms and flooding events. (1) These are much more likely to occur, and become more damaging when they do occur, in some areas flood risk has increase upwards of 20%. (1) [4]

10. ***Indicative content*:** Social impacts can be anything related to how people have been impacted, such as evacuations, houses flooded, injuries, and deaths. Marks awarded for stating a social impact and then developing the point. Environmental impacts can be anything related to the natural world, such as, pollution, and damaged or destroyed habitats.

    Named examples are any relevant UK weather event, examples include the Somerset Levels Floods (2014) or the Beast from the East Storm (2016). No credit given for economic answers, unless related to a social impact or environmental impact.

    This question should be marked in accordance with the levels-based mark scheme on page 178.

    Max level 2 if only one social or environmental example is used. Max level 2 if no named example is used.

    Example of an answer scoring 6 marks:

    Extreme weather is any weather that is different from the norm, but can also pose a serious threat to human livelihood. Social impacts are related to how people have been affected by an extreme weather event, and environmental impacts are related to how the natural world has been impacted. The Somerset Levels flood of 2014 had several social and environmental impacts. The social impacts included houses being flooded, which impacted hundreds of people as it meant they couldn't stay in their houses for an extended period of time, and also meant their homes were significantly damaged. An environmental impact of the 2014 Somerset Level floods was that significant areas were left polluted once the flood waters drained away as sewage and chemicals had leached into the flood waters. This requires a lot of cleaning and could have had a major impact on the wildlife in the area. [6]

11. Naming and explaining one of three natural causes of climate change: Orbital variations (1) – Milankovitch cycles (eccentricity, axial tilt, and precession) cause the distance between Earth's closest and farthest approach around the sun to increase (warming the Earth) or decrease (cooling). This impacts global climate. (1)

LEVELS BASED MARK SCHEME FOR EXTENDED RESPONSE QUESTIONS

Questions that require extended writing use mark bands. The whole answer will be marked together to determine which mark band it fits into and which mark should be awarded within the mark band.

4 mark Questions:

Mark Band 2 **Mid Level** **3–4 marks**	• AO1 – Demonstrates accurate knowledge of the geographical topic concerned. • AO2 – Shows a clear understanding of the issue. Explanations are developed.
Mark Band 1 **Low Level** **1–2 marks**	• AO1 – Demonstrates limited knowledge of the geographical topic concerned. • AO2 – Demonstrates limited understanding of the issue. Explanations are partial.
0 marks	• No answer has been given or the answer given is not worth any marks.

6 mark Questions – Assessment objectives assessed will depend upon the question asked:

Mark Band 3 **High Level** **5–6 marks**	• AO2 – Shows thorough understanding of relevant processes or concepts. • AO3 – Demonstrates coherent application of knowledge and understanding in analysis. • AO4 – Relevant reference made to information shown in given figures.
Mark Band 2 **Mid Level** **3–4 marks**	• AO2 – Shows some understanding of relevant processes or concepts. • AO3 – Demonstrates reasonable application of knowledge and understanding in analysis. • AO4 – Some reference made to information shown in any figures present.
Mark Band 1 **Low Level** **1–2 marks**	• AO2 – Shows limited understanding of relevant processes or concepts. • AO3 – Demonstrates limited application of knowledge and understanding in analysis. • AO4 – Limited or partial reference made to information shown.
0 marks	• No answer has been given or the answer given is not worth any marks.

The above descriptors have been written in simple language to give an indication of the expectations of each mark band. See the AQA website for the official mark schemes used.

