

WJEC GCSE

GEOGRAPHY

Answers

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MADE FOR
WALES



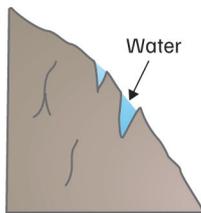
Unit 1

Chapter 1.1 Drainage basin and rivers

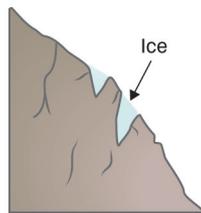
Now try this (p 9)

1. Weathering can occur in any part of the drainage basin where rock is exposed or can be affected by the weather, plants or animals. Examples: on the valley sides, parts of the river channel that are not underwater, etc.

2.



By day, water collects in cracks in the rock



At night, water freezes and expands



Repeated freeze-thaw action causes the rock to shatter. It falls to the bottom of the slope as scree

3. Attrition is the only type of river erosion that does not erode the bed or banks of the river. Attrition only erodes the bedload itself.
4. Any two from the following:
 - When there is less water in the river channel. This leads to a reduction in energy so the water is unable to carry the load and deposition happens.
 - When the river is near the mouth of the river channel. The meeting of the sea and the river disrupts the river flow and therefore causes deposition.
 - When there is slow flow on the inside of a meander.

Now try this (p 13)

1. Freeze-thaw weathering, biological weathering and chemical weathering all break down the exposed rocks on the valley sides, which widens the valley sides and creates the V shape.
2. A gorge forms when a waterfall retreats. When the overhang of the waterfall collapses, the position of the waterfall retreats upstream. As a result, steep or vertical sides are left behind as they have not been eroded by weathering. This forms a gorge.
3. As a river flows over an area of hard rock onto a band of soft rock, it begins to erode the river bed at different rates. Processes such as hydraulic action, abrasion and solution will cause vertical erosion of the river bed and lead to a 'drop' in the river. This process continues until a waterfall is formed. Water falls over the hard rock onto the river bed below, and some of the water will splash back onto the soft rock underlying the hard rock. This causes the soft rock to erode (by hydraulic action). Chemical weathering processes may also erode this area causing it to further undercut the band of hard rock. This creates an overhang.

4. A plunge pool is a pool of water at the base of a waterfall. It is created by the hydraulic action of water falling from the overhang. The plunge pool is eroded further by abrasion due to rocks that have fallen from the overhang. As more water falls on the rocks, they move and erode the river bed further, deepening the plunge pool.

Now try this (p 15)

1. A meander is a bend in the river in its middle or lower course. An oxbow lake is a horseshoe-shaped lake which forms from a meander being cut off from the main river channel.
2. Erosional processes happen on the outside bank of the meander where the water flows fastest and widens the channel sideways. Depositional processes happen on the inside of the meander where the water flows slower and moves the inside bank inwards.
3. The erosion happening on the outside of the bend and depositional processes happening on the inside of the bend causes the channel to move. The end result is that the river channel remains roughly the same width but has moved outwards and slightly downstream. The river channel moves in the direction of flow that the water is hitting the outside bend.
4. Floodplains are unable to form in the upper course of a river as the valley floor is very narrow and the river channel will take up the whole area. Therefore there is very little room for the river to overflow its banks and flood which contributes to floodplain formation.

Now try this (p 17)

1. Floodplains are areas of flat land either side of a river in the river's middle and lower course. Floodplains are where the river naturally floods. If houses are built on a floodplain, there is a high chance that they will be flooded at some stage in the future. Expensive flood defences will need to be put in place to protect the houses which may or may not work, depending on the size of the flood. Therefore building houses on floodplains is not sustainable due to the extra cost and constant threat of a flood event.
2. There are many methods of making the building of houses on floodplains more sustainable.
 - Embankments will raise the height of the river banks and therefore increase the capacity of the river channel. This will reduce the risk of flooding to the houses. However they will need continual maintenance which reduces their sustainability.
 - Keeping the original hedgerows reduces the impact of habitat loss and increases sustainability.
 - The building methods and the provision of flood defences will greatly influence how sustainable the building of houses on floodplains will be. For example, the use of heavy machinery compacts the soil, reducing soil capacity and increasing the risk of flooding. Therefore even the surfaces of the housing estate that are not covered in concrete/tarmac are resistant to infiltration. This will reduce sustainability.

Now try this (p 19)

1. Floodplains are naturally fertile areas of land and therefore do not need artificial fertilisers which contribute to global warming and river eutrophication. Using naturally fertile land increases the sustainability of farming. Some farmers will still use artificial fertilisers, reducing sustainability. As floodplains flood regularly, farming this land also runs the risk of losing the harvest to flood waters (which is not sustainable).

2. The flood management scheme that I have studied is the Afon Arran in Dolgellau. The river management strategy that has been carried out to reduce flooding in this area is to build new river defences that are set back from the river. This included building bank walls in the town centre and walls that would help prevent flooding of the Arran road. A negative of the scheme was that 160 trees needed to be removed in order for the works to take place. This reduced the soft engineering effect of tree absorption of water in the drainage basin and would have further implications on climate change. However, the hard engineering strategies that have been put in place have been effective in reducing the flood risk to residents in the town. The project also worked closely with local schools to increase the children's understanding of flood risks and what influences them. This improved community engagement with the project. Overall, I believe that the management of Afon Arran has been successful.

Chapter 1.2 Changing coastlines

Now try this (p 21)

1. B
2. B
3. Longshore drift transports sediment along a coastline at an angle (45°). This is called swash and follows the direction of the prevailing wind. Gravity will pull waves back down the beach at a 90° angle (this is backwash). This swash and backwash continues in a zigzag manner moving sediment along the coast.

Now try this (p 22)

1. B

Now try this (p 26)

1. 8106 beach
8507 beach
2. 8405 headland
8506 headland
8106 bay
8406 bay
3. Contour lines are close together indicating a steep gradient.
4. Some of the Pembrokeshire Coast is considered a discordant coastline. It is made up of sedimentary rocks which are generally less resistant to erosion than harder rocks. This leads to greater rates of erosion creating headlands and bays.
5. Headland will continue to erode leading to a weakening of the rock underneath and the eventual isolation of the archway into a stack. Over time this stack will erode into a stump.

Now try this (p 29)

1. There are a range of factors that affect the coastline – these could be physical or human. Rock type can affect rates of erosion as some rocks (such as chalk) are more easily eroded than others, which can lead to the formation of rugged coastline headlands and cliffs. Tourists can affect the coastline by overcrowding areas such as the beach and leaving litter which could kill wildlife.

Disposal of waste, such as oil from boats, has a serious impact on the coastline. Deforestation of vegetation around the coastline can leave the area at risk of coastal flooding. This has a serious impact on the coastline as vegetation absorbs water from rising sea levels. Finally, eustatic change can affect the coast. When ice melts due to warmer temperatures, additional water is added to the sea causing sea levels to rise. This can have a serious impact on the coast if flooding occurs.

Chapter 1.3 Migration

Now try this (p 39)

1. Regular migration is when people enter a country through regular border checkpoints, whereas irregular migration is when people do not enter a country via the usual border control points, or they enter without the appropriate documentation.
2. Afghanistan is often a source country for many migrants to European countries and there are a variety of push factors that cause people to leave. In recent years, political factors have become more of a feature due to the Taliban taking over the country. The harsh laws that this regime brought to the country (such as severely restricting the movement of women and fear of persecution if you disagree) have been a major push factor. Afghanistan has always had difficult environmental conditions which might encourage people to migrate away from the country. The climatic conditions Afghanistan experiences can include long periods of drought and high temperatures, leading to desertification which makes land management difficult. These difficulties have increased in recent years due to global warming. Afghanistan is also a country of extreme poverty with no formal financial support from the government for families who are struggling. Therefore economic push factors are also experienced by the citizens.

Overall, the large increase in migrants leaving the country in recent years has most likely been due to political factors as this has been the biggest change in push factors and puts people in fear for their lives and their family's lives.

3. The impacts of migration are often felt more in the host country than the source country due to the increased number of people that are now in their country. These migrants will put pressure on housing, education and health services. They may not be working when they initially arrive in the host country, meaning that they will need to be supported by the government. However, the host country can also feel benefits from the migrants moving to their country. They could bring much needed skills to the country (e.g. medical skills to the UK) which will benefit the country's growth. They might also bring new cultures and foods to the country which increases cultural richness. For example, migrants from the Caribbean brought elements of their culture to the UK which has led to the Notting Hill Carnival in London every year. The carnival displays a visual spectacle and party atmosphere to the capital city.

Chapter 1.4 Settlement change

Now try this (p 46)

1. A

Now try this (p 48)

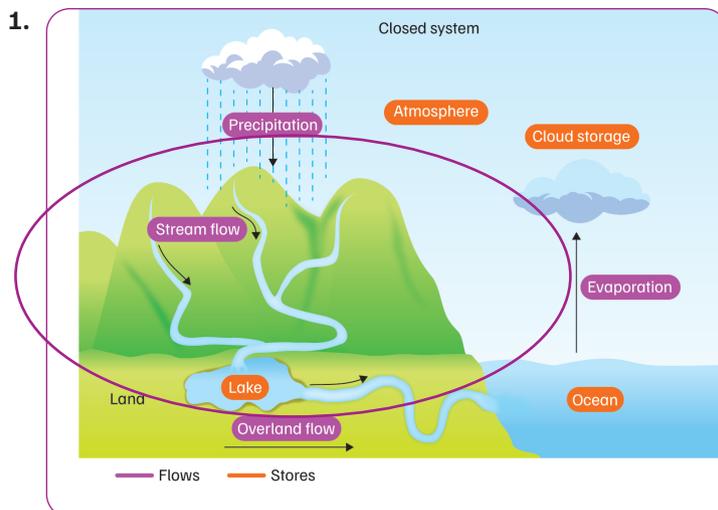
- Mumbai and New York City are examples of contrasting cities. Socially, Mumbai is very overcrowded with a population of over 21 million people. New York City has a smaller population of approximately 8.4 million people.
 - Mumbai is culturally and linguistically diverse within the Indian context, but less so in terms of global diversity. New York City is more internationally and ethnically diverse.
 - Both New York City and Mumbai are economic power houses with global trading centres on Wall Street and in Mumbai. New York is a thriving tourist hot spot, generating \$137 million in 2023.
 - Mumbai is home to a growing manufacturing industry, as well as Bollywood which produces films and creates jobs.
 - Both cities are culture capitals of the world with Broadway and Bollywood.
 - Environmentally, Mumbai faces severe air pollution which has a negative impact on health. New York City has significantly less air pollution than Mumbai.

Now try this (p 49)

- In my opinion, I think London is partially sustainable. Economically, it is the hub of thriving activity with Silicon Roundabout and the potential expansion of airport runways in and around London. It also is partially sustainable due to the infrastructure links with Europe via St Pancras. The proposed investment by the Chancellor into the network railway system will bring in much needed businesses and improves connectivity with other areas of the UK. London is economically sustainable due to its strong links with the stock exchange and businesses in and around Canary Wharf. However, London has high pollution levels due to previous industrialisation, making the city less sustainable. Ultra Low Emission Zone (ULEZ) was introduced to reduce car traffic and pollution. London also has a net zero target by 2050 which could have a significant impact on reducing environmental degradation. To conclude, London is partially sustainable.

Revision round up

Rivers



2. **Rainfall** – periods of heavy rainfall will increase the amount of water in the drainage basin.
Evaporation rates – in periods of hotter weather the evaporation rates will rise, reducing the amount of water in the drainage basin.
Extreme cold temperatures – in very cold weather, the amount of water in a drainage basin is reduced due to the increase in ice.

3. **Erosion**

- Solution – chemicals in the water reacting with chemicals in the soil/rock.
- Abrasion/cohesion – load of the river hitting the river channel.
- Hydraulic action – force of the water hitting the river channel.

Deposition

- Low rainfall/high evaporation rates – less water in channel.
- Near the mouth – river entering the sea slows the flow of water.
- Meanders – slow the flow of flow on the inside of the bend.

