GCSE Geography knowledge organisers

Paper 1	1	Natural hazards
	2	Living world
	3	Coasts
	4	Rivers

Paper 2	1	Urban
	2	Economic world
	3	Resources
	6	Energy

Paper 3	Maths skills (On all papers)
	Graphs
	Maps
	Fieldwork

1. Natural hazards

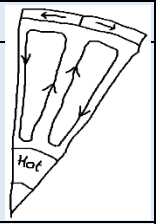
Term	Definition
Natural hazard	A natural event that threatens people or has the potential to cause damage, destruction and death. *Eg.* earthquakes
Tectonic hazards	Caused by movement of the tectonic plates (volcanoes and EQs).
Atmospheric hazards	Created in the atmosphere (tropical storms, drought, tornadoes).
Hazard risk	The probability or chance that a natural hazard may take place.
Earthquake	A sudden or violent movement within the Earth's crust followed by a series of smaller shocks.
Volcanoes	An opening in the Earth's crust from which lava, ash and gases erupt.
Factors increasing hazard risk	
Vulnerability	Higher population densities (floodplains). More people living in dangerous areas.
Capacity to cope	Poverty means people can't afford protection/planning e.g. can't evacuate.
Nature of the NH	More warning for TS than earthquakes. Higher the magnitude = higher risk.

3. Distribution of tectonic hazards

Plate margin	The margin or boundary between two tectonic plates.
Tectonic plate	A rigid segment of the Earth's crust which can float across mantle.
Hazard	**Distribution**
Volcanoes	At destructive + constructive margins. Ring of Fire around edge of the Pacific. Some aren't on margins. (Hotspots)
Earthquakes	Mostly on plate margins. (All margins) Along w. coast North + South America. Some caused by fracking and mining.

2. Plate tectonic theory

Theory	Explanation
Convection currents	Occur in the mantle. The heating and cooling of magma in the mantle makes currents which can move tectonic plates.
Slab pull	Oceanic plate subducting into the mantle pulls the rest of the plate with it.
Ridge push	The weight of the plate at ocean ridges makes the plates move due to gravity.



Structure of the earth

Crust	The crust is made up of 7 large tectonic plates and several smaller ones.	
	Oceanic crust	Thin 5- 10km. More dense. Can be made and destroyed.
	Continental crust	Thick 30 – 50km. Less dense. Older, never destroyed.
Mantle		Semi molten rock moves slowly. Convection currents occur here.
Outer core		Liquid. Iron and nickel.
Inner core		Solid. 5500°C.

5. Key terms

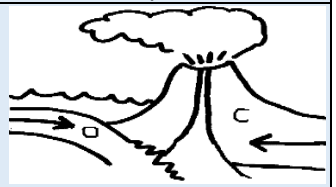
Key term	Definition
Primary effects	The initial impact of a natural hazard on people and property. Caused directly by the event.
Secondary effects	The after effects that occur as indirect impacts of natural events, sometimes on a longer timescale.
Immediate responses	The reaction of people as the disaster happens and in the immediate aftermath.
Long term responses	Later reactions that occur in the weeks, months and years after the event.

4. Plate margins

Include processes and ensure correct sequence.

Destructive margins

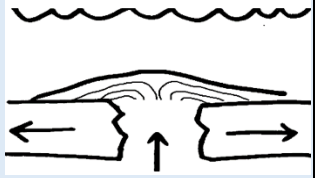
Composite volcanoes.
Earthquakes.



1. **Convection currents** move two plates towards each other.
2. The oceanic plate is denser and so **subducts** under the less dense continental plate.
3. Due to **friction**, and heat in the mantle, the oceanic plate melts.
4. **Pressure** builds up. Magma is eventually released.
5. An explosive eruption forms a **composite volcano.**

Constructive margins

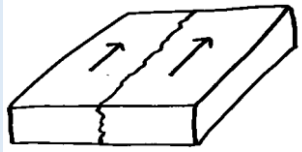
Shield volcanoes.
Earthquakes.



1. **Convection currents** move two plates away from each other.
2. Magma from the mantle rises through the gap.
3. The lava is very runny so travels a long distance before cooling.
4. Over many eruptions, a **shield volcano** is formed.

Conservative margins

Earthquakes.



1. **Convection currents** move the plates side by side.
2. **Friction** builds up causing **tension.**
3. Eventually the tension will be released as waves of energy which is an **earthquake**.

There are no volcanoes at this margin.

6. Tectonic hazards vary between contrasting levels of wealth

	LIC $730	HIC $40,000	Explanation
Earthquake	Nepal 2015	New Zealand 2016	
Primary effects	8,632 died. 22,000 injured. 22 hospitals destroyed. 499,000 homes destroyed. Dharahara Tower collapsed.	2 died. 50 injured. Water/power damaged. Only 36 red tag buildings. 400km road/rail destroyed	New Zealand's buildings are EQ proof. In Nepal building quality is poor, responses ineffective.
Secondary effects	US$5 billion in damages. Tourism decreased by 1/3. 4mill homeless, no water. Avalanches on Everest (18☠)	US$8.5 billion in damages. 200 homeless from Waiau. 100,000 landslides, blocked Clarence River.	Damage costs were higher in New Zealand as more expensive infrastructure.
Immediate responses	India– search/rescue 15mins Shelter- Kathmandu tent city Charities like Oxfam gave aid	200 evacuated in 24 hours. Power restored in 24 hrs. Clean water supplies set up	Not adequate in Nepal, relied on aid. NZ had plans in place- rapid and efficient.
Long term responses	Asian development bank gave US$200 mill Investment needed for infrastructure	New water pipes 4 months Road/rail repaired in 2yrs. Relief fund for low income families ($250).	In Nepal these were slow and are still ongoing. Very fast in New Zealand as more money.

7. Why do people continue to live in areas at risk from tectonic hazards?

Factor	Explanation
Low frequency	People think they won't happen in their lifetime.
Always lived there	Don't want to leave family / friends.
Monitoring	People feel safe as they'll be warned if a hazard is imminent.
Poverty	People can't afford to leave.
Benefits	Volcanoes have fertile soil and geothermal energy. (Economic)
Protection	EQ proof buildings make people feel safe.

8. Management can reduce the risks from tectonic hazards

	Planning	Prediction	Protection	Monitoring
Definition	Actions taken to enable communities to respond to, and recover from, natural disasters.	Attempts to forecast when and where a natural hazard will strike, based on current knowledge.	Actions taken before a hazard strikes to reduce its impact.	Recording physical changes to help forecast when and where a natural hazard might strike.
Earthquake examples	Similar for both. Future development avoids high risk areas. Educate people to know what to do (drills) Plan evacuations. Stockpile emergency supplies i.e. water.	Can't reliably be done for EQs. But we can suggest areas that will be vulnerable.	EQ proof buildings i.e. reinforced concrete. Bridges strengthened with steel frames.	Seismometers and lasers monitor earth movement. Only gives a SMALL warning time.
Volcanoes examples		Can be predicted if the volcano is well monitored. Some LICs can't afford to do this.	Roofs strengthened (heavy ash). Trenches or barriers to divert lava (not successfully).	Seismometers, gases released, changes in shape of the volcano.
How does it reduce the risks?	Less people are vulnerable. Often more efficient in HICs.	Allows evacuation, which can reduce deaths and injuries.	Buildings less likely to collapse reducing injury. But expensive.	Allows a warning to be given to put plans in place like evacuation.

60°S L

10. Weather hazards in the UK

Hazard	Example
Extreme weather	A weather event that is significantly different from the average pattern and is especially severe or unseasonal.
Strong winds	Damage property / disrupt transport. 2018 Storm Ali killed 2 people.
Heavy rain	Can cause flooding, costing millions. Cockermouth 2009 314 mm in 24 hrs.
Snow	Injury, death, travel disruption. March 2018 Beast from East. 50 cm.
Drought	Crop failure, rules to conserve water. April 10-March 12 only 75% of rain.
Heatwaves	Pollution builds up- breathing problems. Death. BUT tourism benefits. 2018.

11. Evidence that weather is becoming more extreme…

Our weather is naturally variable BUT extreme events are becoming more common and severe.

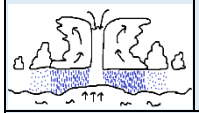
Hazard	Example
Temperature	10 warmest yrs all occurred since 1990. 2018 joint hottest summer on record. Dec 2010 coldest month for 100 years.
Rainfall	More rainfall records broken between 2010 - 2014 than in any other decade. Dec 2015 wettest month on record.

12. An example of a recent extreme weather event in the UK

Name	Cockermouth floods 2009.
Causes	314 mm of rain in 24 hours. Ground saturated (more surface runoff).
Impacts	1 80% of businesses affected. 2 Damage cost over £100 million. 3 Police officer died. 4 2239 properties flooded. 5 110 farms suffered from silt. 6 Biodiversity / habitats affected.
Manage-ment strategies	**Immediate responses** • Government gave £1 million. • Cumbria Flood Recovery Fund £1 mill. • 'Visit Cumbria' website provided information for locals. **Long term responses** £4.4 mill management scheme. H 120m self-raising flood gate. S Flood action group, 2000 trees planted.
This is also our rivers case study.	

13. Tropical storms

Hurricanes, cyclones, typhoons. An area of low pressure with winds moving in a spiral around the calm central point called the eye of the storm. Winds are powerful and rainfall is heavy.

Factor	Explanation
Global distribution	5° – 30° north and south of equator (sea temp warm, wind shear low). More in the northern hemisphere. Move towards the west.
Relationship with ACM	Trade winds (from high to low pressure) send tropical storms to west.
Structure 	Circular, can be 100s of km wide. Eye- calm in centre (air ↓, LOW). Eyewall- strong winds, torrential rain. Edges- Wind speed falls, rain reduces.
How will climate change affect them?	
Distribution	Increase to higher latitudes (warmer sea temperatures).
Frequency	Number could increase. (Longer season)
Intensity	Stronger? More evaporation.

14. Formation of tropical storms

Include processes and ensure correct sequence.

Conditions	5-30° latitude. Ocean depth > 60m deep. Sea temperature > 27°C. Form summer and autumn.

1. Sun heats the ocean (27°C) > **rapid evaporation**.
2. **Condensation** occurs quickly leading to a large amount of cloud forming (**tropical depression**).
3. Due to the earth's rotation, this cloud mass starts to spin. An eye is formed in the centre.
4. Due to rising air, a **low pressure** area forms below. Air rushes into this creating high wind speeds. (>74mph = **tropical storm**)
5. The low pressure results in the ocean being uplifted forming a **storm surge**.

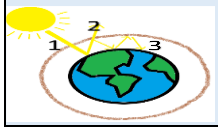
15. How can we reduce the impacts?