9 mark Questions:

Mark Band 3 **High Level** **7–9 marks**	• AO1 – Demonstrates detailed knowledge with good use of exemplification • AO2 – Shows thorough geographical understanding of places, environments and processes • AO3 – Demonstrates application of knowledge and understanding in a reasoned way when evaluating, using source (if present) and example.
Mark Band 2 **Mid Level** **4–6 marks**	• AO1 – Demonstrates clear knowledge with some use of exemplification • AO2 – Shows some understanding of places, environments and processes • AO3 – Demonstrates reasonable application of knowledge and understanding when evaluating, using source (if present) and/or example.
Mark Band 1 **Low Level** **1–3 marks**	• AO1 – Demonstrates limited knowledge with little or no exemplification • AO2 – Shows slight understanding of places, environments and processes • AO3 – Demonstrates limited application of knowledge and understanding when evaluating, using source (if present) and/or example (if required).
0 marks	• No answer has been given or the answer given is not worth any marks.

COMMAND WORDS

Command word	What you need to do
Assess	Make an informed judgement.
Calculate	Work out the value of something.
Compare	Identify similarities and differences.
Complete	Finish the task by adding given information.
Describe	Set out characteristics.
Discuss	Present key points about different ideas or strengths and weaknesses of an idea.
Evaluate	Judge from available evidence, weighing up both sides of an argument.
Explain	Set out purposes or reasons.
Give	Produce an answer from recall.
Identify	Name or otherwise characterise.
Justify	Support a case with evidence.
Outline	Set out main characteristics.
State	Express in clear terms.
Suggest	Present a possible case.
To what extent	Judge the importance or success of (strategy, scheme, project).
Use evidence to support this statement	Select and present information to prove or disprove something.

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EXAMINATION TIPS

When you practise examination questions, work out your approximate grade using the following table. This table has been produced using a rounded average of past examination series for this GCSE.

Be aware that actual boundaries will vary by a few percentage points either side of those shown.

Grade	9	8	7	6	5	4	3	2	1
Boundary	72%	63%	57%	49%	42%	35%	26%	16%	7%

1. Make sure you know the command words that come up in this exam so that you can respond appropriately. See page 179.
2. Think about how much detail you need to include for different types of question. Use chains of reasoning to develop your statements for questions that ask you to explain or evaluate. Use linking terms such as 'as a consequence…', 'because…' and 'this means that…".
3. If a source is provided for a question, you are expected to use it. This demonstrates your ability to extract information.
4. If the question says to use a source 'and your own understanding' you need to use the figure provided and support the answer with your own knowledge. You could use an example.
5. Write answers to 6 and 9 mark questions using paragraphs and end them with a clear conclusion. To reach level 3, you will need to answer in detail, supporting your answer with information from any figures and from your examples or case studies.
6. Make sure you know what all the words in the specification mean – it is a good idea to make a list of key terms and their definitions.
7. Questions about formation of landforms require knowledge of specific processes and the sequence of formation. Take care to use the correct geographical terminology.
8. Read questions carefully and do as they ask. You could BUG the question – **B**ox the command word, **U**nderline the key words and then **G**lance over the whole question to check you have understood it.
9. Remember that 10% of the marks in GCSE geography come from mathematical skills. Check that you can use all of the skills listed in the skills checklist on page 168.
10. Check for gaps in your vocabulary and knowledge. You can't access all the marks unless you are secure in your knowledge of terms and concepts. Use regular self-quizzing to find and then fill gaps.

Good luck!

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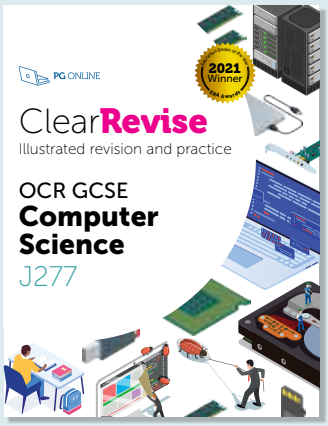