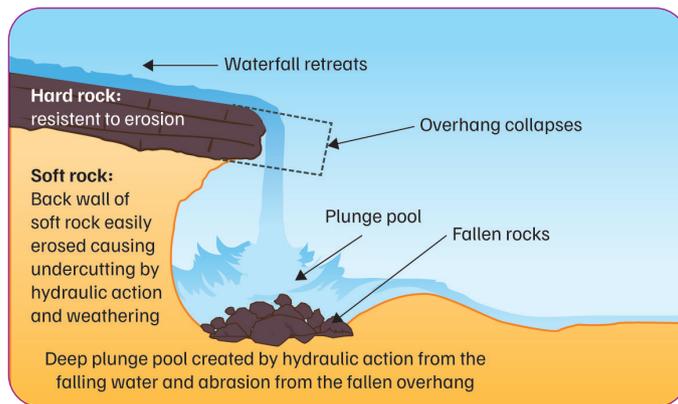
Transportation

- Suspension – carried by the water.
- Solution – dissolved into the water.
- Saltation – bouncing along the river bed.
- Traction – rolling on the river bed.

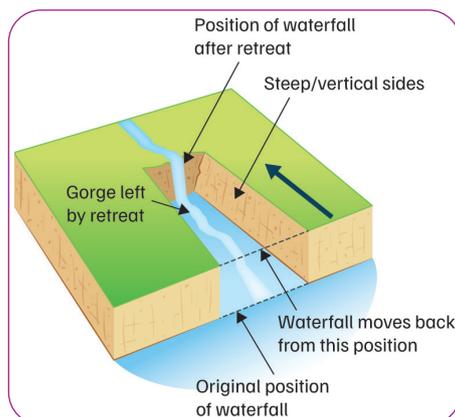
Weathering

- Freeze-thaw – repeated freeze and thaw.
- Chemical weathering – chemicals in rainwater reacting with chemicals in rocks.
- Biological weathering – plants or animals breaking up rocks.

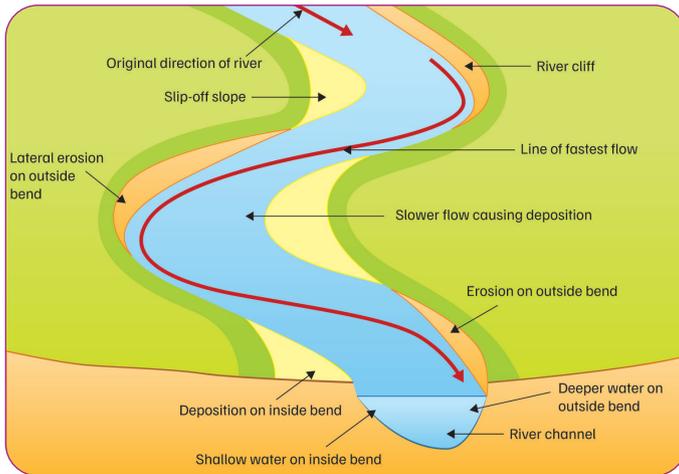
4. **Waterfall:** the river bed drops suddenly which causes the water to fall to a lower level. Waterfalls are erosional river landforms.



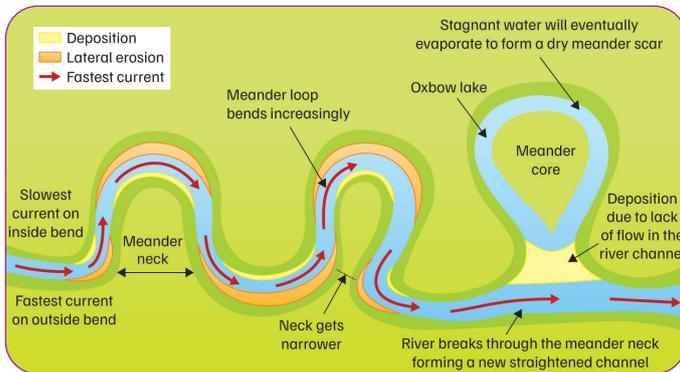
Gorge: a steep sided valley that is created by the retreat of a waterfall. A gorge is an erosional river landform.



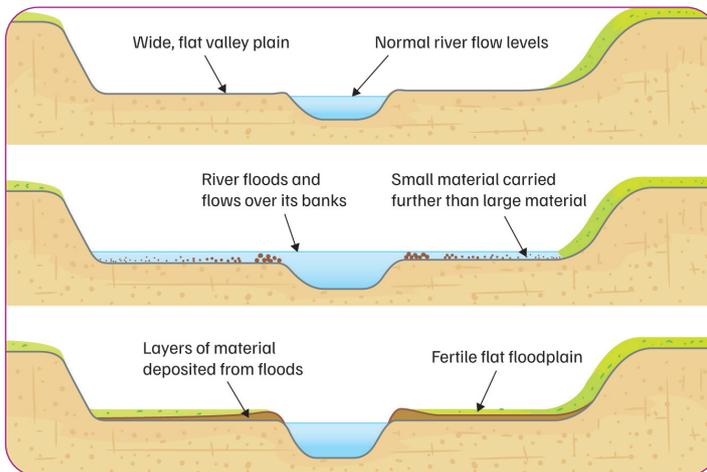
Meander: a bend in the river usually found in the river's middle and lower courses. They are formed by lateral erosion and deposition.



Oxbow lakes: crescent-shaped lakes that are found in the middle and lower courses of a river. They are formed due to meanders being cut off from the main river. Oxbow lakes are formed by erosion and deposition.



Floodplain: an area of flat land either side of the river. They are a depositional landform, created when the river floods.



5.

Use	Impact on people	Impact on the drainage basin
Farming	Provides food for population Increased crop yield due to fertile soil Water from the river can be used to irrigate crops Flooding can lead to a loss of crops	Some farming methods lead to soil degradation which increases the chance of flooding Farming can lead to habitat loss and reduced biodiversity
House building	Provides housing Flat land is easier to build on Flood risk – land is cheaper but home owners are under constant threat of flood Owners may have difficulty getting insurance	Hedgerows and habitats will be destroyed, reducing biodiversity Soil may become compacted due to use of heavy machinery
Power generation (HEP)	Renewable source of energy for homes – smaller impact on climate change	Disruption to habitats as turbines/dams are constructed River flow may be affected which will have impacts lower downstream
Tourism	Business opportunities due to tourists congregating in one area Naturally relaxing areas for people to be – good for mental health	Footpath erosion Cars parked on grass verges can damage the environment

6. **River:** River Neath

Location: South Wales

Source: southern area of the Bannau Brycheiniog National Park

Mouth: Swansea Bay between Swansea and Port Talbot

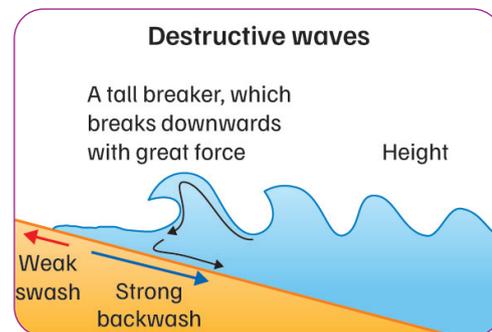
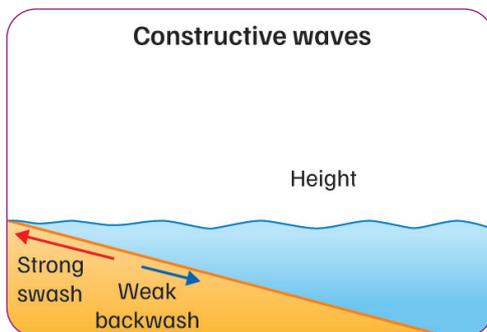
Erosion landforms: numerous waterfalls attract tourists, e.g. Sgwd yr Eira and Sgwd Gwladus

Depositional landforms: floodplains used for farming and provides a flat valley floor for the building of a major road (A465). Also has a number of meanders.

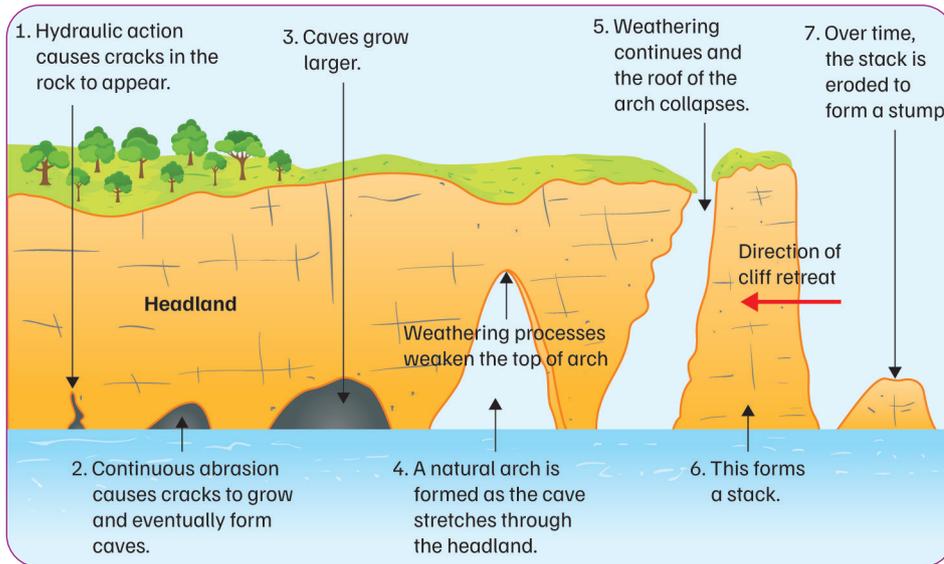
Impact on people: river provides recreational opportunities for people (hiking, fishing). Waterfalls attract tourists, creating more income for local businesses. The wide valley floor in the middle and lower course has enabled the building of settlements (e.g. Neath) and a main road connection between the Bannau Brycheiniog National Park and the M4 motorway.

Coasts

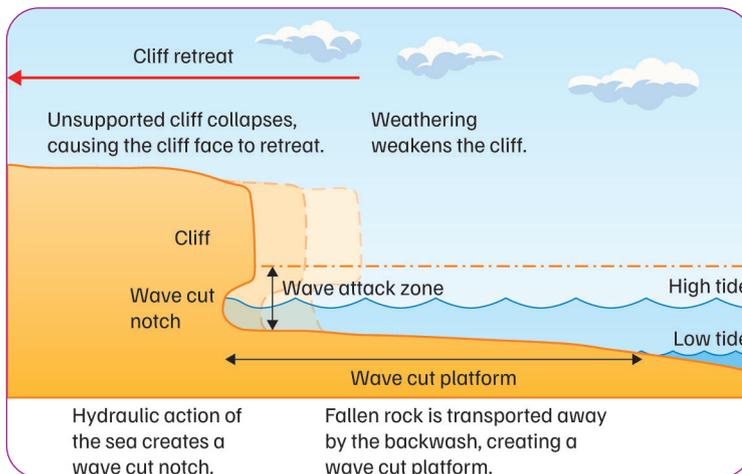
7.



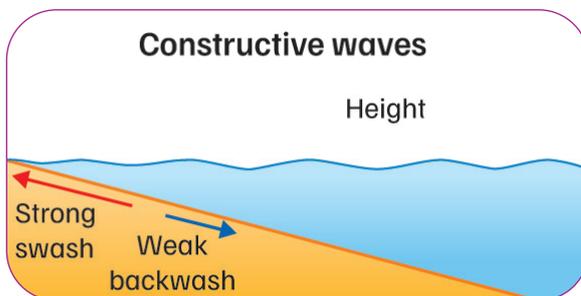
8. Cave to stump sequence – erosional sequence from a small crack in the headland rock to an arch, and then a stump. Caused by erosion and weathering.



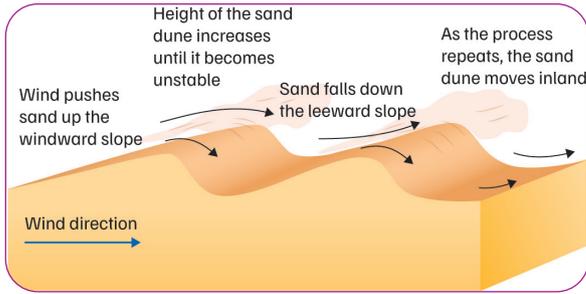
Wave-cut platform – a gently sloping or flat surface formed at the base of a cliff once the cliffs have been eroded.



