GCSE Geography

Essentials Revision Guide

Paper 1: Section A: The Challenge of Natural Hazards – Tectonic Hazards

<table>
<tr><td>What are hazards and why are they a risk?</td><td>A natural hazard is a natural event that can cause harm to people or property.
Hazards only become dangerous when they affect people.
Types of hazards:
1. Biological: disease (eg. COVID-19)
2. Meteorological: weather events (eg. hurricane)
3. Tectonic: earthquakes and volcanoes
4. Hydrological: floods
5. Geophysical: landslides</td></tr>
<tr><td>What processes cause earthquakes and volcanoes?</td><td>The Earth's crust is split into tectonic plates that float on the mantle.
Plates move due to convection currents in the mantle.
Continental plates: thick, light, old and don't sink
Oceanic plates: thin, heavy, younger, sink more easily
Destructive margins: when plates move together. An oceanic plate sinks under a continental plate. Causes strong earthquakes and explosive volcanoes. Example: Nazca and South American plates.
Constructive margins: when plates move apart. Magma rises to form new crust. Causes gentle earthquakes and volcanoes. Example: North American and Eurasian plates.
Conservative margins: when plates slide past each other. This causes strong earthquakes but no volcanoes. Example: San Andreas Fault.

There are two causes of tectonic plate movement: slab-pull and ridge-push.
Slab-pull: When a colder, denser oceanic plate sinks into the mantle, it pulls the other tectonic plates with it.
Ridge-push: When warmer, less dense crust rises up to create a ridge and gravity pushes this plate down, pushing other plates with it.

An earthquake is a sudden movement in the Earth's crust. It happens when plates build up pressure and suddenly release it.
1. Focus: where the earthquake starts underground.
2. Epicentre: point on the surface directly above the focus.
3. Seismic waves: vibrations that spread out from the focus.
4. Richter scale: measures strength of the earthquake
5. Mercalli scale: measures damage caused by the earthquake.</td></tr>
<tr><td>Why do people live in hazardous areas?</td><td>Volcanoes: Fertile soils for farming; geothermal energy (eg. Iceland); warning signs allow for evacuation; volcanoes like Vesuvius are tourist attractions.

Earthquake zones: Buildings can be designed to resist shaking. Big earthquakes are rare.</td></tr>
<tr><td>What are the effects of earthquakes?</td><td><table>
<tr><th>HIC Example: Japan 2011</th><th>LIC Example: Nepal (Gorka) 2015</th></tr>
<tr><td>Primary effects (initial impact):
10 metre tsunami
16,000 deaths
Power cuts, hospitals and buildings destroyed</td><td>Primary effects (initial impact):
9,000 deaths
Monkey Temple was damaged
Homes and schools destroyed</td></tr>
<tr><td>Secondary effects (after-effects):
Nuclear power station meltdown
Rise in homelessness</td><td>Secondary effects (after-effects):
Rise in homelessness
Fewer tourists meaning less money</td></tr>
</table></td></tr>
<tr><td>What are responses to earthquakes?</td><td><table>
<tr><th>HIC Example: Japan 2011</th><th>LIC Example: Nepal (Gorka) 2015</th></tr>
<tr><td>Immediate responses:
Evacuation of people in affected areas
Emergency camps set up</td><td>Immediate responses:
Helicopters used to reach remote areas
International aid provided</td></tr>
<tr><td>Long-term responses:
Tsunami walls constructed
Homes rebuilt</td><td>Long-term responses:
Earthquake drills brought in
Stronger buildings planned in future</td></tr>
</table></td></tr>
<tr><td>How can tectonic</td><td>Monitoring: Use tools like seismometers to detect changes. Helps to predict volcanic eruptions.</td></tr>
</table>

hazards be managed?	**Prediction**: Volcanic eruptions are easier to predict than earthquakes. Early warnings help people evacuate. However, this doesn't reduce damage to buildings. **Planning:** Emergency plans, education and warning systems can be set up. Leads to less panic but does not reduce damage to buildings. **Protection:** Strong buildings with shock absorbers, flexible frames and automatic shut-off systems for gas and electricity. However this is very expensive – many LICs cannot afford this.