Strategy	Explanation
Prediction / monitoring	Satellites and aircraft to monitor storms. Computer models calculate the predicted track. Allows warnings so people can evacuate or protect their home.
Planning	New developments avoid high risk areas Emergency services train and prepare. Plan evacuation routes. Reduces the injuries and deaths.
Protection	Building design- reinforced concrete, stilts to reduce flood risk. Flood defences along rivers and coasts. Reduces the number of buildings destroyed so fewer injuries and deaths.

16. Tropical storms affect people and environments.

	Generic	**Typhoon Haiyan 2013** Philippines
Primary effects	Direct results of strong winds, high rainfall, storm surges. Flooding, buildings destroyed, death.	6,201 deaths. (Most drowned in storm surge.) 1.1 million houses damaged. 90% of Tacloban city destroyed.
Secondary effects	Homelessness > lead to poor health. Lack of sanitation > diseases (cholera) Food shortages, price increase.	4.1 million homeless. Damage cost US$12 billion. 1.1 million tonnes of crops destroyed (rice).
Immediate responses	Evacuate before the storm. Rescue those affected. Provide food, water, blankets. Aid workers arrive from abroad. Recover dead bodies (prevent disease).	➢ Over 1200 evacuation shelters set up. ➢ Philippines Red Cross delivered basic food aid. ➢ UK sent shelter kits. ➢ 800,000 evacuated (warnings given 2 days early).
Long term responses	Repair homes and infrastructure. Promote economic recovery.	➢ More cyclone shelters built. ➢ No build zones. ➢ 'Cash for work' programmes.

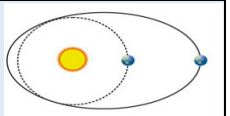
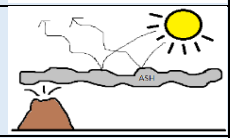
17. Climate change key terms

Key term	Definition
Climate change	A change in the global climate from the expected. This can be due to natural or human causes.
Global warming	Gradual increase in the temperature of the earth's atmosphere generally attributed to the greenhouse effect.
Quaternary period	The period of geological time from about 2.6 million years ago to today
Glacial periods	Colder periods of time.
Interglacials	Warmer periods of time.
Greenhouse gases	Water vapour, carbon dioxide, methane, nitrous oxide, ozone, CFCs
Enhanced greenhouse effect 	The greenhouse effect is a **natural process** that warms the Earth so humans can survive. However, humans have added **extra** GHGs to the atmosphere trapping too much heat making the climate hotter.

18. Evidence for climate change

Key term	Definition
Pollen analysis	Pollen is preserved in peat bogs, we can date the peat and the type of pollen suggests the climate conditions.
Photos	Comparing photos from the 1800's with today show glaciers have shrunk.
Ice cores	Ice cores are extracted by drilling. Analysis of trapped gases tell us the climatic conditions of the past.
Tree rings	Thinner rings indicate colder climates. They can tell us changes in temperature for about 10,000 years.
Temperature records	Records using thermometers show us temperature variations around the globe, but only since the 1850's.

19. Causes of climate change

Natural factors	Orbital changes	Changes in the pathway of the Earth around the Sun over 96,000 years from circular to elliptical. During the circular rotation the earth is closer to the sun and so the climate is warmer. 
	Volcanic activity	Large volcanic eruptions emit ash/gases into the atmosphere. These reflect the sun's radiation back out to space and reduces temperature on Earth for short periods of time (volcanic winters). 
	Solar output	The sun's output of energy changes on a 11 year cycle. When solar output increases the Earth experiences warmer climates.
Human causes	Use of fossil fuels	CO_2 is released into the atmosphere when fossil fuels are burnt. This occurs with cars, factories and to make electricity.
	Agriculture	Farming of livestock produces lots of methane and we now eat more meat. Rice farming also releases methane and is a core food in many cultures.
	Deforestation	Plants remove CO_2 from the atmosphere and convert it to organic matter using photosynthesis. When we cut down trees we stop them absorbing more CO_2. If trees are burnt for fuel or to clear land for farming they release CO_2 into the atmosphere.

20. Effects of climate change

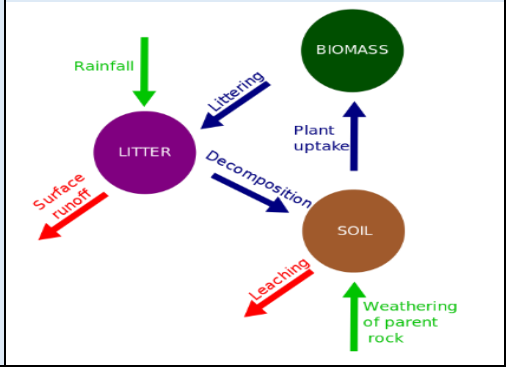
On people	- Death rate has increased (some due to heat, some due to cold) - Migration vital from low lying areas - Water stress increases (political tension) - Lower crop yields (malnutrition) - High damage costs from more storms + Higher temperatures bring an economic boost to some areas (hotter = more tourism, countries at high latitude- farms grow more)
Environment	- Glaciers shrink, ice caps melt - Sea levels rise. 82cm by 2100. - Coastal erosion increases - Coral reefs suffer bleaching - Biodiversity may decrease - More extreme weather events (storms, fires)

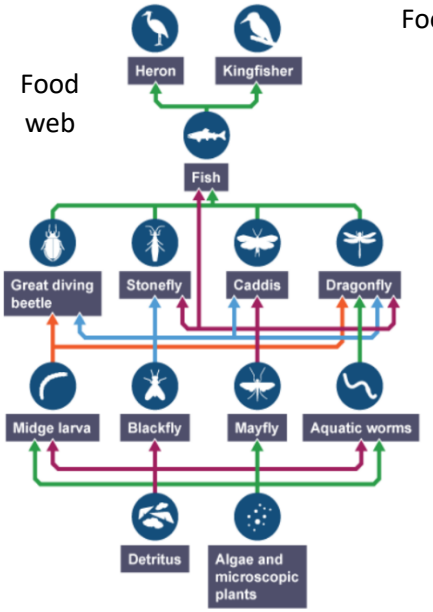
Poor countries tend to suffer the most as they do not have the money to adapt effectively to climate change. Often located in more vulnerable areas.

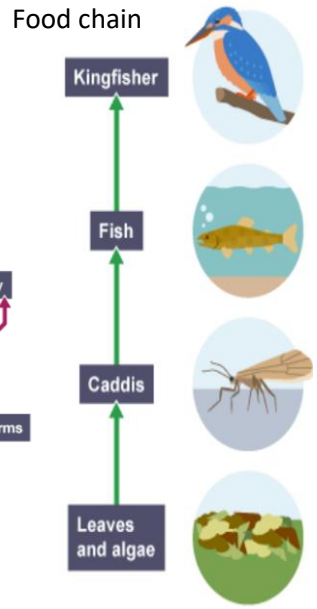
21. Managing climate change

	Strategy	Explanation	Evaluation
Mitigation	Action taken to reduce or eliminate the long term risk to human life and property from natural hazards and climate change.		
	International agreements	1997 Kyoto Protocol. Countries agreed to monitor and cut GHG emissions. UK's target was to cut emissions by 12.5% by 2012 (surpassed it at 22%). 2015 Paris Agreement. 196 countries.	+ Global reduction of CO_2 - The USA didn't ratify the Kyoto agreement and withdrew from the Paris agreement.
	Planting trees	This increases the amount of carbon dioxide that is absorbed from the atmosphere through photosynthesis.	+ Also has other environmental benefits. - Takes a long time for trees to grow
	Alternative energy production	Replace fossil fuels with nuclear power and renewable energy to reduce GHG emissions. The UK is building more offshore windfarms and offering grants for people installing solar panels.	+ Reduces CO_2 emissions. - Expensive, needs large investment.
	Carbon capture and storage	New technology which captures CO_2 from power stations burning fossil fuels and transports it to places it can be stored safely underground.	+ Reduces CO_2 - Expensive technology
Adaptation	Actions taken to adjust to natural events such as climate change, to reduce potential damage, limit the impacts, take advantage of the opportunities, or cope with the consequences.		
	Changes in agricultural systems	Rainfall unreliable, temperatures ↑ Drought resistant crops can be used i.e. millet in Kenya. Some countries are changing to grow different crops i.e. peaches and grapes in southern UK.	+ Higher latitude areas can get more varieties of food. - Drought resistant seeds can be expensive, increases food prices > impacts the poor the most.
	Managing water supply	Dry areas getting drier = water shortages. Collect rainwater, recycle waste water. Water meters installed to cut use.	+ Collecting rainfall is cheap. - Water meters may not change use in HICs (habits need changing). - Little use if the is no rain.
	Reducing risk from rising sea levels	Expected to rise by 82cm in 2100. Physical defences like flood barriers can be built. Cheaper options= earth embankments and building houses on stilts.	+ Important as large areas are being affected. - Can be unaffordable for LICs

1. What is an ecosystem?

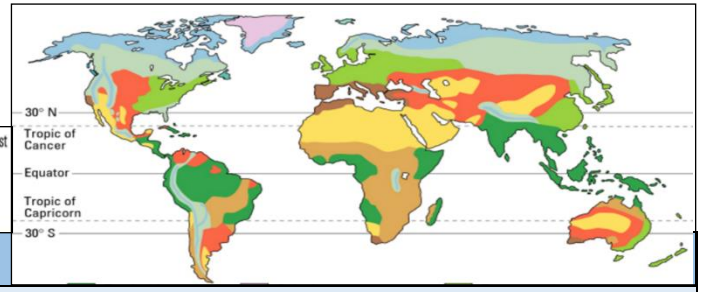
Term	Definition
Ecosystem	A community of plants and animals (**biotic**) that interact with each other and their physical environment -**abiotic**
Biotic	Living elements eg plants, animals.
Abiotic	Non-living elements eg soil, climate.
Food web	A complex hierarchy of plants and animals relying on each other for food. Made of many food chains.
Food chain	The connection between different organisms that rely on one another as their food source. Single flow of energy
Producer	An organism or plant that is able to absorb energy from the sun through photosynthesis.
Consumer	Organisms that eat other organisms. Primary consumers - grasshoppers. Secondary consumers eat herbivores.
Decomposer	An organism that breaks down organic material and recycles nutrients to the soil. E.g. bacteria and fungi.
Nutrient cycle	A set of processes whereby organisms extract the nutrients necessary for growth from soil or water, before passing them on through the food chain. Decomposers ultimately return these back to the soil. 





2. EG of a small-scale ecosystem

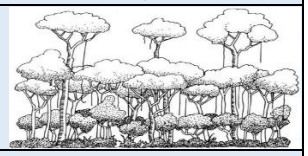
Name	Fresh water pond.
What?	Consists of pond bottom, mid water, surface, pond margin, above surface.
Inter-relationships	Margin provides shelter for insects. Pond surface allows fish to prey on insects like dragonflies. Decomposers live on the pond bottom.
Balance between components	Introduction of more fish means the kingfishers thrive, but the number of caddis decrease due to more predators
	Fertilisers from fields draining into the pond may cause eutrophication. Increases algae but depletes oxygen.