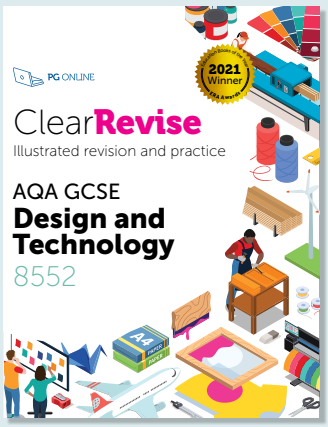

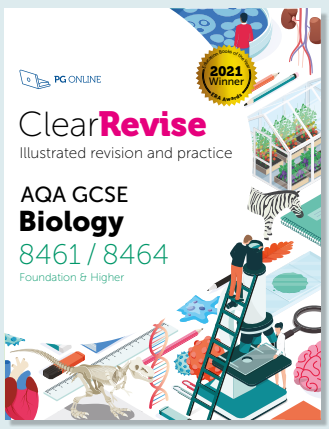

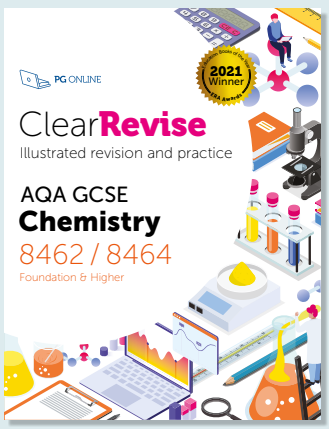

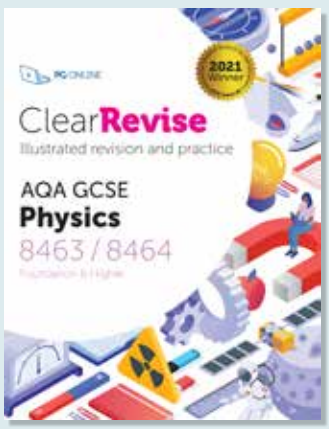

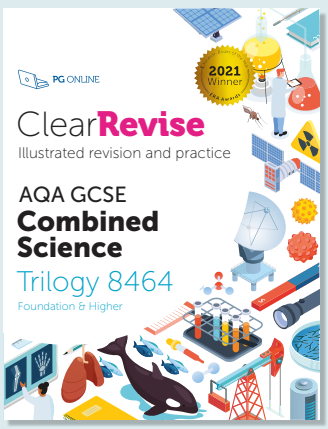

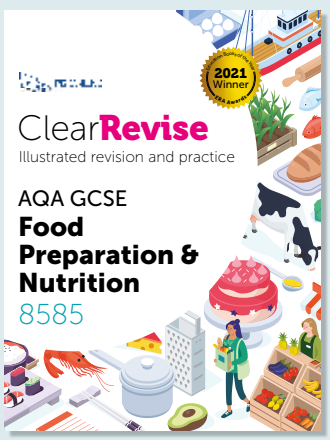

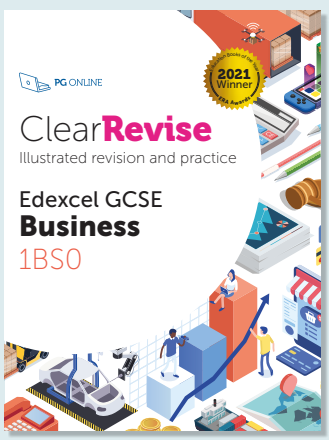

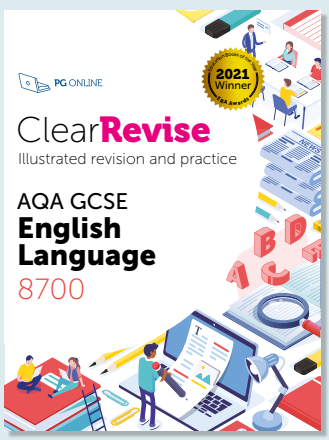

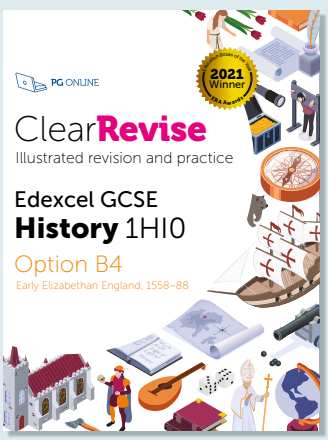

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