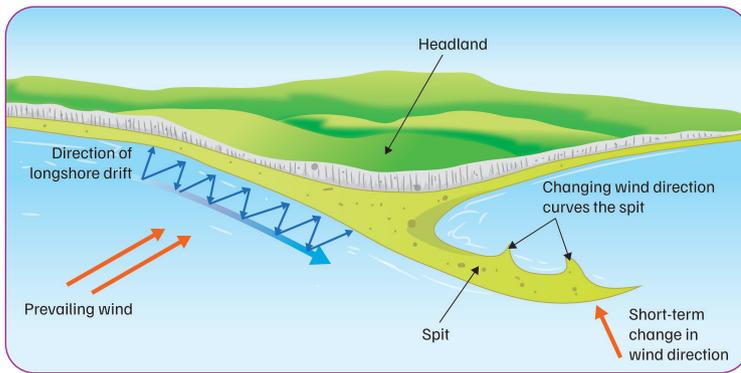
Beach – formed by constructive waves and longshore drift. Waves deposit material on the shore.



Sand dunes – accumulation of sand grains formed by aeolian (wind) processes.



Spit – formed when longshore drift deposits sediment in the sea after the coastline changes direction or at the mouth of a river.



9.

Physical factor	Resulting coastal change	Human Factor	Resulting coastal change
Climate	Climate change will cause sea level rise Small, low-level islands will disappear and other areas will flood Increased number and severity of storms will increase the strength and frequency of destructive waves causing more erosion	Settlement	Flood/erosion defences limit erosion of that area of coastline This could affect areas further down the coastline
Fetch	Longer fetch causes greater wind speed erosive power of waves	Industry	Pollution Coastline could be altered to create ports
Geology	Discordant coastline – rock layers run perpendicular to the coast leading to the formation of headlands and bays Concordant coastline – rocks run parallel to the coast leading to similar rate of erosion along the coastline	Agriculture	Farming on land next to the coast can weaken soil structure and increase surface run off
		Hard engineering	Sea walls, ripraps, etc. can reduce erosion or flooding on one area of coastline but increase erosional processes further down the coast
		Soft engineering	Beach and sand dune replenishment prevent the landforms naturally eroding

10. Coastline: Pembrokeshire coast

Location: southwest Wales

Erosion landforms: cave to stump sequence (Green Bridge)

Depositional landforms: beaches and sand dunes (Pendine Sands), spit (Giltar Spit)

Geology: discordant coastline creates headlands and bays

Human influence:

- Industry: Pembroke (oil) Refinery, Rhoscrowther, Pembrokeshire
- Settlement: Tenby, Pembroke Dock
- Farming: grazing land at Romley Marsh and Freshwater East

Migration

11.

Type of migration	Definition	Example
Forced	People forced to leave their homes	Natural disaster, war, persecution
Voluntary	People choose to leave their homes	To be near family, for a new job
International	People move from one country to another country	Moving from the UK to Switzerland
National	People move within one country	Moving from Pembroke Dock to Cardiff
Regular	Migrants enter a country through regular border checkpoints	Someone moving from Germany to the UK with permission to settle in the UK
Irregular	Migrants do not enter a country through regular border checkpoint or with correct documentation	Migrants crossing the channel in small boats to the UK

12. On host country

- Boost tax revenues
- Fill labour/skill shortages
- May keep wages low
- Greater pressure on services (education, healthcare)
- Unemployment may rise if skills do not match those needed in the host country

On source country

- Gain skills abroad that they can bring back to the source country
- Brain drain
- Remittances sent home increase standard of living in the source country
- Reduced unemployment

On the migrant

- Better job opportunities
- Miss family and friends
- Improved quality of life
- Possible trauma from a difficult journey

13.

Strategy	Positives	Negatives
Laws, e.g. The Illegal Migration Bill (UK)	Gives authorities the power to remove illegal migrants from the country	Deportation can take years to complete due to legal appeals
Points-based migration system	Ensures migrants have the skills the host country needs Migrants will contribute to the country	Does not have an impact on irregular migrants
Visa-free travel	The length of time and purpose of movement is known as the person enters the country	People could come to a country with a visa and then 'disappear' when the visa runs out

14. **Central business district** – characterised by tall buildings and service provisions such as banks and government buildings. It is also the commercial centre of the urban area where the major shopping malls are, and the social hub of the city with lots of cafes, bars and restaurants.

Residential areas – areas of housing or accommodation where people live. These could be detached houses, terraced houses, blocks of flats or informal housing.

Industrial areas – manufacturing industries in the UK used to be based just outside the CBD area so that the factory was close to where people lived. Today most industrial areas are found in industrial parks usually around the outskirts of a settlement. These might be large factories or small industrial units on a business park.

Recreational areas – parks, green areas, playing fields, etc.

15. **Global city – New York**

- Location: east coast of USA
- Urban plan: New York's main centre of commerce and business is found on Manhattan island together with its major tourist attractions. In Manhattan, the main residential areas are Upper East Side, Upper West Side, Chelsea and Midtown. In Brooklyn, the residential areas include Brooklyn Heights and Williamsburg. In Queens, the main residential areas are Jackson Heights and Astoria.
- Why a global city? Major centre of world trade, contains the UN Headquarters, major headquarters of many MNCs. One of the busiest airports in the world and has shipping links. Challenges: widespread poverty and persistent racial inequality, high levels of pollution

Global city – Mumbai

- Location: west coast of India
- Urban plan: many residential areas across the city with a mixture of informal and formal housing. Commercial and industrial areas are to the south of the city as so they are near the port facilities. Natural open spaces are mostly on the outskirts of the city.
- Why a global city? One of the top 10 trading centres in the world, 6% of Indian GDP comes from Mumbai. Well connected by ports for export.
- Challenges: overcrowding, large squatter settlements (Dharavi), lack of jobs in the formal sector, pollution, disease and poor sanitation.

Megacity – Cairo

- Location: eastern bank of the Nile River in northeast Egypt.
- Urban plan: In the 1970s Cairo introduced the New Urban Communities plan which aimed to decentralise the urban population away from the over-crowded centre. Today it has a range of communities on the outskirts of the city and is trying to develop a robust transport network to link these communities.

- Why a megacity? Population of 20 million people, significant influence on regional and global affairs. It is a major cultural, political, and economic hub in the Middle East and Africa. It has a large and diverse economy and a thriving cultural scene.
- Challenges: air pollution, water scarcity, waste management (in large informal housing areas)

16. Renewable energy – install solar panels on all new-build houses

Green public spaces – protect existing public green spaces in cities from development (Central Park in New York)

Sustainable transport systems – invest in public transport systems, encourage cycling by having cycle lanes/electric bikes in the city ('Boris Bikes' in London)

Green building standards – Leadership in Energy and Environmental Design (LEED): globally recognised green building rating system that provides a framework for green buildings.

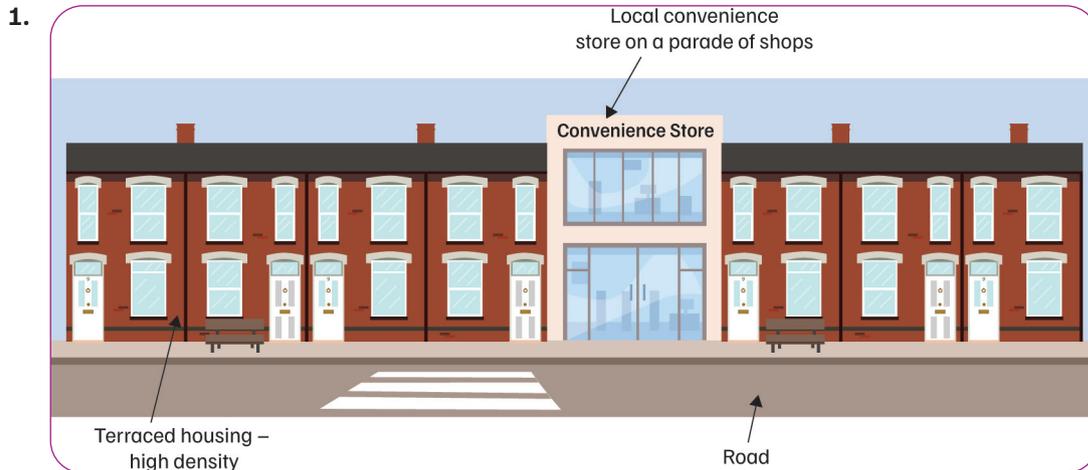
Water conservation – give each household a water butt so that they can collect and use water for outdoor purposes. Install water reduction strategies in the home (water hippos in toilet cisterns).

Energy Conservation – install smart meters in homes to raise awareness of energy usage, low-energy lightbulbs.

Waste management – encourage kerbside recycling.

Chapter 2.3 Processing and presenting evidence

Now try this (p 75)



- 2.
- Ensure the sources are from trusted sites, such as government websites.
 - Check the date the source was written – sources from too long ago might not add any value.
 - Choose sources that are relevant to your investigation and add value to what you are trying to prove.

Revision round up

1. The question that the study is aiming to answer.
2. Predicted outcomes are important at the beginning of the enquiry process as it shows the reader what you expect your findings to show. This is usually in the context of wider geographical theories. It also allows the geographer to check whether their outcomes are in line with the predicted outcomes. This provides an opportunity for explanation if they differ.
3. North arrow, scale, title, key, arrows to each site so that the precise location can be seen.
4. GIS contain layers of data which can be switched on or off depending on what information you are looking for. They can provide a valuable insight into the fieldwork area before data is collected and might indicate where the best data collection sites will be.
5. Activity being carried out
Date of activity
Location(s)

Risk to health and safety	People at risk	Level of risk	Measures to reduce risk

6.

Sampling type	Description	Advantages	Disadvantages
Random	Choosing a person to answer your questionnaire by chance	Useful when investigating large sample populations Avoids bias as no particular person is targeted	Might not be representative of the area Only some data is sampled randomly Some sites or social groups may not be accessible
Opportunistic	Sampling what is available at the time	Flexible design Quick to complete	Sample might be biased Difficult to repeat
Stratified	Dividing sample into sub-groups	Comparable data sets Can be used alongside other sampling methods	Time consuming Need to ensure the available populations fit the chosen categories
Systematic	Collecting data in an ordered way with a system	Repeatable by any other group to gain further data	Some sites may not have a chance to be sampled so are not included You can sample too many times at one site, which may not always be helpful

7. Primary data is data that you collect yourself (firsthand). Secondary data already exists (someone else collected it).
8. Quantitative data is numerical data (e.g. pedestrian count).
9. Qualitative data is non-numerical and records thoughts, feelings and opinions (e.g. interviews).
10. Census data, OS maps, newspaper articles, house price data, old photographs.
11. Mean, median, mode, range.
- 12.

Graph type	Strengths	Weaknesses
Line graphs	Easy to construct Clearly shows trends	Not useful for percentage data Trends can be exaggerated or minimised by the scale
Bar graphs	Easy to construct and interpret Useful for discrete data	Can only be used with discrete data Can look cluttered if there is a lot of data
Pie charts	Shows proportions Comparison between the different factors is easy	More difficult to compare two sets of data Does not show change over time
Located bar graphs	Combines numerical data with spatial patterns Easy to compare bar graphs	Can only be used for discrete data Can become overcrowded
Scatter graphs	Shows correlations can add a best fit line for missing points	Only shows the relationship between two data sets Difficult to interpret if correlation is weak

13.