3. Large scale natural ecosystems

Biome	A plant and animal community covering a large area of the Earth's surface. Global ecosystems.	
Name	**Distribution**	**Characteristics**
Polar	At the poles. High latitudes.	Very cold and dry all year round (<250mm). 99 per cent of it is covered by ice. Very little vegetation, dark for several months a year. Low biodiversity.
Tundra	60ºN, along Arctic Circle.	Winters very cold, summers brief, little rainfall. Treeless, mosses and low shrubs. Layer of permanently frozen ground called permafrost.
Temperate deciduous	Mainly found along the mid latitudes.	Deciduous means trees lose their leaves in the winter. Found in areas with 4 seasons. Summers warm, winters mild, rainfall all year round.
Mediter-ranean	40º – 45ºN.	Hot and dry summer with mild winters. Vegetation includes olive and fruit trees. California and some parts of Australia too.
Desert	Between 15º - 35º. Along the Tropics.	High average temperature and very low precipitation (<250mm). Very hot during the day but cold at night. Vegetation is sparse. Sandy soils.
Savanna	Between 15º – 30º. Between TRF + sav.	Grass land with a relatively dry climate. It has wet and dry seasons. Large herds of animals graze alongside predators such as lions.
Tropical rainforests	Along the equator, between the Tropics	High temperatures and heavy rainfall (>2000mm) due to it being in a low pressure area. High biodiversity as it has ideal conditions for plants to grow.

4. Rainforest characteristics

Characteristic	Description
Climate	Consistent all year. No seasons. Very wet. > 2,000 mm per year. Very warm. Average temp. 28°C.
Soil	Latosol (red as rich in iron). Infertile (heavy rain leaches nutrients). Some nutrients on surface. (Decomposition)
Structure (4 layers)	Emergents. Upper canopy. Lower canopy. Shrub layer. 
Biodiversity	Very high, but at risk due to deforestation. >50% of all the species in the world.
Plants	Evergreen as continual growing season. Tall trees. Dense canopy blocks light.
Nutrient cycling	This is very rapid due to the hot and humid conditions.

7. Sustainable management

Rate of deforestation	Varies across the world. Decreasing in Brazil. Increasing in Indonesia.
Strategy	**Explanation**
Selective logging and replanting	Only SOME high value trees like mahogany or older trees are cut. Encourage growth of smaller trees.
Conservation	Nature reserves are set up where economic activity is restricted.
Education	Educating locals on the values and how to make money sustainably.
Ecotourism	Environmentally friendly (small scale, employs locals, educates tourists).
International hardwood agreements	To prevent illegal logging and promote sustainably sourced timber. E.g. FSC.
Debt reduction	Debt cancelled with the aim that the extra money is spent on conservation.

8. Tropical rainforest case study

Name	Borneo, south east Asia.
Back-ground	Island (Malaysia, Brunei and Indonesia). Rate of deforestation faster in Malaysia than any other tropical country.

Causes of deforestation	
The cutting down and removal of forest	
Farming	Subsistence- Grow just enough food for their family. Small scale and sustainable. Commercial- Farming to sell produce for a profit. Largest exporter of palm oil.
Logging	Cutting down trees to sell. Largest exporter of tropical wood (1980s) 85% of logging has been illegal in past. Clear felling replaced by selective logging.
Road building	Roads constructed for access to mines… E.g. Sarawak, east Malaysia.
Mineral extraction	Removal of resources from the earth. Tin extracted in Malaysia.
Energy development	Building dams = forest being flooded. Bakhun Dam flooded 700km^2.
Settlement	New settlements form i.e. Penan.
Population growth	Transmigration policy. 15,000 ha. Urban poor encouraged to migrate to the countryside to ease overcrowding.

5. Adaptations to tropical rainforests

	Name	Description	Explanation
Plants	Drip tips	Waxy leaves shaped like a funnel.	Encourages runoff to reduce water damage and rotting.
	Lianas	Woody creepers rooted to the ground which wind around trees.	By using trees as a ladder to climb, they can get to the sunlight and nutrients.
	Buttress roots	Large roots at the bottom of trees which stand above the surface.	Help support tall trees and overcome shallow soil. They also increase the surface area to help the O_2 / CO_2 exchange.
Animals	Jaguar	Spotted fur called rosettes.	Dense canopy leads to dark forest floor. Fur camouflage.
	Sloth	Slow and nocturnal. Thick, dense coats with angled fur	Conserves energy as they only eat leaves. Funnels high amounts of rainfall off.
	Flying squirrel	Flaps of skin between their limbs.	Allows them to glide between the tall trees to avoid being eaten by predators on the forest floor, conserves energy.

6. Value of tropical rainforests

To people	To the environment
25% of all medicines. Resources to sell like wood, nuts, rubber. Indigenous tribes.	>50% of all plants and animals. High biodiversity. Trees absorb carbon (< climate change) 20% of world's fresh water and 28% of world's oxygen.

Impacts of deforestation	
Soil erosion	No canopy = exposed soil. Roots no longer hold the soil together. Heavy rain washes the soil away.
Economic development	Provides jobs which leads to more tax. Infrastructure improvements open up area for tourism. Profit from selling tin, palm oil, HEP…
Climate change	Trees absorb CO_2 during photosynthesis Deforestation reduce CO_2 storage increasing the greenhouse effect.

9. Hot desert characteristics

Characteristic	Description
Climate	Very little rain. < 250 mm per year. Infrequent; may only rain once every couple of years. Extreme temp. 45°C in day, cold nights
Soil	Shallow and sandy. Lack of rain/plant material means its dry Salinisation is a problem (high evaporation)
Bio-diversity	Low. A further risk from climate change. Highest near water sources.
Plants	Very sparse due to lack of rain. Short life cycle, some appearing only with rain. Many are succulents.
Nutrient cycling	Slow due to a lack of moisture and vegetation. Means infertile soils.
Interde-pendence	Animals spread seeds through dung. Sparse vegetation limits no. animals. People are putting extra stress on the ecosystem, eg draining water supplies.

12. Causes of desertification

The process by which land becomes drier and degraded.

	Cause	Explanation
Human causes	Population pressure	Our population is increasing which is leading to more…
	Removal of fuel wood	Some people still use wood for cooking so cut trees down for fuel Tree roots are vital for holding the soil together so without them more soil erosion occurs.
	Over-grazing	Too many cattle reduces vegetation so nutrients aren't returned to the soil. They also compact the soil.
	Over-cultivation	Crops remove nutrients but does not replenish them so over time soil degrades.
Physical	Climate change	Temperature has increased. Made rain unreliable. Dry soil erodes easily. Worsen by human activity.
	Soil erosion	Bare soil is exposed to wind and rain and so erodes. Made worse by human activity.

13. Strategies to reduce desertification

Strategy	Explanation
Water and soil management	Bunds prevent soil washing down hills
	Irrigation takes water from rivers to water crops (but causes salinisation)
Tree planting	Trees roots hold soil together, provide shade, add moisture to soil. Great Green Wall.
Use of appropriate technology	Magic stones (low stone walls), reduce soil erosion.

11. Hot desert case study

Name	Thar Desert, India and Pakistan.
Background	Most densely populated desert. 80 people per km^2.

Development opportunities	
Mineral extraction	Limestone, gypsum (making plaster), kaolin (paper whitener). Can be sold for profit and provide jobs.
Energy	Jaisalmer Wind Park, India's largest. Solar power at Bhaleri. Sold for profit, aids industry.
Farming	Mostly subsistence. Indira Ghandi Canal now allows irrigation
Tourism	Growing industry. Jobs (guides), profit. Annual Desert Festival (>10,000 tourists).

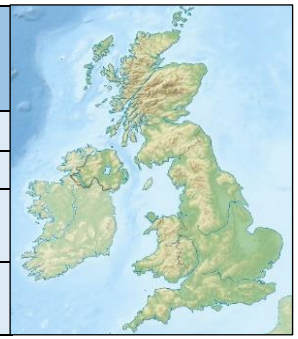
Challenges for development	
Extreme temperatures	Temperature reaches 53°C in July. Working outside is hard. Crops struggle
Water supply	Rainfall is low. 100 – 240mm/year. Shortages frequent due to demand. Impacts farming and industry. Indira Ghandi Canal now helping.
Inaccessibility	Traditional forms of transport like camels in the inner desert. Tarmac melts, sand covers rds; affects trade.

10. Adaptations to hot deserts

	Name	Description	Explanation
Plants	Succulents Eg cacti	Large, fleshy stems. Thick, waxy stems.	To store water during times of reduced rainfall (< 250mm / yr). To reduce water loss (transpiration).
	Tap roots	Long roots (7-10m)	To reach very deep water supplies.
	Dormant seeds	Germinate with rain. Short growth cycle.	As rain is unreliable, seeds germinate when it rains so they survive. They grow, flower, release seeds in weeks- species doesn't die out.
Animals	Camel	Wide feet. Long eye lashes.	Spreads the camel's weight so it's easier to walk on the sand. To keep sand out of their eyes.
	Desert Jerboa	Nocturnal	Bury underground during the day to escape the high temperatures.
	Bat eared fox	Large ears.	Provides a large surface area to maximise heat loss.
	Peringuey's adder	Slide sideways.	Reduces contact with the hot ground.

1. The UK's diverse landscapes

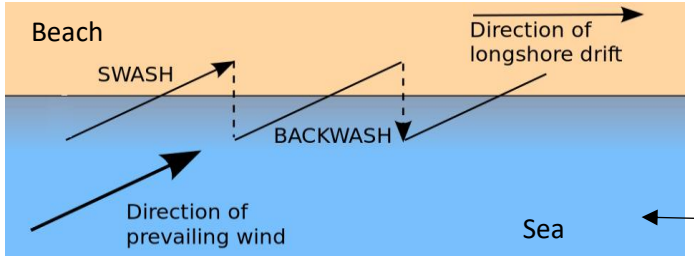
Term	Definition
Relief	Shape of the land.
Upland areas	Land over 200m. Highlands. Steep.
Lowland areas	Land below 100m. Flat or rolling hills



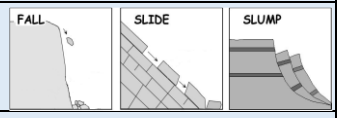
2. Waves

Term	Definition
Swash ↗	Movement of the water UP the beach in the direction of the prevailing wind.
Backwash ↓	Movement of water DOWN the beach at right angles (90°) due to gravity.
Constructive waves	Build up the beach. Strong swash. Weak backwash. Low height, long wave length. Low frequency.

Destructive waves	Erode the coast. Weak swash. Strong backwash. Tall height, short wave length. High frequency.

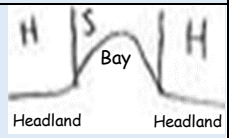


3. Processes

Sub-aerial processes (above the sea)	
Weathering	
Wearing away of rocks in situ. Material not removed.	
Mechanical weathering	The breaking down of rock without changing its composition. Freeze thaw.
Chemical weathering	The breaking down of rock caused by chemicals. (*e.g.* weak acid rain).
Mass movement	
The downhill movement of material under the force of gravity.	
Rockfall	Free fall of rocks under force of gravity.
Sliding	Material collapsing in a straight line.
Slumping	Downward rotation of sections of cliff along a slip plane. Worse when saturated.

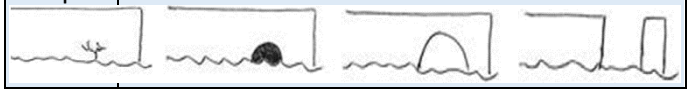
Marine processes	
Erosion	
The wearing away and removal of material by a moving force such as a breaking wave.	
Hydraulic power	The sheer force of the water compressing air into cracks causes bits to break off.
Abrasion	Sediment scraping against the cliff (like sandpaper) removing small pieces.
Attrition	The 'smashing' of sediment against each other to become more rounded.
Solution	Chemical erosion caused by the dissolving of rocks by sea water.
Deposition	
Dropping of material	Occurs when there is a loss of energy. e.*g.*. Sheltered bays, when the wind drops.
Transportation	
Longshore drift	Zig zag movement of sediment along the coastline.

4. Erosional landforms

Headlands and bays	
Step 1	Discordant coastlines have alternating bands of more resistant (chalk) and less resistant rock (clay). 
Step 2	The less resistant rock is **eroded** faster through **abrasion,** creating bays.
Step 3	The more resistant rock **erodes** slower and is left jutting out to sea forming a headland.

Wave cut platforms	
Step 1	Waves **erode** cliff base between high+ low tide
Step 2	**Abrasion** create a wave cut notch which enlarges over time.
Step 3	The rock above the notch is unsupported so will collapse due to **gravity (mass movement).**
Step 4	Cliff **retreats**, leaving a wave cut platform (the un-eroded original cliff left behind).

Cave, arch, stack	
Step 1	**Hydraulic power** enlarges cracks in headland
Step 2	Over time they turn into a cave.
Step 3	Back of cave is deepened by **abrasion** until it **erodes** through the headland > arch.
Step 4	**Weathering** and **erosion** wear away at the arch until it eventually collapses (gravity).
Step 5	A stack is formed.



Example of a UK coastline. Dorset coastline.	
Headlands and bays	Swanage Bay, Durlston Head
Wave cut platform	Kimmeridge
Arch	Durdle Door (concordant)
Stack	Old Harry

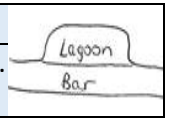
5. Depositional landforms

Beaches Swanage	
Step 1	Beaches form when **deposition** occurs.
Step 2	There needs to be a source of sediment nearby like soft cliffs.
Step 3	Constructive waves **deposit** material in sheltered areas like bays.

Sand dunes Studland	
Step 1	Wind blows sand up the beach (**saltation**).
Step 2	Obstacles such as seaweed cause the wind speed to decrease resulting in **deposition**.
Step 3	Over time sand dunes build up and are colonised by marram and lyme grass.
Step 4	This vegetation stabilises the sand dunes.

Spits Sandbanks	
Step 1	Longshore drift transports sediment along the coast in the direction of the prevailing wind (**swash** and **backwash**).
Step 2	Where the coastline changes direction…
Step 3	Sediment is **deposited** in calm weather out to sea.
Step 4	Can form a hooked end and a salt marsh behind the spit where it is sheltered.

Bar	
Step 1	When a spit joins two headlands.
Step 2	A lagoon forms behind the bar.



6. Coastal management

Hard engineering			
Man made structures built to control the sea. Reduces flooding and erosion.			
Strategy	**Explanation**	**Costs**	**Benefits**
Sea walls	A hard wall made out of concrete that reflects waves back out to sea	Expensive (£2000 per/m). Life span 75 years.	Prevents erosion / flooding. Often protects tourist resorts.
Rock armour	Boulders piled up along the coast. These erode rather than the coast.	Boulders can be moved by waves and need replacing.	Gaps allow water through, reducing wave energy. Cheap
Gabions	Wire cages filled with rocks at the base of cliffs. Absorb wave energy.	Ugly to look at. £100 per/m Metal corrodes over time.	Cheap and easy to build. Reduce erosion.
Groynes	Wooden fences at right angles to the coast, preventing sand moving by longshore drift = wider beach.	Starve beaches further along the coast = more erosion there. Life span only 25 years	Stops longshore drift removing beaches. Fairly cheap.

Soft engineering			
Schemes set up using a natural approach to managing the coast.			
Strategy	**Explanation**	**Costs**	**Benefits**
Beach nourishment	Sand and shingle from elsewhere is added to beaches. Wider beaches stop erosion and flooding	Needs redoing every 5 years. Sand has to be brought from elsewhere. Expensive.	Blends with existing beach. Larger beaches = tourists.
Reprofiling	Sediment is redistributed from the lower part to the upper part of the beach. Increases gradient.	Only works if wave energy is low. Needs to be redone lots.	Cheap and simple. Reduces energy of the waves.
Dune regeneration	Creating or restoring sand dunes by nourishment or planting marram grass to stabilise the sand	Protects only a small area. Areas zoned off from public which is unpopular.	Sand dunes create a barrier between the sea and land. Stabilisation is cheap.
Managed retreat Coastal realignment	Remove current defences, allow sea to flood the land behind. Over time land becomes a marshland.	Land is lost = conflict (farmers) Salt water can negatively impact existing ecosystems.	Cheap and easy. Doesn't need maintenance. New habitats created.

7. An example of a coastal management scheme

What?	Reasons for management	Management strategy	Effects and conflicts
Bournemouth Beach Management Scheme. Aim: Hold the line and protect tourism.	Coastline would erode at a metre a year. Beach important for tourism (£413million). 3114 homes at risk from collapsing cliffs.	3 phases costing £50 million. HARD: Replaced or added 53 groynes. SOFT: 3 lots of replenishment, every 5 yrs	✓ Beaches = More tourists = 9000 jobs ✗ Barton on Sea at risk from erosion. ✗ Conflict: locals vs construction.

GCSE Geography. Paper 1.

1. Global pattern of urban change

The world's population is growing rapidly; currently 50% of us live in urban areas.

Urbanisation	An increasing percentage of a country's population living in towns and cities.
HICs	Very slow rate of urbanisation. Already have high urban populations. Urbanisation happened earlier (during the industrial revolution).
NEEs	Fast rate of urbanisation due to industrialisation. Urban population is increasing rapidly.
LICs	Fast rate of urbanisation. Urban population is low as many still work in farming.

2. Factors affecting urbanisation

Rural-Urban migration	The movement of people from a rural area (countryside) to an urban area (towns and cities).
Push factors	Negative factors that make people leave an area *e.g.* drought, famine, war, few services.
Pull factors	Positive factors that attract people to an area *e.g.* better access to services, better paid jobs, access to electricity.
Natural Increase	When the birth rate is higher than death rate; the population grows. High in NEE cities as migrants are often young and health care is improving.

3. Megacities

Megacity	A city of more than 10 million people living there.
How many?	There are now 34. Rapidly increasing.
Where?	Most are in Africa and Asia.

17. Key terms

Social deprivation	The extent an individual or an area lacks services, decent housing, adequate income and employment.
Dereliction	Abandoned buildings and wasteland.
Urban Greening	Process of increasing and preserving open space in urban areas *i.e.* parks.
Urban sprawl	Unplanned growth of urban areas into surrounding rural areas.
Integrated Transport System	Different forms of transport are linked together to make it easy to transfer from one to another.
Brownfield	Land that has been used, abandoned and now awaits reuse; they are often found in urban areas.
Greenfield	A plot of land, often in rural areas or on the edges of urban areas that has not been built on before.
Commuter settlements	A place where people live but travel elsewhere for work *e.g.* Yate → Bristol.

18. Sustainable urban living

Sustainable urban living	Where people living, now, have the things they need, without reducing the ability of people in future to meet their needs.
Water conservation	Recycling grey water. ½ flush toilets. Rainwater harvesting on roofs. Permeable pavements- filters pollutants.
Energy conservation	Energy efficient appliances. Energy saving (south facing windows). Use of renewable energy sources.
Waste recycling	Recycling boxes in houses. Recycling facilities nearby. Encourage websites like 'Freecycle'.
Creating green space	Maintain green spaces around towns- Cools area, encourage exercise, happy.

19. Urban transport strategies used to reduce traffic congestion

Problems with congestion	↗ air pollution (global warming). Late for work, deliveries delayed. ↗ accidents, stress, asthma. In Bristol, 200 people die as a result of air pollution each year.
Beryl Bikes	Shared bikes in Bournemouth + Poole.
Oyster Cards	Quick and easy to pay for more than one type of public transport (London).
Park and ride	Car parks on the outskirts of a town, with buses into the city centre.
Congestion charge	Charge for entering the city centre at peak times.
Bus lanes	Stop buses being held in traffic.

4. Location and importance of Lagos

Location	Lagos is located on the south coast of Nigeria, close to the Benin border.
Regional	Good transport links- centre of trade. Large migrant pop.- cultural diversity.
National	Largest city in Nigeria (21 mill megacity) 80% of Nigeria's industry, 30% of GDP.
International	Financial centre of West Africa. Important port, international airport.

5. Causes of urban growth in Lagos

Rural to urban migration	More than 275,000 migrants arrive in Lagos every year. 1,200 migrants arrive each day.
Natural increase	High birth rate of 35.2 per 1000/year. Migrants are young so have children.

6. Opportunities created by urban growth in Lagos

Social	• Better access to services (health care, water treatment). • 68% have a secondary education. 90% attend primary v.s. 40% in rural areas. • Electricity (Lagos uses 40% of Nigeria's).
Economic	• Jobs available (construction- Eko Atlantic). • Wages 4x higher than in rural areas. • Thriving film/music industry- Nollywood 2nd largest film industry, $3 billion in 2018
Urban industrial areas	Groups of industries located together. • Provide jobs > Wages increase > Home market increases. • Increases exports + tax to government. • Attracts other businesses **(positive multiplier effect)**.

7 + 8. Challenges created by urban growth in Lagos

Managing urban growth	66% live in squatter settlements like Makoko (1/4 million people). **Squatter settlements** are areas of poor-quality housing (often illegal), lacking in basic services *i.e.* sewage and water. 3 km to communal water points. Up to 15 households can share 1 toilet.
Providing clean water	Only 40% of the city is connected to the state water supply. Pipes are old and can be contaminated with sewage. Informal market for water- inflated prices.
Providing sanitation	Squatter settlements do not have access to sewers. Causes health problems *e.g.* cholera.
Providing energy	Not enough power for all… Neighbourhoods have to take turns for a few hours at a time. In squatter settlements, some illegally tap electricity which is dangerous.
Providing access to services	This is better than in rural areas… but not equal for all. Squatter settlements have limited access. Poorer people are less likely to afford services. Makoko has just 1 school and informal, unregistered healthcare centres.
Reducing unemployment	Not enough formal jobs. 60% work in the informal economy. *E.g.* People scavenge in the Olusosun rubbish dump.
Crime	City is too large to effectively police all of it. High crime rates in squatter settlements. Gangs like 'Area boys'.