Map type	Strengths	Weaknesses
Choropleth map	Easy to construct and interpret Good representation of data over space Useful for identifying spatial anomalies	Indicates that there is a sudden change at the boundary Does not show differences within each area
Flow map	Shows movement of people or goods Illustrates volume and direction	Often need to distort the actual distance to be able to plot the data set
Proportional symbols map	Shows differences between locations Easy to see overall trend	Difficult to see the absolute data for each section Symbols can overlap on the map

- 14.** A bibliography should be used when using secondary data so that the reader knows where the data came from. This gives an indication of its accuracy, reliability and if there is likely to be bias.
- 15.** The analysis section of a geographical enquiry should include primary data, secondary data, any statistical analysis that has been applied to the data, identification of patterns or trends and justification for why the researcher has stated these patterns or trends exist.
- 16.**
- What trend/pattern does the data show?
 - Does the statistical analysis of the data show any other trends?
 - Why might the data collected show these trends?
 - Does the secondary data reinforce these trends?
 - How does this relate to the wider field of Geography or predicted outcomes?
- 17.** To ensure that your data analysis is focused on the enquiry questions, the data should be discussed in the context of those questions. Only select the data that is relevant. Do not describe all the data that was collected.
- 18.** A conclusion is best structured by answering each sub-question, explaining the trend and justifying the answer with data. Using the answers to the sub-questions, the main enquiry question can be answered and related to the predicted outcomes/wider field of geography.
- 19.** Planning an enquiry, collecting evidence, data processing and presentation, data analysis, conclusions.
- 20.** It is good practice to consider further geographical questions in the evaluation as this shows what the next step would be after this enquiry.
- 21.** Reference to wider geographical theories can be made in the analysis, conclusion and evaluation sections of the enquiry. They may also be referenced in the planning section when thinking about predicted outcomes.

Unit 3

Chapter 3.1 The geography of inequality

Now try this (p 86)

1. Rural areas have poorer access to mobile phone signal and broadband because the cost to put the infrastructure in place is high compared to urban areas where the population is larger. Urban areas have access to better materials, such as fibre optic cables, whereas rural areas still use copper wiring. Rural landscapes also affect signal strength by reflecting Wi-Fi signals, making connections poorer. In terms of services, rural areas have smaller populations and lower investment in services by the government compared to urban areas.

Now try this (p 95)

1. A. $\$70,590 - \$840 = \$69,750$
B. $\$39,350$ (Japan)

Now try this (p 97)

1. I agree with this statement to an extent. Physical factors (such as disasters) cannot be stopped, only managed. Therefore, places at risk of such events will always face them. Poorer areas often struggle to recover from the effects of natural disasters as they have a low GDP and poor infrastructure, meaning it is difficult to rebuild after a disaster. An example of this is Haiti, which faces tropical storms of increasing intensity. Additionally, physical factors have contributed to the development gap. For example, countries with poor physical geography, such as being landlocked, have poor access to water. This could lead to poor development of infrastructure, like ports which could have been used for shipping.

However, there are also a range of human factors that have created the development gap. For example, many African countries have been exploited in the past under colonial ruling by richer countries, which has led to those countries taking many valuable commodities from them. This has left the African countries with few resources of little value. Trade blocs are playing a significant role in the development gap as President Trump increases tariffs on many countries. This could lead to poorer countries struggling to import or export goods to the USA due to the increasing costs added to their goods or imports.

Now try this (p 99)

1. MNCs can have many impacts on developing countries. A positive impact is that they can create jobs in manufacturing by building factories. A disadvantage is that workers are often subjected to poor working conditions, such as poor pay and long hours. Another advantage is that workers are trained in new skills (such as manufacturing) so they can complete their job to a good standard. A disadvantage of MNCs is that profit often leaves the developing country and returns to the MNC's country, meaning the developing country does not benefit from any profit.
2. There are a range of strategies that can help close the development gap. For example, tourism can help LICs develop as it can create employment opportunities for local people. TNCs can have a somewhat positive effect as they create infrastructure and employment opportunities for the LIC. However, they often treat LIC workers poorly, making them work long hours for little money.

Chapter 3.2 The highs and lows of our weather

Now try this (p 101)

1. Climate differs across Wales as we can see in the climate graphs. Rainfall varies more across the year for Aberystwyth and Haverfordwest compared to the other locations where it is more even throughout the year. Aberystwyth and Haverfordwest also received slightly less rainfall in total throughout the year. Changes in temperature throughout the year are fairly consistent across all locations, with December, January and February being the coldest months and July and August being the warmest months. We can also see that winter temperatures for Haverfordwest and Aberystwyth are slightly warmer than most other locations.
2. In terms of the climate of Wales changing across the year, it is coldest in December, January and February and warmest in July and August. The temperature range for Wales is around 11°C. The months with the heaviest rainfall are usually November and December. The months with the lowest rainfall vary depending on the location in Wales but April is one of the driest months for many locations.

Now try this (p 103)

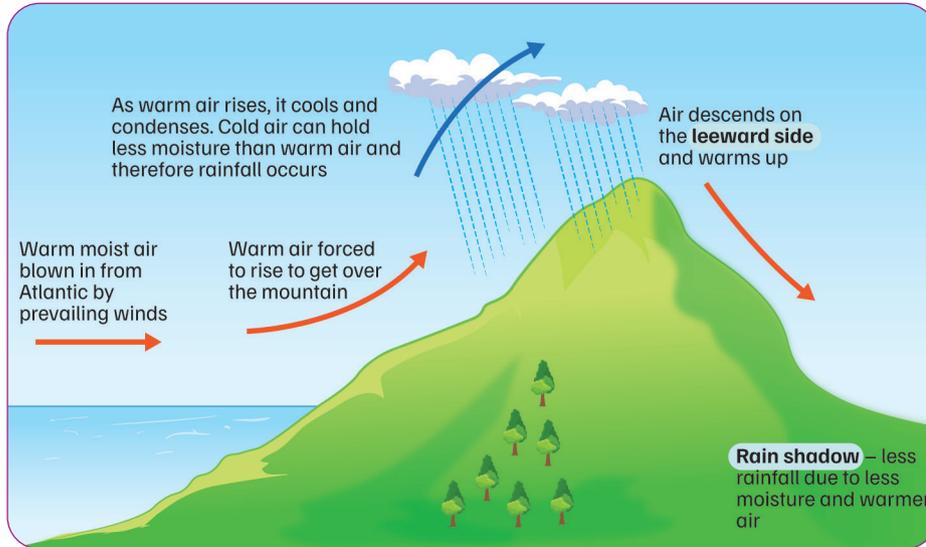
1.

Air mass	Temperature
Polar continental	Cold air
Tropical maritime	Warm air
Polar maritime	Cold air
Arctic maritime	Cold air
Tropical continental	Hot air
2. The closer a location is to the equator, the warmer the temperature will be. There are two reasons for this. Firstly, the distance travelled by solar radiation is shorter at the equator compared to the poles so there is more solar radiation to be distributed. Secondly, the surface area that the solar radiation heats up is larger at the poles due to the angle at which the radiation reaches the earth, which reduces the temperature. At the equator, the solar radiation is more concentrated so has a greater warming effect.
3. Haverfordwest shows slightly warmer winter temperatures compared to Welshpool and this could be due to two factors. Firstly, Haverfordwest has a lower latitude than Welshpool meaning it is closer to the equator. The closer to the equator, the warmer a location will be. Secondly, during the winter months the west of the UK is warmed by a warm **ocean current** that hits the southwest of the UK. The North Atlantic Drift brings warm water from the Gulf of Mexico to the UK, which warms the air temperature for locations in the southwest of Wales like Haverfordwest.

Now try this (p 105)

1. Warm air rising and condensation
2. Re-radiated heat

3.



Now try this (p 107)

1. Hadley cell
2. The UK experiences lots of rainfall due to its latitude location. At 55°N it is just below the point at which the Ferrel cell and Polar cell meet. As a result, the UK is located in an area where air rises which causes low pressure. Due to the frequent low pressure systems, the area gets a lot of rainfall.
3. The earth's axis is not perpendicular, but has a tilt around its axis of around 23.5°. This causes the angle at which the sun's rays hit the earth to vary throughout the year. This results in the amount of sunlight reaching parts of the earth to vary, which gives us seasons.

Now try this (p 109)

1. Ahead of the warm front, London will experience temperature increases as the warm body of air approaches and increasing amounts of cloud. As the warm front passes over, London is likely to experience some rainfall because the warm air passes over the cold air. In the warm sector, the temperatures will be warm and the rainfall will reduce. However, as the cold front approaches London it will experience a drop in temperatures. As the cold front passes over, there will be a period of heavier rainfall. Once the rainfall begins to clear, the temperature will drop further due to the body of cold air that will now be over London and the amount of rainfall will reduce.
2. The UK experiences a lot of low pressure weather systems due to its latitude. It is close to the point where the Polar cell meets the Ferrel cell which is characterised by air rising and therefore low pressure systems being created.

Now try this (p 111)

1.
 - Isobars spaced far apart
 - No/few fronts
 - Pressure readings are highest in the middle of the system, decreasing as you move away from the centre.
2. In the summer, anticyclones in Wales typically show clear skies, light winds and dry conditions. This can bring fine weather and long sunny days. Across the UK, this can be linked to droughts,

water shortages and forest fires in areas such as the Welsh upland areas. In the winter, high pressure systems can create fog and frost, making driving conditions difficult. Wind speeds are typically slow or not present at all.

3. In the summer, the sun is typically higher in the sky. This can lead to stronger sunlight and warmer temperatures. The ground heats up, increasing convection currents. In the winter, the sun is lower in the sky leading to clear skies and long nights (radiative cooling). The ground loses heat rapidly, causing frosty conditions. In winter, the high pressure systems bring cold, dry air from the poles or continents. In the summer, the high pressure systems bring warm, dry air which can occasionally cause heat waves.
4. Both people and the economy can be affected by heat waves in both a positive and negative way. The economy can benefit as more people take holidays in Wales rather than going abroad. This increases spending within the Welsh economy by way of seasonal tourism jobs and hospitality (such as B&Bs) which is a very positive impact. Drinks and ice cream suppliers are positively affected as these businesses sell more during warmer periods which has a significant positive impact on their profits. However, heat waves can have a disastrous effect on farmers' crops, causing them to die. This means they cannot be sold and has a negative impact on the economy. People can be negatively affected by heat waves. Increased risk of sunburn can cause an increase in A&E visits, putting a strain on the NHS. People can also be significantly affected by forest fires caused by high pressure systems, which can lead to loss of homes and forced evacuation.

Chapter 3.3 Wild weather

Now try this (p 115)

1. Example answer:

Hurricane Sandy

- Strong winds: $5 \times 2 = 10$
 - Raw sewage in the overflowing water: $4 \times 3 = 12$
 - Homelessness: $4 \times 3 = 12$
 - Death: $5 \times 5 = 25$
 - Trees uprooted: $4 \times 1 = 4$
2. One response to Hurricane Sandy was that the government gave \$600 million to assist people. This was very effective because it allowed homes to be rebuilt so people were no longer homeless. Another response was that residents were forced to evacuate. This was a strong action to take but it helped save people's lives as they were able to move somewhere safer. A third response was electrical companies worked longer hours to get power back which enabled people to try and rebuild their lives.

Chapter 3.4 Continual climate change

Now try this (p 120)

1. Orbital precession causes the earth to wobble around its axis due to the gravitational effects of the sun and moon. As a result, this can cause a change in the intensity and timings of the seasons. It can make them more extreme in one hemisphere and less extreme in the other.
2. Volcanic eruptions can impact climate. When a volcano erupts, it emits carbon dioxide into the atmosphere. Carbon dioxide is a greenhouse gas and contributes to global warming, therefore increasing temperatures. However, an eruption can also emit sulphur dioxide which reacts with

certain chemicals in the atmosphere and causes short-term cooling. In addition, if the eruption is particularly explosive, some of the debris material that is ejected from the volcano (ash) can enter the upper atmosphere and move around the globe by the atmospheric circulation system. This ash can then reflect incoming solar radiation which will also have a cooling effect.

3. During glacial periods, the temperature range is usually between 0°C and -9°C, whereas the temperature range for interglacial periods is usually between 0°C and 3°C. Interglacial periods also experience more rainfall than glacial periods because the water is locked up in ice sheets during glacial periods. This means glacial periods are usually arid. We are currently in an interglacial period as we experience warmer temperatures and rainfall.
4. We are currently in an interglacial period as the average temperature in 2023 was 1.46°C. However global warming will have an impact on this. The natural causes of this warmer period would be the interglacial period that we are in, however we are also seeing unprecedented human additions of greenhouse gases to the atmosphere. These greenhouse gases are causing more heat to be trapped in the atmosphere, causing atmospheric warming to an extent that we have not seen before. Therefore, I think that a combination of human and physical factors are likely to be causing this current period of warming.