Managing environmental issues

	Challenge	How is it being managed?
Waste disposal	Produces 9000 tonnes of rubbish each day. Only 40% of rubbish is collected.	LAWMA starting to collect rubbish overnight. Recycling banks added to each estate.
Air and water pollution	10,000 illegal industries = waste disposal and emissions are not controlled. Squatter settlements have no sanitation. Pollution levels are 5x higher than recommended limit > breathing problems.	Lagos has banned the import of mini generators Communities encouraged to share one larger generator. $2.5 million new water treatment plants.
Traffic congestion	40% of Nigeria's cars are registered in Lagos. Bad traffic congestion- poor public transport 2 hours commute called the 'Go Slow'.	Bus Rapid Transit network. Built to cope with 200,000 people daily.

9. Example- How urban planning improves the quality of life for urban poor

What?	How does it improve QoL?	Was it successful?
Makoko Floating School Built in 2013 Educated 100 of the poorest children in Makoko	Collects rainwater – drinking source Used for community meetings Built by unskilled locals (gained new skills) Improved job prospects for children	✓ Increased quality of life. ✗ Collapsed after a storm in 2016. ✗ Didn't cater for enough children.

10. Distribution of population and major cities in the UK

Population	66 million. Distribution is very uneven. 82% live in urban areas. Upland areas are sparsely populated.
Cities	Most in lowland areas and on coasts. London is the biggest city and the capital. It has 10% of the population. Cities reflect our industrial past (near raw materials *e.g.* Leeds near coal). Counter-urbanisation is a recent trend.

11. Location and importance of Bristol

Location	South west of the UK, on Bristol Channel. Near to junction of M4 & M5.
Importance within the UK	Largest city in the southwest. 8th most popular city for foreign tourists. 2 universities and 2 cathedrals.
Importance to wider world	Largest concentration of silicon chip manufacturing outside of California. International airport (links to Europe). Many TNCs located there (AirBus, BMW)

12. Impacts of migration on the growth and character of the city

National migration	1851 - 1891 population doubled as people arrived looking for work.
International migration	Now,international migration accounts for half of its growth. 50 countries. Many from Europe (Poland, Spain).
Impact on character	Many cultural opportunities. Afro-Caribbean- strong community spirit and events (St Paul's Carnival).

13. Urban change in Bristol

- Population is growing rapidly.
- Population is more ethnically diverse.
- More under 16-year olds than of pensionable age.
- Electrification of railway to London (<70 minutes).
- Become more accessible (road, rail, air).

14. Opportunities created by urban change

Cultural mix	50 countries represented (food, art). St Paul's Carnival (attracts 40,000).
Recreation and entertainment	Underground music scene -Colston Hall. Entertainment (The Bristol Old Vic). 2 football teams (City, Rovers). Shopping Cribbs Causeway, Cabot Circus.
Employment	Highly tech. industries = jobs. 50 silicon businesses. Many TNCs. £100 million improved broadband.
Integrated transport system	Links different types of public transport Reduces congestion in the city. ↗ % people walking and cycling (57%).
Urban greening	> 90% live within 350m of park/water. 300 parks. 1/3 Bristol is open space. 2015 European Green Capital status.

15. Challenges created by urban change

Urban deprivation	Some areas face social deprivation. 1/3 of people in Filwood are in very-low income households. Problems of crime, drug use, low quality housing, lack of transport.
Inequality in housing	Filwood- 50% in council housing. Stoke Bishop- millionaires (large villas)
Inequality in education	Filwood- 36% get top GCSE grades. Stoke Bishop- 94%.
Inequality in health	Filwood- Life expectancy 78 years. Stoke Bishop- 83 years.
Employment	Filwood- 1/3 16-24-year olds. Stoke Bishop- Just 3%.
Dereliction	Industrial buildings derelict (inner-city). Stokes Croft (many squatters).
Building on brown and greenfield	2006-13 94% housing on brownfield. Plan for 30,000 homes on brownfield. Temple Meads built on brownfield.
Waste disposal	>1/2 million tonnes of waste/year. (23% lower per head than UK average) ↗ recycling by 50%. Teach it in schools.
Urban sprawl	Greenbelt to prevent merge with Bath City extended to NW (Bradley Stoke). Led to destruction of greenfield sites. Yate- Commuter settlement.

16. An example of an urban regeneration project

Example	Why did it need regeneration?	What are the main features?	Successful?
Temple Quarter, Bristol	• Bristol surrounded by a green belt. • Brownfield site- rundown, ugly. • By Bristol Temple Meads Station- poor impression for new visitors. • Previously an industrial area.	• Enterprise Zone *e.g.* low rents. • Improve access *e.g.* ITS. • New bridge across River Avon (access to planned Bristol Arena). • Maintain historical features, cobbled streets- gives character • Brunel's Engine Shed £1.7mill.	✓ 4,000 new jobs by 2020 (17,000 by 2037) ✓ Attracts tourists. ✓ Redeveloped brownfield site ✕ Arena still not built

1. What is development?

Term	Definition
Development	The progress of a country in terms of economic growth, the use of technology and human welfare.
Uneven development	Development takes place at different rates in different places.
Development gap	The difference in standards of living and wellbeing between the world's richest and poorest countries.
Quality of life	General wellbeing (includes health, happiness, social belonging…)
Standard of living	Level of wealth and material goods available to people. $
Economic development	Progress in an economy. New technology can lead to a move from agriculture to industry.

Ways to classify the world

LIC	Low income countries. GNI per capita of under $1,045. (Poor) e.g. Haiti.
NEE	Newly Emerging Economies. Countries that have begun to experience high rates of economic development, with rapid industrialisation. e.g. Nigeria
HIC	High Income Countries. GNI per capita of over $12,746. (Rich) e.g. UK.
Brandt line	An outdated line from the 1980's that split the world into rich north and poor south.

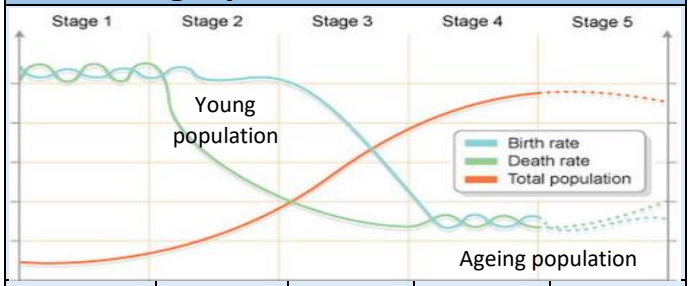
5. Consequences of uneven development

Disparities in wealth	Most developed countries> most wealth Africa owns just 1% of global wealth.
Disparities in health	Health care in LICs poor = ↓ life expect UK LE is 81 years. Nigeria LE is 52 years
International migration	Poor try to migrate to HICs. Mexico into USA. Syrians into Europe. Economic migration also occurs.

2. Measuring development

Term	Cat.	Definition
Arrows show how the indicator changes with development.		
GNI per capita	💰 ↗	Gross National Income per person. Total income divided by the size of the population. - Doesn't show inequality within a country. It's just an average.
Birth rate	🧍 ↘	The number of babies born in a year per 1000 of the population. +Reliable- infers female equality.
Death rate	🧍 ↘	The number of people that die in a year per 1000 of the population. - Less reliable. HICs now have an ageing population- > DR
Infant mortality rate	🧍 ↘	The average number of deaths of infants under the age of 1, per 1000 live births per year.
Life expectancy	🧍 ↗	The average number of years a person might be expected to live. - Less reliable for a LIC due to IMR making it look lower
People per doctor	🧍 ↘	The number of people who depend on a single doctor for their health care needs
Literacy rate	🧍 ↗	The percentage of people who have basic reading / writing skills.
Access to safe water	🧍 ↗	The percentage of people who have access to water that does not carry a health risk such as cholera
HDI	💰 🧍 ↗	Human Development Index. A combined measure that includes GNI per capita, life expectancy and adult literacy rate. Out of 1. + Best indicator as it includes 💰 and 🧍 data. Removes anomalies
Generic limitations	Data can be out of date or unreliable. Inequalities exist within countries.	

3. Demographic Transition Model



-	LIC	NEE	HIC	HIC
High BR	High BR	Falling BR	Low BR	Low BR
High DR	Falling DR	Low DR	Low DR	Low DR
Lack of clean water and reliable food = ↑DR High IMR = ↑BR	Farming = ↑BR Medical care improves = ↘DR	Rural / urban migration. Factories not farming = ↘BR	Women have careers, marry later, contraception = ↘BR Very good health care, healthy diets = ↘DR	

4. Causes of uneven development

Cat	Factor	Explanation
Physical	Natural disasters	Government has to spend money rebuilding rather than education. eg Haiti has had EQs and TS
	Land-locked	No coastline. This hindered trade keeping the GNI low. E.g. Nepal.
	Extreme climates	If it's too hot or cold agriculture is difficult. E.g. Thar Desert
Economic	Debt	A country's money will go to repaying debt rather than education.
	Selling primary products	These are low value goods so the government has restricted income to invest in health care.
Historical	Colon-ialism	European countries controlled much of Africa and Asia. After regaining power they were poor and civil wars often occurred. eg Nigeria- UK colony
	War	Money spent on arms. E.g. Sudan

6. Strategies to reduce uneven development FAT MIDII

Strategy	Explanation	Evaluation
Fairtrade	When producers in LICs are guaranteed a fair price for the goods they produce ie cocoa, coffee. The better price improves income, aids community projects and protects the environment.	+ Improves quality of life - Poorest can't afford certification
Aid	When a country or non-governmental organisation donates resources or money to another country to improve people's lives. Short term emergency aid or long-term aid. Nigeria- NETS4Life.	+ Improves quality of life - Aid may be tied - Corruption of aid
Tourism	Visitors spend money in a country and infrastructure is improved.	- Can be unreliable
Microfinance loans	Very small loans which are given to people in the LICs to help them start a small business. Often to women.	+ Makes women more equal - Can lead to debt
Investment	Countries or TNCs can invest in a country. Might include the development of infrastructure, building dams or industry. Shell.	+ Triggers multiplier effect - Economic leakage can occur
Debt relief	36/39 of the poorest countries have had their debt cancelled if they could guarantee no corruption and they agreed to spend the money on education/ reducing poverty. Nigeria's cancelled 2005.	+ Improves quality of life - They may go into debt again - Corrupt governments…
Intermediate technology	Sustainable technology that is appropriate to the needs, skills, knowledge and wealth of local people. Small scale projects.	+ Affordable - Small scale
Industrial development	Developing the secondary sector. This brings jobs, higher income and infrastructure improvements.	+ Triggers multiplier effect - Environmental damage

7. Tourism to reduce uneven development

Nepal	LIC. GNI per capital of US$1,090. Suffered civil war and earthquakes. Trek (Mount Everest), jungles, culture.
Advantages	+ $445 million in 2015. + 8% GNI. + 500,000 jobs. 7% employment.
Dis-advantages	- Locals are poorly paid. - Economic leakage. - EQ in 2015 reduced tourism by 1/3. Some out of work for 7 months. - Environmental damage (ie O_2 tanks).
Summary	Has been successful but it is unreliable. Need to find a more sustainable method for the long run.

8. Introduction to Nigeria

Located just north of the equator, in west Africa.

Importance of Nigeria	
Global importance	NEE in 2014 > 21st largest economy. 5th largest contributor to UN peace keeping.
Local importance	Fastest growing economy in Africa. In 2014 they had the highest GDP.
Nigeria's context	
Political	Ⓟ Boko Haram have killed 17,000 people since 2002.
Environment	Rainforest- south > savanna- north.
Social	500 ethnic groups Literacy 61%, life expectancy 52 years
Cultural	Nollywood (2nd largest film industry).

9. Nigeria's changing industrial structure

Term	Definition
Industrial structure	The relative proportion of the workforce employed in different sectors of the economy (p, s, t, q).
Primary sector	Jobs that extract/collect natural resources. ↓ Decreasing due to mechanisation and industrialisation. This started rural to urban migration.
Secondary sector	Jobs making things. ↑ Increasing (industrialisation).
Tertiary	Jobs that provide a service. ↑ Increasing as people start to have more disposable income.

How does manufacturing stimulate economic development?

- Factories provide jobs > people have more disposable income > home market enlarges.
- Companies pay tax > government invests in infrastructure like roads > attracts more companies to invest. **Positive multiplier effect.**

10. Transnational corporations

Term	Definition
Transnational Corporation	Companies that operate in more than one country. (40 TNCs in Nigeria)
Host country	Country the TNC places its factories.
Footloose	Industries not tied to a certain location
Shell in Nigeria	
Advantages	+ 65,000 jobs = > disposable income. + 91% contracts to Nigerian companies (reduces economic leakage)
Dis-advantages	- Bodo oil spill 08/09. 11 million gallons of oil spilt over 20km².
Summary	National economic benefits vs local environmental costs in Bodo.

12. Impacts of economic development

Impact on the environment	70-80% forests destroyed. Bodo Oil spill (Shell 08/09). 10,000 illegal industries = air pollution. Loss of species (giraffes, 500 plants).
Impact on quality of life	Life expectancy ↑ from 46-52 years HDI from 0.47 to 0.53. BUT inequality has widened due to oil wealth and corruption.

11. Nigeria's changing relationships

Political relationships	- Gained independence (UK in 1960). - Member of British Commonwealth.
Trading relationships	- Member of OPEC (oil). - Member of ECOWAS (Western Africa trading group). - Has strong links with China and USA.

International aid in Nigeria

Term	Definition
International aid	Money, goods and services given to help the QoL of **another** country.
Emergency aid	Usually follows a natural disaster or war. e.g. Food, water, shelter.
Develop-mental aid	Long term support by charities or governments to improve QoL. E.g. infrastructure, education, clean water
Aid in Nigeria	
What?	4% of aid given to Africa. UK gave £360 million in 2014.
Nets for life	Nets to prevent malaria. 82,500 given out in Abuja. ✓ Successful as community based.
Problems with aid	- Sometimes it isn't sustainable. - Corruption. - Can be tied (strings attached).

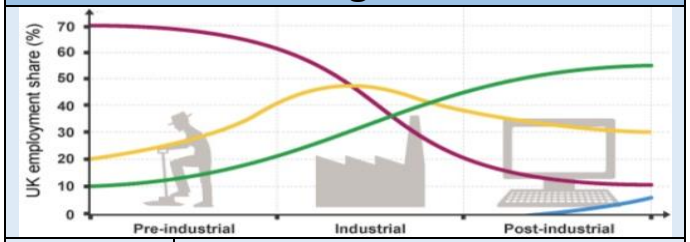
19. Place of the UK in the wider world

Trade	UK trades globally. Exports are worth £250 billion. Strong links with USA, Europe, Asia.
Culture	UK culture exported worldwide. Shaun the Sheep in 170 countries.
Transport	Channel tunnel links UK/France. Heathrow major airport hub.
Electronic communication	Most trans-Atlantic cables go through the UK. Many IT firms.

UK Economic and political links

European Union	Partnership of 28 countries. The largest single market in the world. 50% of our trade. 40% of immigrants to UK came from EU. Voted to leave in 2016. Not yet left. The UK left 31.1.2020.
Common-wealth	Association of 53 independent states. Aims to improve wellbeing of members. Commonwealth games every 4 years.

13. Economic change in the UK



Primary	↘ due to mechanisation.
Secondary	↗ due to industrial revolution then ↘ due to de-industrialisation.
Tertiary	↗ due to wealth (↗ disposable income)
Quaternary	High-tech jobs including research and IT. ↗ due to government policies and the increase in technology.
Why has our economy changed?	
De-indust-rialisation	The decline of a county's traditional manufacturing industry due to exhaustion of raw materials, loss of markets and competition from NEEs.
Government policies	A plan decided by a government to manage issues in a country.
Global-isation	The process which has created a more connected world; with increases in the movement of goods/people worldwide

14. Post industrial economy

Tertiary and quaternary sector employed 81% in 2011.	
IT	Employs over 60,000 people.
Services	Retail is the largest sector. Employs 4.4mill
Finance	London is the world's leading centre. HSBC
Research	Government invested £30bill in 2013.
Science parks	Groups of high tech industries and those doing scientific research. Located near universities (for graduates, share facilities).
Business parks	Purpose built areas of offices and warehouses (on edge of cities as less congestion, cheaper, good transport links).

15. Environmental impact of industry

Air and water pollution. Soil degradation.
Releases CO_2 increasing the rate of global warming.
Transport of materials is by road ↗ air pollution.

Example of modern industry being environmentally sustainable

Google	London Landscraper started 2018.
686 bikes spaces 4 car spaces	Encourages cycling to work. < congestion/CO_2 emissions.
Solar panels. 19,800 kWh	Reduces fossil fuel consumption and reduces carbon footprint.
Rooftop gardens	Urban greening. < CO_2. Collects rainwater. Encourages wildlife.

16. Changes in the rural landscape

Population decline	Outer Hebrides (away from cities, limited opportunities).
Social changes	🧍 Declined by >50% since 1901. 🧍 ↑ aging population = care issues. 🧍 Less children > schools shut.
Economic changes	💰 Services close ie post offices. 💰 ↑ tourists but infrastructure not there. 💰 Government subsidies cost of ferries.
Population growth	South Cambridgeshire (near large cities, people can commute).
Social changes	🧍 Migrants from Cambridge, some now from Eastern Europe too. 🧍 Proportion of elderly increasing (>65). 🧍 80% car ownership = > congestion. 🧍 Young people are costed out.
Economic changes	💰 ↑house prices.Less affordable housing 💰 Petrol prices ↑.

17. Improvements in infrastructure

Road	Upgrading 'Smart motorways' M4. Variable speeds, reducing accidents, extra lanes. 2014 Road investment strategy £15 bill. New construction jobs, boost economy.
Rail	Crossrail in London. Puts extra 1.5 million within 45 mins commute of capital city. HS2 to reduce journey times. London to Manchester in 1 hr 8 minutes.
Port	Liverpool 2. Doubles capacity to over 1.5 million containers a year. 96% of UK imports/exports through ports.
Airports	Heathrow expansion. 3rd runway £18.6bill

18. North-South divide

Causes	Decline of heavy industry in North (coal) Investment in finance and service industry in the South Investment in infrastructure in South
Impacts in north	Higher unemployment / lower wages (40%) Poor health, lower life expectancy (10 yrs) Poor education. There are SOME exceptions

Strategies attempting to resolve regional differences

Devolving more powers	Give more power to local councils and Welsh and Scottish governments. Plan best how to use their money.
Northern Powerhouse	A plan to attract investment to north. Improve transport links to northern cities. e.g. HS2, Liverpool2. BUT just a CONCEPT not a plan.
Enterprise Zones	55 EZs to encourage businesses to set up in areas of high unemployment. Reduce taxes, simple planning rules, superfast broadband to the area. Created more than 15,000 jobs.

1. What are resources?

Term	Definition
Resource	A stock or supply of something that has a value or a purpose (food, energy, water).
Resource management	Control and monitoring of resources so they don't become depleted or exhausted.

Significance for well being

Resources are key to human wellbeing. Their social and economic benefits increase standard of living.

Food	More than 1 billion are malnourished (this ↑ chance of diseases). Calories provide energy which are vital for people (work, school).
Water	Needed for drinking, cooking and washing. Walking long distances to collect water can stop people working /going to school. Dirty water kills (diseases like cholera).
Energy	Allows industry to develop, creating jobs and making countries richer. Vital for transport. Without it, people burn wood/kerosene to heat homes (takes longer, damages environment)

Resources inequality

Distribution **Uneven**	Some countries don't have energy reserves or have unsuitable climates to grow food.
Dependent on **wealth**	Countries without have to import them or find technological solutions. (Expensive)
Consumption	Greatest in **HIC**s (> money, expect higher living standard). Rapidly increasing in **NEE**s. Low in **LICs**. Can't afford to exploit resources or import them.

2. Food in the UK

Demand	Increasing… rising population, demand for greater choice, more disposable income.
Importing 40% food	Expensive in the UK due to poor harvests. Greater demand for exotic foods. Labour cheaper in LICs. Unsuitable climate for growing some food. We want seasonal foods all year round.

Problems with importing food…

Carbon footprint	A measure of the greenhouse gases produced. If we transport goods from abroad the carbon footprint is larger.
Food miles	The distance covered supplying food to the consumer. The smaller the better.

Current food trends in the UK…

Agri-business	Large scale, industrial farming aimed to maximise the amount of food produced.
Organic produce	Food grown without the use of chemicals. Higher labours costs can make it expensive.
Eat local	Buy from local farms = lower food miles.

3. Energy in the UK

Demand	We consume LESS energy even though there are more people because of industry decline and energy efficient products like light bulbs.
Energy mix	The different energy resources used by a country. Renewable + non-renewable.
How is it changing?	Renewables are increasing. 1970 – 91% came from coal and oil. 2014 – 19% came from renewable. 50% came from coal and oil.
Reduced domestic supplies coal, gas, oil	North Sea oil + gas reserves running out. We still have coal reserves but all coal fired power stations will close by 2025. By 2020 we will need to import 75%.
Issues with energy exploitation	Economic 💰 Extraction is expensive. 💰 Money needed to research alternatives 💰 UK has to pay to import energy. Environmental 🌲 Fracking can cause mini earthquakes. 🌲 Burning fossil fuels release CO_2. 🌲 Oil spills can leak toxic chemicals.