Now try this (p 122)

1. The process that keeps the heat in the earth's atmosphere is the greenhouse effect. This process involves energy from the sun heating up the earth's surface. This heat is then re-radiated back into the atmosphere. Some heat will escape back into space, but the greenhouse gases in the atmosphere will prevent much of the heat escaping. This results in the heat becoming trapped in the atmosphere.
2. Forest fires increase the greenhouse effect as they increase the amount of carbon dioxide (a greenhouse gas) in the atmosphere. When trees are burned, they release all of the carbon dioxide that has been stored within them for many years. In addition, burning trees prevents those trees from absorbing carbon dioxide that is already in the atmosphere, which further increases the level of the gas in the atmosphere.
3. Burning fossil fuels is unsustainable as the burning process releases all the carbon that had been stored in the fossil fuels for thousands of years. The only way to improve their sustainability is to put carbon capture procedures in place which will help reduce the amount of carbon dioxide being released into the atmosphere. Deforestation is unsustainable as trees absorb carbon dioxide during the process of photosynthesis. Removing trees prevents this absorption. However, planting at least one tree for every one that is cut down will make the process more sustainable. Landfills create methane due to the breakdown of the waste material. They can be made more sustainable by reducing the amount of waste produced and sent to landfill. Recycling helps to reduce the amount of waste sent to landfill. Therefore many of the human activities that create greenhouse gases can be made more sustainable, however the activity which is arguably the most unsustainable (due to its wide use and difficulties in capturing the released carbon dioxide) is burning fossil fuels. The only way to truly improve the sustainability of energy generation is to use renewable energy instead.

Now try this (p 124)

1. Ice cores provide long-term evidence of climate change which is unable to be replicated in other evidence sources. As the layers of snow from each year's snowfall compress and turn to ice, they trap air bubbles which act as 'samples' of the atmosphere across thousands of years. We can

therefore analyse the composition of the air bubbles to know what the climate was like at different time periods.

2. Tree rings provide evidence of climate change as each ring represents a year of growth. A wider ring indicates that the tree grew more during that year and therefore the climate was likely to be warmer and wetter.

Now try this (p 129)

1.	Environment	People
	More frequent and severe storms	Crop failures due to lack of rainfall and hotter weather
	The habitat niche for many species will move due to warming and therefore the species will need to colonise new areas	Higher chance of properties flooding due to rising sea levels and more storms

2. The impact of climate change on the Maldives is severe. As they are low-lying islands in the middle of an ocean, they are likely to become completely submerged as sea levels continue to rise. More islands are becoming abandoned as it is simply too dangerous to live there. At some point in the future, the whole Maldivian population will need to be relocated as a result. The major source of income for the Maldives is tourism due to the natural coral reefs and sea life that populate the waters around them. However, global warming causes coral bleaching as the coral cannot survive in the warmer sea conditions. If the coral dies, much of the aquatic life in these waters will disappear which will remove the primary reason most tourists visit this area.

On the other hand, the population in Kenya is struggling to feed itself due to more frequent and extreme droughts. Previously farmable land is turning into desert due to the hot and arid conditions. As a result, much of the population is being displaced in search of areas where they can grow food.

On balance, I think that the impact of climate change will be greater on the Maldives due to their islands completely disappearing in the future.

Chapter 3.5 Managing global challenges

Now try this (p 131)

1. There are many strategies that can help mitigate against climate change. For example, world leaders meet at the COP climate change agreement conventions and set global targets to help reduce emissions. This is a strong strategy because targets help hold people accountable and can be measured against for progress. Another strategy is using solar panels which could help reduce carbon emissions by using natural green energy from the sun instead of fossil fuels which release a lot more carbon dioxide when burnt.

Revision round up

The geography of inequality

1. • Physical geography, e.g. mountains
• Government funding

- Literacy rates
- Industries
- Access to services
- Political parties/policies

2.

Physical causes of inequalities	Human causes of inequalities
Physical geography, e.g. mountains	Government funding
Access to water	Literacy rates
Coastlines for port building or tourism	Industries
	Access to services
	Political parties/policies
	Gender

3. **Regional variations**

- Differences in funding from the Welsh Government or Westminster
- Disparities in services, standard of education, literacy rates and outcomes for children

Differing perceptions

- Perception that the south of the UK has more opportunities, including better universities
- Perception that people in the north of England or Wales have poorer access to high-quality schools, so may be less educated and skilled than people in the south
- These perceptions are not always true

Segregation

- Falling investment in an area by TNCs and the government can make communities feel segregated
- Rural communities in the UK can feel isolated due to a lack of infrastructure and service investment by the government

4. **Welsh Government strategies to reduce inequality**

- Merthyr Council have built affordable housing to reduce the number of people renting.
- New relief road around parts of the M4 providing easier access to South Wales. This will improve connectivity for TNCs and workers, providing more income for Wales.

UK government strategies to reduce inequality

- HS2 train will support connectivity between the north and south of the UK at key points. Creates more jobs in the building of the train and track, increasing employment. Will reduce journey times meaning more people can remain living in the north but commute to the south for work.
- Commitment to spend £81 million building 1.5 million new homes and 20,000 new social housing residences to help people get out of poverty.

5.

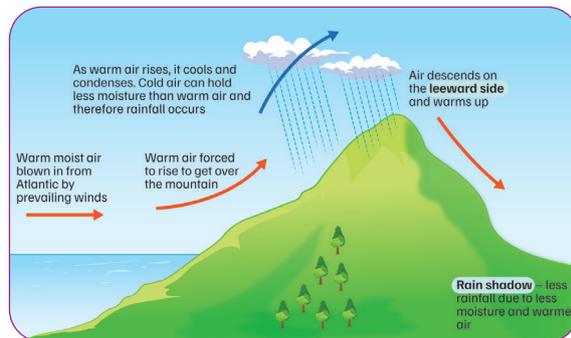
Physical causes of the development gap	Human causes of the development gap
Mountains	Colonisation
Landlocked	TNCs
Drought	Trade blocs
Flooding	Tariffs

The highs and lows of our weather

6. Factor	Description of how it affects temperature
Air masses	Different air masses bring different types of weather: polar air is cold, while tropical air is warm.
Altitude	There is a negative correlation between temperature and altitude: temperature decreases by around 1°C for every 150 m increase in altitude.
Aspect	South-facing slopes in Wales experience warmer temperatures than north-facing slopes. South-facing slopes in Wales are experience the direct heating effect of the sun, while north-facing slopes are in the shade.
Latitude	The closer to the equator a location is, the hotter the temperatures are likely to be.
Ocean currents	The main ocean current that affects the west of the UK (including Wales) is the North Atlantic Drift. This means the western side of the UK experiences warmer temperatures in the winter compared to the eastern side.
Prevailing winds	The prevailing winds for the UK come from the southwest. They bring warm air and increase temperatures in Wales.

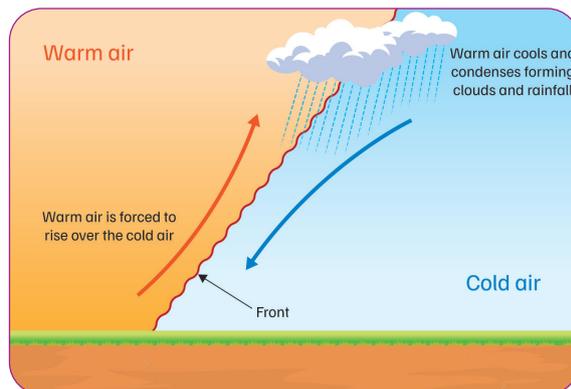
7. Relief rainfall

- Warm air rises
- It condenses and cools to form clouds
- As clouds rise, they cool and it rains (cold air holds less moisture)
- Air travels back down the other side of the mountain and warms up again



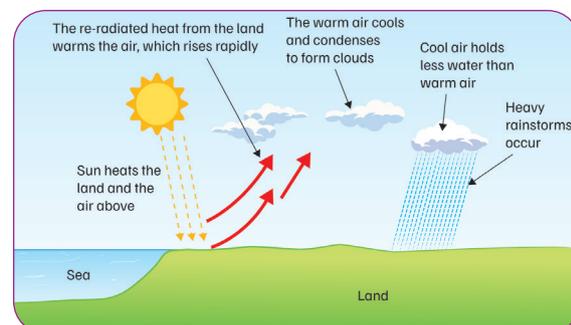
Frontal rainfall

- Warm air meets cold air
- Warm air rises over the cold air
- This creates low pressure

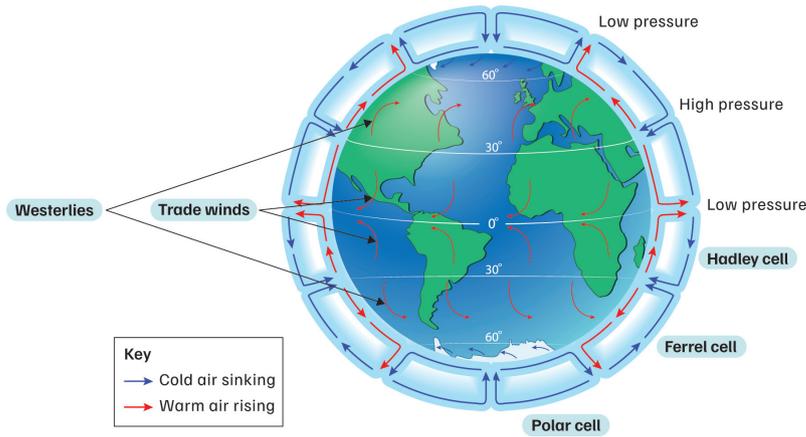


Convective rainfall

- Happens in summer months after a long period of very warm weather
- Sun heats the land and the sea, and the air above
- Air rises rapidly and condenses to form clouds
- Air cools and forms rain as cool air cannot hold moisture for long



8.



Wild weather

9.

High pressure hazard	California fires 2025
Causes	Deforestation leading to reduced water sources Burning fossil fuels increased the amount of carbon and other gases in the atmosphere Jet streams merged Earth's rotation caused air to move to the right
Impacts	30 people died Air pollution for weeks 23 people arrested for looting \$57 billion in damage to the economy
Responses	Government deployed 7,500 personnel to help
Low pressure hazard	Hurricane Sandy 2012
Causes	Rising and cooling of water vapour Imbalance of heat across the world's oceans Increased temperature caused by build-up of greenhouse gases
Impacts	286 people killed Estimated \$70 billion damage caused 1.5 billion tonnes of raw sewage leaked into rivers
Responses	Aid concert held to raise funds Flights were cancelled Government gave \$600 million in funds

Continual climate change

10. Natural causes of climate change:

- Volcanic eruptions releasing toxic gases that thicken the ozone layer
- Milankovitch cycles – earth's rotation around the sun causes changes in temperature
- Sunspots
- Respiration of plants and animals

Human causes of climate change:

- Burning fossil fuels
- Containerisation
- Dumping electronic waste (e-waste) into landfill
- Deforestation
- Cattle ranch farms
- Oil fracking

11. Ice core data: a section of ice drilled from a glacier or ice sheet. Shows layers of ice over time with trapped particles of carbon.

Tree rings (dendrochronology): trees grow faster in warmer temperatures. Tree rings inside the trunk show evidence of climate change as they grow. Rings can be linked to changes in recorded climate.

IPCC/NASA: intergovernmental panel on climate change. Collects and monitors data on climate change.

Keeling curve: seasonal variations in atmospheric CO₂ recorded at the Mauna Loa observatory. The concentration of CO₂ increases from 1960 to 2010.

Retreating glaciers/ice sheets: visual representation of expansion and contraction of ice sheets is a good indicator of climate change. The faster the retreat, the higher the temperatures.

Sea level rise: warmer climates have more thermal expansion of water as ice caps and glaciers melt. Monitoring changing sea levels can help give a good idea of rates of climate change.