4. Water in the UK

Demand	Demand is increasing (70% since 1985). Higher pop. > more houses > more water intensive appliances.
Water quality	Water quality improving. But pollution present from fertilisers, oil spills, vehicle pollutants.
Managing pollution	Stricter regulations on fertilisers, filtering water for sediment, purifying water (chlorine).

Areas of deficit	South east. High population = high demand but low rainfall.
Areas of surplus	North + west. High rainfall but low population.
Water transfer	From areas of surplus to areas of deficit. eg Mid Wales (surplus) to Birmingham. BUT expensive, affects wildlife, social conflict.

5. Energy overview

Energy Security Affected by:	Energy security means having a reliable, uninterrupted and affordable energy supply. • Supplies available • Size of population • Amount used by each person
Energy surplus	This occurs when a country produces more energy than is required by their population.
Countries with surplus	Oil: Iran, Saudi Arabia. Coal: Australia, China.
Energy deficit	Having too little energy to meet the needs of the people and industry.
Countries with deficit	Politically unstable: Sudan (LIC). Few resources: Ireland (HIC).
High consumption	Wealthy countries (HICs) tend to have higher energy consumption due to car ownership/heating.
Low energy consumption	Poorer countries (LICs) tend to have lower energy consumption due to lifestyle and lack of access.

9. Sustainable resource future

Carbon footprint	The amount of greenhouse gases an individual produces.
Strategies for conserving energy	
Sustainable design	Insulate walls, south facing homes Automatic lights, solar panels on roofs.
Demand reduction	Improve public transport. Encourage energy conservation.
Technology to increase efficiency	Hybrid cars. Power stations become more efficient. Energy efficient appliances.

6. Factors affecting energy

Reasons for increasing consumption	
Rising population	More people need more energy.
Economic development	Rapidly increasing in NEEs. More disposable income to spend on luxuries like cars, electronic devices.
Technology	We have more technology. Phones, tablets all require energy.
Factors affecting supply	
Physical factors	Unequal distribution of fossil fuels. Variations in climate mean some energy sources are more suited to certain areas.
Economic factors	Fossil fuels are becoming more costly to extract and prices fluctuate. LIC's can't afford to exploit their energy.
Tech-nology	Some sources are hard to extract so advancements in technology to access. Improvements in technology has made fracking possible.
Political factors	Wars/political instability can affect exports International agreements encourage countries to emit less CO_2 > renewable. Nuclear illegal in some countries.

10. Example of a local scheme

Where?	Chambamontera. Rural village in northern Peru.
What?	Micro-hydro scheme. SUSTAINABLE. Set up by Practical Action in 2007.
Evaluation	+ 60 rural families have electricity. + 60% said their income had increased. + Used local labour and materials. - Cost $51,000. Locals families paid $750

7. Impacts of energy insecurity

Exploration of difficult and environmentally sensitive areas	Need to seek out new reserves in areas like the Arctic. Oil spills could damage these fragile ecosystems.
Food production	Production uses 30% of energy. Energy deficit may lead to food shortages and malnutrition.
Industrial output	Energy is essential for industry. Power cuts stop production.
Potential for conflict	Middle East produces 56% of oil. They control prices. Can lead to war like Iraq.

8. Strategies to increase supply

Renewable	Will never run out. Increase their use. (7)	
	Wind	Turbines on land/sea.
	Solar	Solar panels convert sunlight.
	Hydro	Dams. Turbines spin to create electric.
	Tidal	Barrages across estuaries use tides.
	Geo-thermal	Water heated underground in contact with hot rocks. (Tectonics)
	Wave	Air forced into chambers, turn turbines
	Biomass	Energy produced from organic matter
Non renew.	Non-renewable so will run out. (4)	
	Nuclear	Large amounts, but waste dangerous.
	Fossil F: Coal Gas Oil	Need to search for new reserves. Use new technology to exploit reserves previously too difficult/costly to use.

Extracting a fossil fuel. Fracking.

Fracking in the UK was stopped in November 2019.	
Advantages	+ Cleanest FF. 45% less CO_2 than coal + Large reserves in the UK. + Can create jobs.
Disadvantages	- Releases CO_2, methane. - Will run out. - Causes small earthquakes.

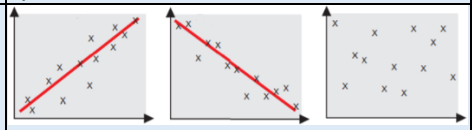
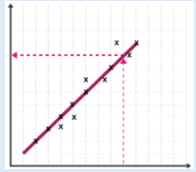
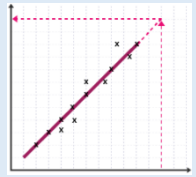
1. Measures of central tendency

Key term	Definition	Example: 9 3 5 4 7 3 8
Mean	Total of items ÷ number of items.	(9+3+5+4+7+3+8 = 39) ÷ 7 = **5.57**
Median	Middle value (when they are in order). Or position can be calculated using (n+1) ÷ 2	3 3 4 **5** 7 8 9 = **5** (7+1) ÷2= 4th position
Mode	Most common.	3 (appears twice) There can be several modes.
Modal class	Most common class.	-
Range	Difference between the highest and lowest value.	Highest 9 – lowest 3 = **6**
Upper quartile	Value ¾ of the way through ordered data (smallest to largest). Position = $\frac{3(n+1)}{4}$	3 3 4 5 7 **8** 9 = **8** Position = $\frac{3(7+1)}{4}$ = 6
Lower quartile	Value ¼ of the way through ordered data (smallest to largest). Position = $\frac{(n+1)}{4}$	3 **3** 4 5 7 8 9 = **3** Position = $\frac{(7+1)}{4}$ = 3
Interquartile range	The difference between the upper and lower quartile.	Upper quartile 8 – lower quartile 3 = IQR 5

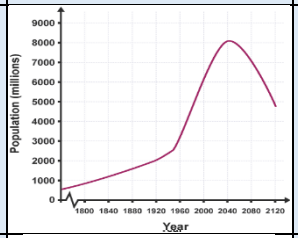
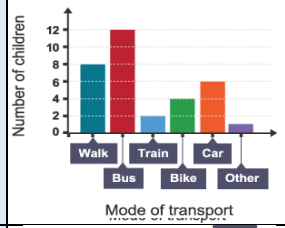
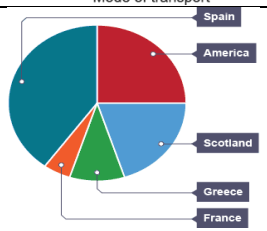
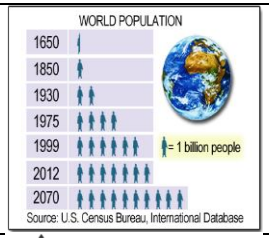
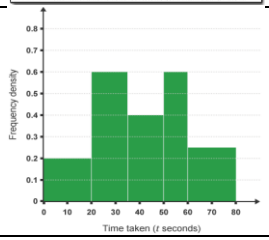
2. Percentages

Strategy	Description	Example
Percentage	To give the amount (X) as a percentage of a sample (Y): X ÷ Y x 100	45 out of 50 people travel by car… 45 ÷ 50 x 100 = 90%
Percentage increase	To calculate the percentage something has increased by. 1. Work out the difference between the two numbers (the increase). 2. Divide the increase by the original number. 3. Multiply the answer by 100%.	Population in 2020 = 65mill. Population in 2000 = 52 mill. 1. 65m – 52m = 13m 2. 13m ÷ 52m = 0.25 3. 0.25 x 100 = **25% increase**
Percentage decrease	To calculate the percentage something has decreased by. 1. Work out the difference between the two numbers (the decrease). 2. Divide the decrease by the original number. 3. Multiply the answer by 100%.	Cars in 2020 = 40 Cars in 2000 = 70 1. 70 – 40 = 30 2. 30 ÷ 70 = 0.43 3. 0.75 x 100 = **43% decrease**
Use of percentiles	Percentiles are used to indicate the value below which a given percentage of observations fall. For example, the 80th percentile is the value below which 80% of the observations occur and above which 20% of the observations occur.	

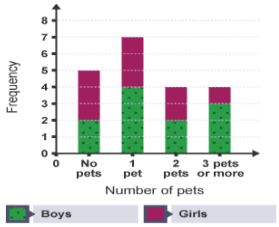
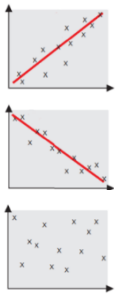
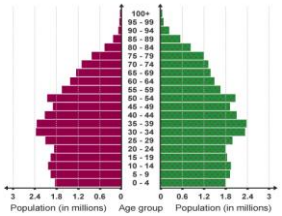
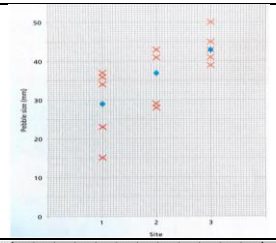
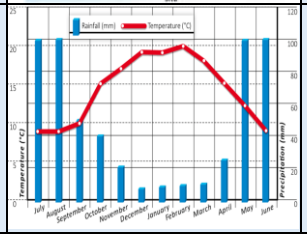
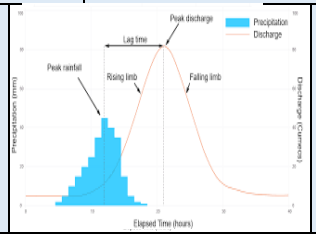
3. Relationships in bivariate data

Strategy	Description
Bivariate data	Data for two variables that may be related. e.g. GNI per capita + life expectancy.
Graphed on…	Scattergraphs.
Lines of best fit	Either a completely straight line or a smooth curve, which shows the trend between the two variables. Try to ensure an equal number of points each side of the line.
Correlation	 Positive Negative None The closer the crosses to the line of best fit the stronger the correlation.
Interpolate	Estimating an unknown value from within the data set. 
Extrapolate	Estimate an unknown value that is outside the data set. Makes the data more uncertain. 