	Social	Economic	Environmental
Kenya (landlocked)	Population of 55 million people Risk of famine due to loss of crops and water sources	Nearly 2 million people visit the country each year. Climate change will cause the death of ecosystems which will severely affect the tourism industry. Kenya also exports \$190 million foodstuffs each year which will decrease if crops are lost	Droughts will kill off many of these crops and ecosystems
Maldives (island)	Up to 80% of the population will be displaced by 2050 due to climate change	Will lose the main source of income from tourism – helps to boost the economy (GDP) by 50% each year	Increases in coastal erosion and tropical storms (including strength and intensity)

Managing global challenges

13. Any three from:

- **Solar panels:** green, renewable form of energy, zero emissions, slow global warming rates. However, they are expensive to install and may contribute to pollution levels when transporting and installing them.
- **COP climate change conferences:** global leaders come together and agree on targets for reducing carbon emissions. Targets are good benchmarks to hold other countries to account. However, trying to get to net zero carbon emissions means major financial investment in infrastructure.
- **Protests:** raise awareness of the issue of climate change. Especially impactful when involving famous people like David Attenborough and Greta Thunberg – politicians have been forced to take action. However, the impact is not as high as changing infrastructure or setting targets.
- **Afforestation:** planting lots of trees to reduce atmospheric carbon by capturing it through the process of photosynthesis.

14.

Threat	How is this a threat to ocean biodiversity?	Scale of the threat	Strategies to manage the threat	Sustainability of the management approaches
Climate change	Ocean acidification as CO ₂ is absorbed by the oceans – affects coral reefs and organisms with shells	Global issue Sea level rise – 800 million people live in cities where sea levels could rise by more than 0.5 m so could be forced to move	Carbon capturing schemes, e.g. restoring upland peatbogs COP climate change conferences	The UK aims to restore 25% of its upland peatbog areas by re-wetting them. This is a natural strategy (sustainable)
Plastics and pollution	80% of marine litter comes from land sources – this affects 100,000 global marine species every year Contaminates in water alters its pH value, leading to ocean acidification	Global issue 8 million pieces of plastic make their way into the ocean every day	Boyan Slat founded The Ocean Cleanup organisation UNCLOS helps manage and protect against overfishing and pollution	The Ocean Cleanup has captured thousands of kilograms of plastic waste, however there is evidence that some marine animals have been caught UNCLOS is a legal framework that covers every coastline and ocean. It holds strong legal powers via the UN

Chapter 4.1 The concept of sustainability

Now try this (p 139)

1. I have studied Machynlleth. In my opinion it is reasonably sustainable. It has an eco-friendly group called Ecodyfi who promote the use of renewable energy and ecotourism which is good because it means less carbon emissions are being produced. Machynlleth is also home to the Centre for Alternative Technology (CAT) which informs local people about green energy and net zero carbon. This increases sustainability because it educates people about their actions. The woodlands are sustainably managed so that ecosystems can survive and are not affected by tourism. This is sustainable because habitats are not destroyed and food chains are not disrupted. Wildlife is also protected by UNESCO which means it has a special protection status which hopefully adds to the ecosystems surviving for longer.

Now try this (p 141)

1.	Well-being goal	National well-being indicators
	A prosperous Wales	Adults with qualifications, air quality, fair pay
	A resilient Wales	Air quality, sense of community
	A healthier Wales	Healthy babies, air quality, adults with qualifications, fair pay, sense of community
	A more equal Wales	Fair pay, healthy babies, adults with qualifications, fair pay, sense of community
	A Wales of cohesive communities	Sense of community, sense of community, people speaking Welsh every day
	A Wales of vibrant culture and thriving Welsh language	People speaking Welsh every day, sense of community
	A globally responsible Wales	Air quality, fair pay, sense of community, people speaking Welsh every day

Now try this (p 143)

1. In my opinion, I think the attempts to be sustainable have been reasonably successful. In Wales, the Cycle to Work scheme has allowed people to buy bikes at a reduced rate. However, it is difficult to measure how often people use their bike to commute compared to their car. Another scheme to increase sustainability is recycling more to reduce the amount of waste going to landfill. In my opinion this has been successful as more people are recycling plastic and cardboard. However, not all plastic can be recycled so weekly council collections are not always going to benefit the environment. Solar panels are a good way of encouraging people to be more sustainable as it is a form of green energy, however they can be an eyesore on properties and don't generate as much energy as fossil fuels. They can also be expensive to purchase and install. The new Cardiff

bus centre renovation could be sustainable as long as it encourages people to use public buses instead of their cars as buses carry more people. However, people will still want to use cars to get to remote places. The SDGs are useful as they help set measurable targets for countries. However, not all countries follow the guidelines or targets.

Chapter 4.2 Making sustainable decisions

Now try this (p 145)

- A.** An elderly resident of the village might be resistant to the new housing development due to the change in their village and influx of new residents. They might be concerned about traffic congestion in the village and increased noise.

B. The local councillor might be conflicted about this development. They will want to ensure that there is minimal impact on their existing constituents in the village, but will also want to provide affordable housing to local residents.

C. The housing developer would be keen for the development to get underway due to the employment opportunities it will provide their employees and potential profit that will be made by the company.

D. The owner of a factory 5 miles away from the village might be pleased that the development is going ahead as it could bring a youthful workforce to the area to fill jobs that they have been struggling to fill.

E. A family of five currently living in a 2 bedroom house might be pleased that the development is going ahead so that they can purchase accommodation in the same area but have more space.
- The size of the proposed plot
 - The facilities that are already in the village and if they are oversubscribed
 - Traffic flow surveys
 - The current population of the village
 - The potential employment opportunities in the area
- The development could bring in new families. This could give local services (such as schools) increased pupil roll numbers, ensuring they are able to stay open. It might also bring new customers to local shops and businesses which would also ensure they stay open. However, there may also be increased demand for public services such as GPs and dentists, leading to longer wait times for residents. This could lead to conflict between new and old residents.

Now try this (p 147)

- Negative:** buildings (houses and industry) may be forced to relocate if the area they are currently located is flooded to create the reservoir. This would lead to whole communities being displaced and fractured.

Positives: greater security for towns and villages in the lower course of the river who will be protected against flooding. Improved water management within the area and more sustainable water supply.
- Negatives:** the recycling of plastics may release chemicals into the atmosphere causing local air and water pollution. There may be increased number of heavy vehicles transporting the plastics and end-products to and from the recycling plant. This may cause greater congestion on roads.

Positives: the plant might provide employment opportunities for some of the unemployed people in the city. It could provide training and upskilling opportunities. The plant could create a positive multiplier effect with more people in work benefitting other local businesses.

Now try this (p 149)

1.

SWOT analysis using vulnerability matrix	
<p>Greatest challenge and urgency to act</p> <ul style="list-style-type: none"> Ranked 129th out of 192 on the World Climate Risk Index 122nd most vulnerable country on the vulnerability risk matrix Highly dependent on FDI and donations Experiences extreme weather Sea level rise 	<p>Have great challenges but are adapting solutions</p> <ul style="list-style-type: none"> Battery storage Upgrades to infrastructure Energy efficiency planning Collaboration with other countries
<p>Few present challenges and have time to get ready</p> <ul style="list-style-type: none"> Climate change strategy 2020–2030 Monitoring systems in place 	<p>Well positioned with few challenges</p>

2. I completely agree that the residents of St Lucia are at risk of becoming climate change refugees. They face too many challenges and risks and have little in terms of solutions to prevent this natural disaster of flooding from happening. Their ranking across the world climate change risk index puts them near the bottom half of the global table and they have little in terms of self-sufficiency for preventing a natural disasters like hurricanes or flooding. They are also very reliant on foreign investment, so if they lose their tourism, they will be unable to take any more investment as there will be nothing worth investing in. This makes them highly vulnerable to the challenge and risk of climate change with little or no recovery possible. St Lucia seem to only have temporary battery back-ups in place and no real alternative power source. This makes people very vulnerable to climate change impacts.

Revision round up

- Meeting the needs of the present without compromising the ability of future generations to meet their own needs.
- Long-term economic stability
 - Environmental protection, including animals, plants and habitats.
 - Reduce pollution and harmful impacts of climate change
 - To make sure the needs of all citizens are met so they are healthy and have equal access to resources

3.

Economic	Environmental	Social
Supporting economic growth and development in a way that is financially viable long-term Fair trade and security through long-term employment	Protecting natural ecosystems, conserving resources and reducing pollution and carbon emissions	Ensuring access to basic needs (food, water, education and healthcare)

4.

SDG number	Which pillar on the sustainability stool?	Aim of the SDG	Example of where people are working towards it
1	Economic	End poverty in all its forms everywhere	A total of 350 social protection measures have been introduced by 105 different countries
2	Social	End hunger, achieve food security and improved nutrition and promote sustainable agriculture	Little or no progress made since 2000
3	Social	Ensure healthy lives and promote well-being for all at all ages	146 out of 200 countries have met (or are on track to meet) the under-5 mortality rate
4	Social	Ensure inclusive and equitable quality education Promote lifelong learning for all	1 in 6 countries will achieve secondary school target
5	Social	Achieve gender equality Empower girls and women	15.4% of countries are on track to meet the 2030 targets for the 5 main indicators related to gender equality
6	Environmental	Ensure water availability Sustainable management of water Sanitation for all	Billions of people still do not have access to safe drinking water Governments and NGOs such as Water.org are constructing pipled water systems, wells, boreholes, and rainwater harvesting systems
7	Economic Environmental	Access to affordable, reliable and sustainable energy for everyone	675 million people still live in the dark (4/5 of these people live in Sub-Saharan Africa) Rwanda has launched a national solar power project combined with clean cooking initiatives
8	Economic	Sustained and inclusive economic growth Full employment and decent work for all	Global unemployment is expected to fall For example, Ethiopia's Productive Safety Net Programme (PSNP) employs rural workers in public works during seasonal food shortages
9	Economic Environmental	Build resilient infrastructure, promote inclusive and sustainable industrialisation	LICs are likely to miss their 2030 target for SDG 9. However, Ethiopia's Growth and Transformation Plan has made roads, railways, and hydroelectric dams a priority

SDG number	Which pillar on the sustainability stool?	Aim of the SDG	Example of where people are working towards it
10	Economic Social Environmental	Reduce inequality within and between countries	Malawi's free primary education policy increased school enrolment among poor children quite dramatically
11	Economic Social Environmental	Make cities and settlements inclusive, safe, reliable and sustainable	1.1 billion urban residents live in slums For example, Kibera (Nairobi) has seen several slums upgraded as part of projects including toilets, footpaths, and lighting
12	Environmental Social	Ensure sustainable consumption and production	Ghana , Accra supports waste recycling cooperatives to reduce landfill use
13	Environmental	Take urgent action against climate change	The world will exceed 1.5°C by 2035 Sea level rise has doubled in the last decade The EU Green Deal aims to make Europe the first climate-neutral continent by 2050
14	Environmental	Conserve the oceans and marine resources for sustainable development	1/5 fish caught comes from illegal fishing. Ocean acidification has tripled globally The World Bank's Blue Economy Program helps countries with sustainable marine resource management
15	Environmental	Protect and restore terrestrial ecosystems Combat desertification and deforestation Stop land degradation and loss of biodiversity	100 million hectares degraded annually (2015–2019) Countries are working together through global initiatives like Earth Day and World Wildlife Fund campaigns
16	Social	Promote peaceful and inclusive societies Ensure access to justice and build effective, inclusive institutions	108.4 million people displaced globally by the end of 2022 Rwanda's post-genocide government promotes inclusion of women and ethnic groups in leadership The UN's peacekeeping missions work to stabilise and support fragile states
17	Economic Environmental Social	Strengthen global partnerships to work towards sustainable development	The African Continental Free Trade Area (AfCFTA) aims to boost trade and integration in Africa by working with other countries

Source: <https://www.globalgoals.org/goals/>

5.
 - Globally responsible: 7, 12, 13, 14
 - Cohesive communities: 15, 18
 - More equal: 5, 10, 11
 - Vibrant culture and thriving Welsh language: 4
 - Healthier: 1, 2, 3, 6
 - Resilient: 16
 - Prosperous: 8, 9

6.