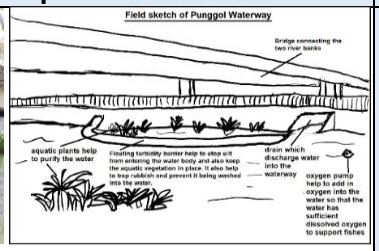
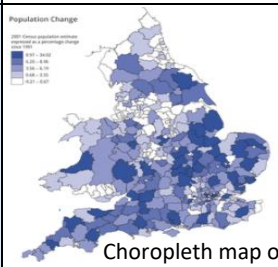
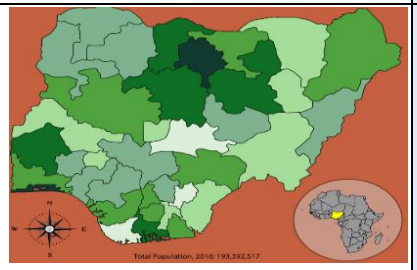
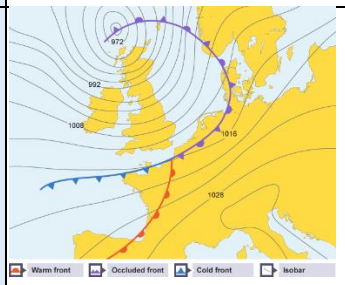
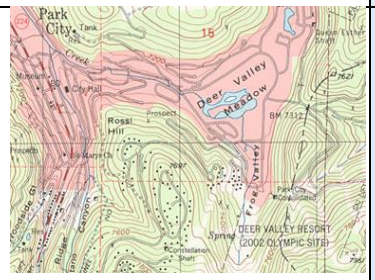
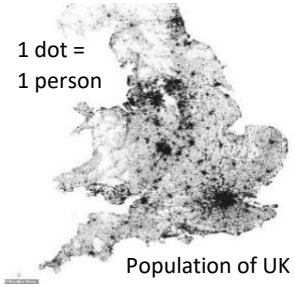
Graphical skills

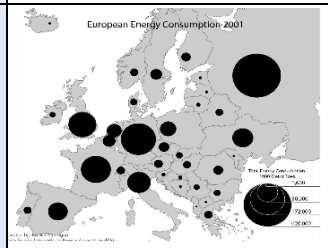
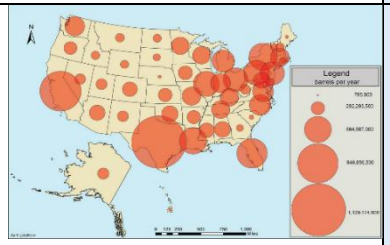
Name	Picture	Description	Example use	Evaluation
Line graph		Shows how variables change over time. Time is plotted on the x axis.	For continuous data *e.g.* the number of vehicles (buses, cars and motorbikes) that travel to an area over the day.	+ Can show multiple variables on one graph. + Able to estimate (interpolate) data using the trend of the line. + Easy to spot anomalies. - Data points can cluster making it difficult to draw the line. - Must be accurately plotted to ensure it is useful.
Bar graph		Each bar is the same width but of varying heights, depending on the figure being plotted. Bars are drawn equal distance apart (normally with a gap between each bar).	For data which fits into discrete categories *e.g.* the number of different types of car, plants or pets.	+ Simple to draw and read. + Easy to make comparisons of quantities between categories. - Only shows one variable against another. - Difficult to find fractions or percentages without further analysis.
Pie chart		Shows the quantity of something by dividing a circle into different parts (slices).	For data which fits into discrete categories *e.g.* the number of people working in different employment sectors.	+ Visually effective at showing how a total quantity is divided up. + Easy to make comparisons between categories. - Hard to accurately interpret percentages unless written on the pie chart. - Small quantities are difficult to represent with narrow slices.
Pictogram		Shows the quantity of something by using appropriate symbols/pictures that are drawn to scale.	For data which fits into discrete categories *e.g.* the world population in different years shown with picture(s) of people to represent the quantity.	+ Visually effective at showing quantities. + Easy to read and identify overall trends. - Difficult to accurately interpret data from symbols/pictures.
Histogram		Shows the frequency of something by using bars of different heights. Bars are touching. X axis shows continuous scale.	For continuous data *e.g.* the amount of rainfall across a continuous timescale of 24 hours.	+ Visually effective at showing how frequency changes. + Easy to spot anomalies. - Inappropriate intervals on x axis can distort data representation.

Graphical skills

Name	Picture	Description	Example use	Evaluation
Divided bar chat		Each bar is the same width, but the bars are individually subdivided to show how the total quantity is divided up. Bars are drawn equal distance apart.	For discrete groups of data *e.g.* the number of people working in different employment sectors in different years.	+ Visually effective at showing how a total quantity is divided up. + Summarises large sets of data, allowing comparison. - Can be difficult to identify trends.
Scatter graph		Shows whether there is a relationship between two sets of data. The pattern of the data points describes the relationship or correlation. Where data points are plotted close to the line of best fit the correlation is said to be strong.	For data for which you want to identify if there is a relationship between *e.g.* plotting life expectancy against GNI per capita.	+ Line of best fit can be drawn to show correlation, effectively showing a relationship. + Can easily spot anomalies where there is a strong correlation. - A correlation may be chance. - If there are too few data points it can be difficult to identify whether there is a correlation.
Population pyramid		A type of histogram in which the length of the bars is determined by the number of people in a population in that age group.	To show the structure of a population by identifying the number of males and females in age categories.	+ Visually effective at showing which age group has the greatest quantity of people in. + Can be used to approximate a country's birth and death rate. - Detail can be lost if large age intervals are used.
Dispersion graph		Shows the range of a set of data and how the data tends to group together or disperse. The values are plotted on a vertical axis to show the spread.	To show the range of pebble sizes at different locations on a beach.	+ Visual representation of the range of a data set. + Can be used to determine central tendency. - Difficult to plot if the range is small and data points plot close together.
Climate graph		A climate graph shows the average precipitation for each month in a year with a bar graph (blue) and the average temperature each with a line graph (red).		
Hydrographs		A hydrograph shows the amount of precipitation over a continuous timescale on a histogram. It also shows the river discharge as a line graph.		

Graphical skills

Map type	Example	Description	Evaluation
Photos and sketch maps	 Photo of Underpass  Sketch of Underpass	Photos give real world data on a location, are easy to interpret and are cheap and easy to produce. Field Sketches allow the artist to pick important geographical data relevant to their enquiry. Photos can include aerial and satellite.	+ Shows human and physical features of location (land use, vegetation etc). + Photos are easy to produce and keep. Very visual. - Sketch maps may not be of good quality and miss vital information. - Photos only show a single moment in time.
Choropleth map	 Choropleth map of population change.  Population density in Nigeria.	Uses colours or shades to show data. Used for population density, age or income.	+ Very easy to identity spatial patterns and trends. + Very visual use of data over large areas. - Unable to differentiate within a certain location. Assumes that all area has the same data. - Suggests abrupt changes in data between areas.
Isoline map	 Synoptic chart of the UK  Contour lines	Isolines can be on a map, graph or image. They connect locations of the same value. Most commonly seen as contour lines. Air pressure on weather maps.	+ Useful for showing gradual changes. + Lines show locations of the same value. - Can be confusing where gradient change is extremely close together, or very far apart. - Requires a lot of data to be effective.
Dot maps	 Population of UK  World cities with population of 1 million or more	Dot maps are dots of a fixed size that are used to represent a data set. For example, one dot could be equal to one individual or one million for population size and distribution.	+ Easy to identify spatial patterns. + Great visual tool for large amounts of data. - Clustering of dots makes it impossible to read data. - Areas may appear blank due to value being used per dot – false sense of emptiness.

Graphical skills			
Map type	**Example**	**Description**	**Evaluation**
Desire lines and Flow line maps	 Desire lines showing US exports.  Flow line- Immigration movement.	**Desire lines**: Shows movement with a straight line. ie goods, trade, people. Line length can show distance. **Flow lines:** Have arrows and show the specific direction of movement (curved lines). Width of the line can show quantity.	+ Shows general movement direction (A to B). + Line width can be proportional to value and size. + Easy to understand. General trends are obvious. - Distance is not always accurate, may not show specific end point, only a country. - Can get difficult to read if there are too many lines. - DESIRE Don't show journey details. (Just start + end) - FLOW Can be difficult to read if lines cross.
Proportional symbols	 EU Energy Consumption 2015  Population of USA states in 2018	Maps that use symbols drawn in proportion to the size of the data. Any symbol can be used but circles are most common. Used for: energy consumption, cars owned, forest fires per state.	+ Useful for comparing data. + Easy to read as symbols are proportional. • Symbol may obscure location or mean less accurate positioning on maps. • Difficult to calculate actual value.

1. Stages in a fieldwork enquiry

	Stage	Example
1	Question / Hypothesis	Tourism has an environmental impact in Swanage.
2	Data collection	Questionnaire. Environmental Quality Survey.
3	Data presentation	Bar chart, pie chart. Radar graph.
4	Data analysis	70% said tourists leave litter.
5	Conclusion	Tourism DOES have an environmental impact.
6	Evaluation	I need to increase my sample size for my questionnaire.

2. Possible enquiries

Coasts	Does hard engineering restrict longshore drift?
Rivers	Velocity increases with distance downstream.
Urban	Regeneration has created social and economic opportunities in Boscombe.

3. Suitable location?

Distance	Can you get there and back in a day?
Access	Is the site public access? Can you get there?
Sampling opps.	Will it be busy enough to get a reliable sample size? Enough locations to survey?

4. Risk assessment

This is where you consider what could cause people harm while completing fieldwork and think about how to reduce the likelihood of this happening.

Coasts fieldwork	Drowning	Face the sea. Stay 5m from the water.
	Sun stroke	Check the forecast. Take suntan lotion and a hat.
Human fieldwork	Getting lost	Arrange a meeting spot. Carry a map.
	Traffic accident	Always cross at a crossing. Concentrate- no distractions.

5. Key terms

Key term	Description
Data collection methods	How will you collect the data? e.g. questionnaire, river depths.
Data presentation	How will you present your data? e.g. bar graph, flow arrow map…
Accuracy	How close to the true value? (Is it correct to the nearest mm?)
Reliability	The extent to which an investigation produced consistent results. (If you do it again, would you get the same results?)
Validity	How suitable were your methods for answering the question it was intended to?
Limitations	Problems with what you did.
Anomalies	A result that is unusual or does not follow the trend of the other data.
Evaluation	How can you improve your enquiry?

6. Types of data

Key term	Definition	Examples
Primary data	Data that is collected first hand.	Measuring pebble size on a beach yourself.
Secondary data	Data that has been previously collected by someone else.	July temperatures for the last 30 years.
Quantitative data	Numerical data.	River depths.
Qualitative data	Non-numerical, opinion based data.	Questionnaire data / field sketches.

7. Sampling

Why sample?	To save time. To avoid bias.	
Sample size	Number of data sets collected. Larger sample sizes make data more representative. (Reliable)	
Strategy	**Description**	**Example**
Random sampling	Collect data using a random number generator.	Picking up stones from a riverbed using a random number generator.
Systematic sampling	Collect data at specific intervals.	Sampling every 5th groyne.
Stratified sampling	Collect data from different groups of a population to ensure fair representation. (Deliberately introducing bias.)	Surveying 3 residential locations and 3 town centre locations.

8. Conclusion and evaluation

Improve your methods	Is there better equipment you could have used? Should you have used a different sampling method?
Increase the reliability	Increase your sample size. Collect data at different times of the day or days of the week.
Increase the accuracy	Use digital fieldwork equipment. Take measurements 3 times and take an average.
Future studies?	Go at a different time of day / year? Add additional methods?