Skill	Importance
Cartographic skills	Understanding the geography of an area to decide on the correct location
Graphical skills	Interpreting data and identifying trends, visualising the impact of collected data to inform a decision
Numerical and statistical skills	Comparing and analysing different sets of data
Communication skills	Explaining findings so that other people can make sense of the decision
Evaluative skills	Thinking critically about the data that will inform a decision
Interpretative skills	Making sense of complex data from different sources to come to a decision
Problem-solving skills	Developing ideas in collaboration with other people to provide sustainable solutions to real-life situations
Referencing skills	Using your own research to inform your decision and citing the sources correctly

7. Your reference file might look like the one below. You could also include publications and books.

Context	Reference
Pollution – split into land, water and air	https://www.bbc.co.uk/bitesize/guides/zsbn7p3/revision/7
Energy	https://www.coolgeography.co.uk/gcsen/CRM_Energy_Patterns.php
Urban/industrial development	https://www.internetgeography.net/aqa-gcse-geography/urban-issues-and-challenges/
Transport	https://www.internetgeography.net/topics/developments-in-infrastructure-in-the-uk/
Tourism	https://studymind.co.uk/notes/case-study-tourism/

8.
 - Book title
 - Author
 - Date of publication
 - Page numbers accessed
 - Date accessed

9. Sustainability impact assessments are used to identify proposed actions and their impact on the environment.

- **Environmental impacts:** pollution, health, loss of biodiversity
- **Economic impacts:** benefit analysis of decisions, job sector growth
- **Social impacts:** community health, livelihoods and culture

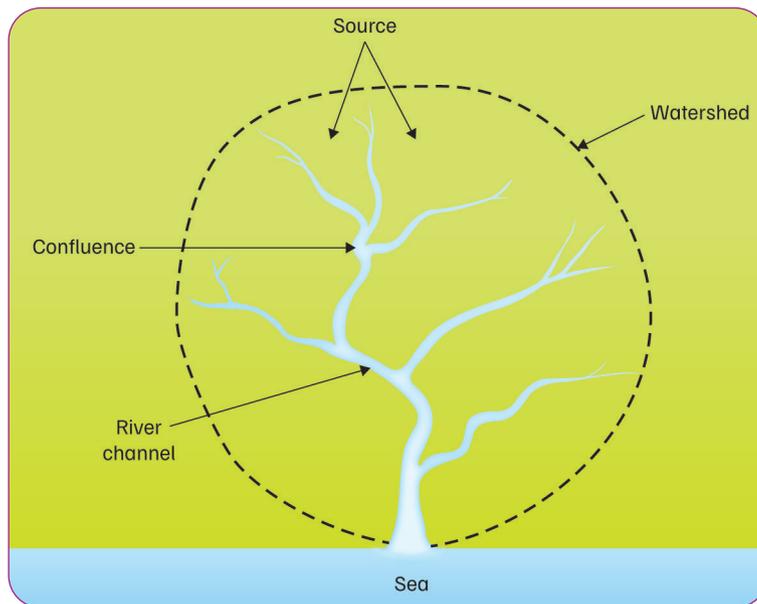
-1 = negative impact, 0 = neutral, 2 = positive impact, ? = unknown				
Review Q's	Economic impact	Social impact	Environmental impact	If negative, how can it be mitigated? If positive, how can it be enhanced?
e.g. why is the carbon footprint so big?				
e.g. what are the main employment sectors?				
e.g. what is the mood of the population as a result of the strategy?				

Exam practice questions

Unit 1

- 1ai)** A megacity is a city with over 10 million people living in it.
- 1aii)** A megacity is based on the city's size (it has over 10 million people living there) whereas a global city is one that has a significant role in global economic, political and cultural activities.
- 1aiii)** Five sustainability issues that are commonly found in global cities are having green public spaces, water conservation, transport systems that are sustainable, energy conservation and managing waste sustainably.
- 1bi)** The photograph shows informal housing that is overcrowded and does not look like it has planned infrastructure. To increase the sustainability of these housing areas, any houses that are not made of solid materials such as brick can be upgraded or rebuilt to provide more secure accommodation. Many informal settlements do not have water supply or sewage systems which can impact the health of the residents. Putting proper sewage systems in place will remove waste and clean water for consumption. This will improve the health of the residents and improve sustainability.

2a)

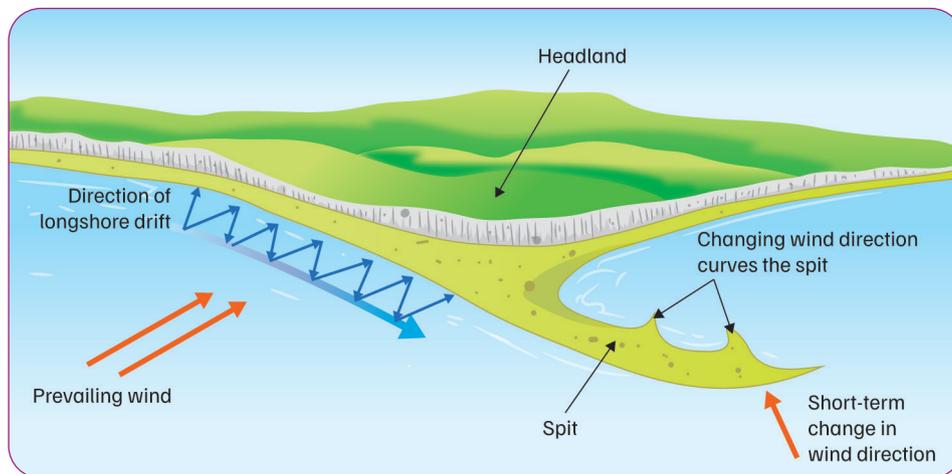


- 2bi)** Meander
- 2bii)** 384932
- 2biii)** The map shows that this river is in its middle course due to the wider valley floor and presence of meanders. It also looks like there are oxbow lakes on the valley floor.
- 2c)** Building houses on floodplains can be seen as unsustainable because floodplains are areas of land that a river floods. Therefore, to ensure that the houses do not flood, flood defences will need to be constructed and constantly maintained. This will have an economic and environmental impact and could push a flooding issue further downstream which is not sustainable.
- 3ai)** The map shows the movements of Migrants between Nigeria and the UK in 2023. It shows a greater number of migrants moving from Nigeria to the UK compared to the amount that migrate from the UK to Nigeria. There are 141,000 people migrating to the UK compared to 19,000 migrating to Nigeria – a difference of 122,000.

- 3a ii)** Your answer could include any three from the following list:
- The UK is a high income country whereas Nigeria is middle income country so there is a perceived better standard of living in the UK.
 - The UK is perceived to have better education and health services than Nigeria. Therefore people might migrate from Nigeria for these benefits for their family.
 - Nigeria has a weaker infrastructure and fewer opportunities of investment compared to the UK which attracts more MNCs.
 - The UK is perceived to have greater employment opportunities.
- 3a iii)** Impacts of large-scale migration on the source country might include brain drain: highly educated people leaving a source country in search of better pay elsewhere. This leaves the source country struggling to fill skilled jobs with appropriately qualified people. A positive impact of large-scale migration on the source country could be that remittances are sent back to the host country. Economic migrants often send home a proportion of their wages to their families back in the source country which increases their quality of life.

4a i) Constructive waves

4a ii)



4a iii) In my opinion, the factor that has the biggest impact on coastal change is settlement. Settlements placed by the coast can impact the coast in a number of ways. When settlements are close to the coast, coastal defences are often constructed to protect the settlement from coastal erosion or flooding. This could be the building of a sea wall or the use of rip rap, for example. This changes the nature of the interaction between land and sea and will change the rate of erosion of the coastline. Another way that people can change the coastline due to settlement is by increasing pollution. This might include run off of sediments, chemicals, and waste which can harm marine ecosystems and coastline environments.

On the other hand, industrial waste impacts coastal pollution. Industry can also impact the coastline through the creation of ports for the import and export of goods. For example, the steelworks at Port Talbot has its own port for importing raw materials and exporting steel. This port has a large harbour wall which alters the direction of ocean currents in that area. Agriculture can also impact the coastline. When farmers use the coastline for grazing cattle, the soil structure weakens which can lead to increased surface run off in the area.

When looking at all three factors, I still believe that the building of settlements will have the biggest impact on coastal change.

Unit 2

- 1ai)** How does land use change along a transect across the city of Cardiff?
- 1aii)** I chose this enquiry question because the topic in which my enquiry is based is 'transects'. Cardiff is a large city in my local area (cynefin) and it has a range of land uses across it. Studying a transect across the city it is likely to show a change in land use.
- 1bi)** You might have chosen:
- 192744
 - 178750
 - 163767
 - 146209
- 1bii)** When studying how land use changes along a transect, I wanted to study a line across the city to see how buildings and their uses change. I started at the coastline and took the transect across the whole city. I decided to look at 4 sites as a representative sample and used the OS map to find locations where I might see changes in land use. I also ensured that the study sites were spaced out across the city.
- 1c)** The potential risks to myself are getting lost or having an altercation with a member of the public. The risks to the public are relatively low. The main risk is that I would get in the way of daily activities which I would need to be sensitive to. When in residential areas, I would also need to be mindful that residents might wonder why I am looking at their homes and writing on a piece of paper. As for the environment, I would need to ensure that I do not take anything that I did not come with or leave anything behind. When collecting data, I need to make sure that I do not change the environment in any way.
- 2ai)** Systematic sampling
- 2aii)** I would use systematic sampling as this will ensure the same approach is used at each sample site and that the data is recorded consistently. It would also mean that the approach would be the same if different groups were collecting data from different sites. This means the samples would be comparable.
- 2bi)**
- Land use survey to record the type of buildings and what they are being used for.
 - Environmental quality survey to record what the general environment of each area is like, for example litter, green areas, etc.
 - Pedestrian count to record how many people are walking around the area.
 - Traffic count to record how much traffic there is and what type of vehicles are in the area.
- 2bii)** The secondary data I would look for would include:
- crime rates
 - average cost of houses/properties in the area
 - average income per household in the area.
- Using secondary data would provide extra information about each area which might help explain some of the trends in my primary data. It could also reinforce or highlight anomalies in my primary data that I might not have noticed.
- 3ai)** Mean and proportions
- 3aii)**
- A choropleth map could be used to illustrate different land uses within an area. This is a great visual way to illustrate variations in land use.
 - A pie chart could be used to illustrate the cost of housing in an area as it shows proportions.
- 4)** The data shows that the velocity of the water increases from 0.19m/s at site 1 to 1.12m/s at site 10. There were a couple of anomalies seen at site 2 and 4 where the velocity increased and then decreased again afterwards.

The width of the channel also increased from site 1 to site 10, and the same trend was seen in the depth of the channel. The increase in channel width and depth is representative of what I would expect to see in a river. Adding water to the channel increases the potential for erosion, hence the river getting wider and deeper. It looks as though this also impacts the velocity of the water. This could be due to the fact that friction is reduced in a wider and deeper channel. Therefore, the middle section of the channel would not touch the bed or banks, so would not be slowed down by friction.

- 5)
 - Range of velocity: $1.12 - 0.19 = 0.93\text{m/s}$
 - Mean width: $14.2 + 10.6 + 10.5 + 7 + 6.3 + 4.6 + 5.5 + 4.4 + 3.0 + 1.4 = 67.5$
 $67.5 \div 10 = 6.75\text{m}$
- 6) From the evidence, I can conclude that the river channel does increase in size from source to mouth. The data shows that the width of the channel was 1.4m near the source and 14.2m near the mouth – an increase of 12.8m along the stretch of river studied. The depth of the river also increased along the length of the river studied (by 63cm). This is likely due to the increase in water volume after numerous tributaries join the river channel which increases the volume of water. This increased volume gives the water more erosive power which will increase the size of the channel.
- 7) When planning my enquiry I tried to make it as fair a test as possible. The enquiry question was specific and explains the aim of the study. The data collection locations were chosen at regular intervals across the city at locations that were safe and accessible. The variety of locations should provide a representative sample of land use across the city. To make the study more accurate I could have gathered data from more sites but this was not possible to do in the time allowed for data collection. Using systematic sampling ensures that the data from each site is comparable, even if different groups of pupils recorded it. If I had used opportunistic sampling, data collected by different groups might not have been comparable. The collection of secondary data in addition to primary data will allow for context to be added to the primary data and will also help to highlight any anomalies. However, it is important to consider any bias that might be in the secondary data. Overall I feel that the planning was effective in order to collect a reliable data sample.

Unit 3

- 1ai)** All employment rates in Wales have increased over time.
- 1aii)**
- North Wales may have experienced a decline in industries which could have then led to out-migration of workers.
 - The southeast of Wales may have received greater investment as it is home to the capital of Wales and therefore receives more government funding.
 - The southwest might have received more investment in energy industries, such as tidal energy in areas such as Pembrokeshire because it is near the coast.
- 1aiii)** Your answer could include any two points from the following list.
- Access to health and social care facilities
 - House prices
 - Quality of housing made accessible to people
 - Quality of infrastructure
- 1aiv)** Areas that are more isolated, such as rural settlements, may have a lack of services or infrastructure. Another physical factor could be the relief of the land. For example, mountainous areas are more difficult to build on than flat areas, resulting in a lack of infrastructure.
- 1bi)** I agree with this statement to an extent. Human factors, such as colonialism, can lead to LICs remaining underdeveloped due to a lack of valuable resources to trade with other nations. This is as a result of HICs previously taking these assets to sell themselves. Human factors like trade blocs and tariffs play a significant role in the development gap. If set too high, they can price LICs out of the market, meaning any profit the LIC makes from their own goods cannot be beneficial to them.

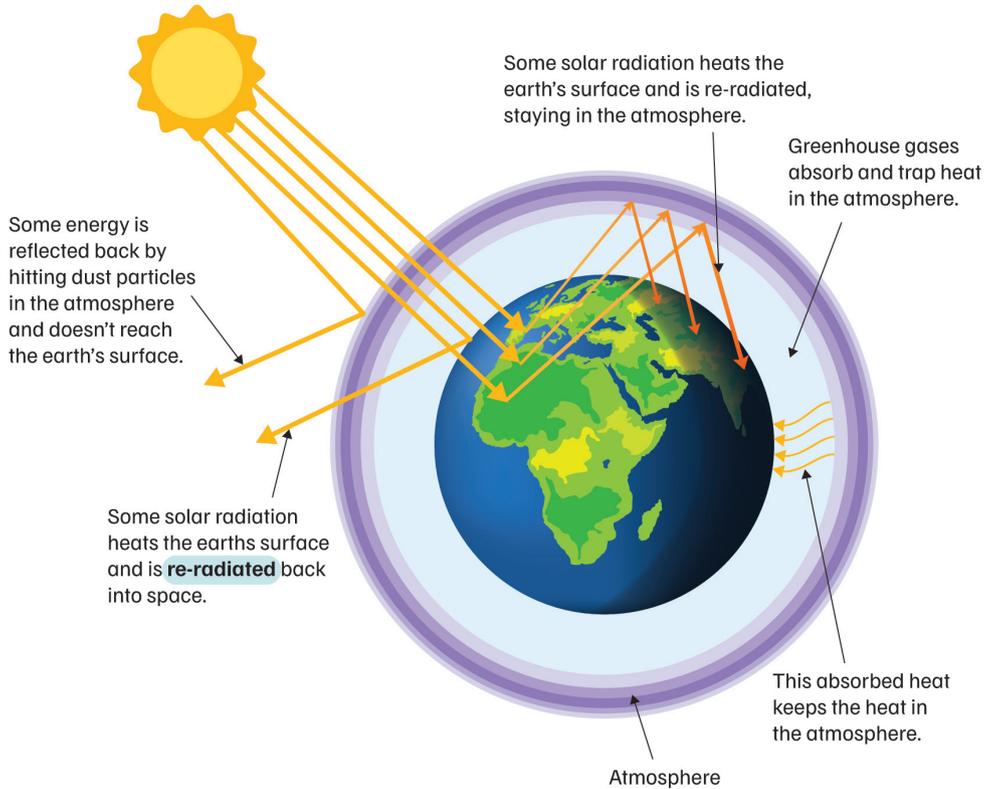
On the other hand, I can also see that physical factors can have a major impact on the development of LICs. For example, droughts can result in crops failing to grow, leaving LICs with nothing to sell or harvest.

Overall, I think both human and physical factors play a role in the development gap.

- 2 ai)** Climate is the average weather conditions experienced in a place over a longer period of time, e.g. 30 years.
- 2a ii)** **Altitude** – the greater the altitude, the colder temperature. Areas in Wales with higher altitude tend to lose more heat.
- Ocean currents** – the closer to the south/southwest of the UK, the warmer the winter temperatures due to the warm ocean current. This current brings warmer water currents, therefore increasing the temperature during winter.
- Air masses** – area that experience tropical maritime air masses will often experience warm and wet climates compared to those that experiences polar maritime (cold and wet) or polar continental (cold and dry) climates.
- Latitude** – the closer an area is to the equator, the warmer it will be due to direct solar radiation.
- 2a iii)** Low pressure forms at the equator because the sun shines directly on it most of the year. This makes the land and ocean at the equator very hot. This heat warms the air above, which rises. When the warm air rises, there is less air near the ground, which creates low pressure. Also, winds from the north and south come together at the equator and push more air upward, which keeps the pressure at the equator low.
- 2a iv)**
- Summer anticyclones bring hot, dry weather. Skies are usually clear and sunny. They can cause heatwaves and droughts.
 - Winter anticyclones bring fog, frost and mist in the morning with clear skies later in the day. Heat escapes easily at night.

2bi) In my opinion, I think emergency services are hugely important in responses to storms. Well-trained and well-prepared emergency services are important as they help save people in danger. These services include power companies that can put energy supplies back on quickly, making sure people don't die of hypothermia and the area recovers from the storm quickly. I think it is equally important to plan and mitigate for storms to avoid pressure on the emergency services. For example, it is vital to build greater flood and storm defences in an area that frequently experiences storm damage so that they can recover quickly. Given the amount of damage storm Darragh caused in 2024, I think it is very important to mitigate by putting in place flood warnings so that people have time to evacuate.

3ai)



3aii) The burning of fossil fuels creates large amounts of toxic gases that damage the environment by not allowing UV rays to escape the atmosphere, leading to global warming. There are different ways human activity enhances the greenhouse effect.

- Burning fossil fuels to power factories, homes or cars.
- Deforestation to harvest mahogany wood – this releases the carbon stored in vegetation into the atmosphere, causing the build-up of toxic gases.
- Large cattle ranching industries, due to the methane given off by animals as they belch.

3aiii) The Maldives is an island country affected by climate change. This country will soon be underwater as a result of climate change, namely flooding due to rising sea levels. This will lead to the abandonment of the area and forced migration of residents. The Maldives will also lose its main source of income from tourism which boosts its economy (GDP) by 50% each year. The impact of this loss of income is severe as many people rely on tourism for their living. In contrast, Kenya is a landlocked country greatly affected by drought as a result of climate change. Nearly 2 million people visit Kenya each year. Climate change will severely affect Kenya's tourism industry due to the death of many ecosystems. Kenya also exports

\$190 million foodstuffs each year. Droughts will kill off many of these products leading this industry into a deep decline.

3aiv) There are several ideas at global level for managing climate change. Your answer could include any two points from the following list.

- At COP conferences, many global leaders come together to discuss ways to combat climate change and reduce carbon emissions.
- The Paris agreement sets useful climate change goals. However, it is difficult to judge how committed countries are to meet these targets.
- Implementing carbon taxes or cap-and-trade systems to encourage emission reductions.
- Great Green Wall, Africa (GGW) aims to create an 8,000 km 'green belt' of restored land across 11 countries. Their target by 2030 is to restore 100 million hectares of degraded land.

3av) Sustainable strategies are all about a top-down, bottom-up approach. Top-down approaches include national and international policies, such as the Paris agreement. On a national level in Spain, for example, Seville has enough solar panels to power the homes of 3,000 people with using green, renewable energy. Australia uses the 5 Rs which largely focus on re-using and recycling plastic that would otherwise end up in the water systems, killing of the valuable coral reefs which help to absorb CO₂.

Bottom-up approaches focus on local people doing what they can do reduce climate change. For example, people can reduce plastic waste which can have a devastating effect on the oceans by releasing carbon and other contaminants. This can be done by recycling waste plastic and beach clean-ups.

Unit 4

1. The issue is largely focussed on the sustainability of water systems and roads which could affect habitats. The building of the relief road could lead to the destruction of habitats.
2. For this question, you need to carry out your own research on the impact of the proposed relief road around the M4 and its impact on habitats. Some ideas you could research are:
 - How much would the project cost?
 - What locations will it travel through?
 - Which local habitats could be at risk?
 - Are there any alternative ideas?
 - Why did the Welsh government make the decision to propose the building of this road?
3. **Option 1**
 - **Social** – could reduce traffic travel times into South Wales given the predicted pattern of traffic jams set to worsen.
 - **Economic** – could encourage more people and businesses to locate to South Wales.
 - **Environmental** – could provide a sustainable transport alternative.

Option 2

 - **Social** – no disruption to nearby homes if the road is not built.
 - **Economic** – cost could be spent on the healthcare system or education instead of construction and upkeep of the road.
 - **Environmental** – no pollution and disruption of habitats due to construction.

Option 3

 - **Social** – could encourage more people to think about the environment and reduce their car use.
 - **Economic** – investment in green transport could be longer lasting than spending money on a road.
 - **Environmental** – using more public transport could help reduce carbon footprints.
4. **Option 1**
 - **Social** – potential disruption to existing transport methods, increasing travel times during the construction of the relief road. This could make people extremely frustrated.
 - **Economic** – the cost is around £1.6bn which could be better spent on other key issues affecting Wales.
 - **Environmental** – the proposed scheme presents issues for habitat sustainability. The noise pollution to build the road is also a concern.

Option 2

 - **Social** – traffic jams will continue and this will frustrate the public, potentially making them late for work.
 - **Economic** – the government might have to raise taxes to pay for the road. The money used to build the road cannot be invested into other major services, e.g. education or healthcare.
 - **Environmental** – disruption to habitats, which could cause species to migrate elsewhere. The rise in pollution from digging the road and paving new surfaces could affect the CO₂ levels in the atmosphere.

Option 3

- **Social** – public transport is not known for reliability. People might continue to use their cars despite any investment in public transport.
 - **Economic** – the government may not spend the same amount of money on improving public transport as it would have spent on the new road. Businesses might not move to the area without the construction of the new road.
 - **Environmental** – the new method would still produce some level of pollution even if it was less than people using a new road.
5. I think the benefits of constructing the relief road far outweigh the negatives. Socially, people will find journey times shorter meaning they can travel in and out of South Wales much quicker. This could lead to improved networking with other businesses who might want to locate along the M4 corridor into Wales. However, I fully appreciate the damage and disruption to the environment should the road be built. Given that the amount of traffic is predicted to worsen, there is a need for this road and not building it now is simply delaying the inevitable. Improving public transport should be considered. Not only will this help people who do not drive, but long-term, encouraging more people out of their cars and onto public transport will reduce carbon emissions.

To conclude, I would prefer option 1. I think we should build the M4 relief road because it will help to attract more TNCs and workers to South Wales, therefore improving the economy. It will also reduce traffic queuing on the M4 and, therefore, carbon emissions.

6. I would reject option 2 because Wales needs a relief road, so we cannot forget about building it. It would help link other areas of the southeast and cut-down on traffic jams. In turn, this will reduce carbon emissions as people wouldn't be stuck in traffic jams.

I would reject option 3 because people need to be able to travel quickly for work and socialisation, therefore a faster road is beneficial. Long-term investment in public transport will not improve inward investment from TNCs and therefore will not attract workers to South Wales. The cost of building the relief road can be recouped with the improvement in inward investment from other companies locating in South Wales.

7. The SDGs I would link to option 1 would be:
- **17** Partnerships for the goals – working in partnership with sustainable builders to create the relief road would lead to more eco-conscious building.
 - **10** Reduced inequalities – the relief road will allow more people from the north to gain quicker access to jobs in the south.
 - **11** Sustainable cities and communities – the construction of the road could create greater access to new suburban cities being built, improving access to housing for people.
 - **9** Industry, innovation and infrastructure – the road in itself is evidence of improved infrastructure linking South Wales to the M4 corridor. If sustainably sourced materials are used, it could help create one of the most sustainable roads in Europe.