Paper 1 Section A: The Challenge of Natural Hazards – Weather Hazards

What are the patterns of weather around the world?	**Equator** is hot as the Sun is more direct. Warm air rises causing low pressure, clouds and rain. **Either side of the Equator** – air falls causing high pressure and sunny/dry conditions. **Half-way between Equator and Poles** – warm air rises over cold causing rain. **Poles** – cold air sinks causing drier conditions.
How do tropical storms develop?	**Tropical storms** (hurricanes) form over **warm oceans**. High temperatures causes warm air to rise rapidly leading to evaporation and condensation. They bring strong winds, heavy rain and large waves called a **storm surge**.
What are the effects of tropical storms?	**Typhoon Haiyan (Philippines)** **Primary effects**: Storm surge caused flooding and **8000 deaths**. **Farmland was flooded**, **destroying the rice crop**. **Secondary effects:** Dirty water caused **diseases** to spread; millions were made homeless
What are the responses to tropical storms?	**Typhoon Haiyan** **People evacuated** when it was forecast. **Pits dug for toilets** to prevent disease spreading. New **storm-resistant houses** and a **raised main road** on the coast above the flood water were built. **Planting mangroves** is a long-term buffer from waves.
What weather hazards does the UK get? What are the effects?	1. **Strong winds** – destroys trees and roofs on buildings 2. **Heavy rain** – causes flooding 3. **Drought** – causes low water supplies and crop failures 4. **Heat waves** – causes heat exhaustion for old people, transport disruption, melting roads, and crop failure.
Is UK weather getting more extreme?	Yes! The **ten hottest years** in the UK have all been since 1990. **More flooding** recorded in 2010. December 2015 was the **wettest month** ever recorded.
What is the impact of extreme weather in the UK?	**UK Snow and cold weather December 2010** **Social impacts:** Some old people froze to death after falling outside. People were stranded in cars. Schools closed for several days, including CHS. Increase in the number of road crashes in icy conditions. **Economic impacts:** Gas supplies ran low. Flights cancelled. Councils spent double the normal amount on gritting roads. Farmers' incomes fell as some livestock died. **Environmental impacts:** Birds struggled to find food. **Management strategies** to reduce the risk of extreme weather: Blizzards – weather warnings from the Met Office; councils stockpiled salt to prepare for icy roads.

Paper 1 Section A: The Challenge of Natural Hazards – Climate Change

What is the evidence for climate change?	1. **Temperatures have always changed naturally** over long periods of time. There have been **many ice ages and warm periods**. 2. **Recent temperature rise** is faster and **is caused by humans**. 3. Ice cores show that carbon levels haven't been this high for 800,000 years.
What are the causes of climate change?	**Long term:** changes to the Sun's heat; Earth's orbit bringing it nearer or further from the Sun; volcanoes giving off greenhouse gases that trap heat. **Short term:** humans **using fossil fuels** (eg. coal). This releases carbon dioxide. This causes the greenhouse effect. Heat is trapped in the atmosphere.
What are the effects of climate change?	1. More extreme weather 2. Flooding of coastal cities eg. Mumbai in India

	3. Hotter and drier conditions – more wildfires eg. Canada, 2023 4. Warmer oceans – kills coral reefs 5. Crops die – cocoa bean production 55% lower in Ivory Coast 6. More heat-related deaths 7. More ice melts – ice measurements in Antarctica the smallest ever 8. Ice melts adds water to the oceans causing rising sea levels
How can climate change be managed?	**Mitigation** – things which lower the risk and impact: 1. **Use clean energy** more eg. solar power 2. **Capture carbon** from the air and bury it 3. Plant more trees 4. Countries work together to use less fossil fuels **Adaptation** – things which deal with the risk without changing it 1. Developing **drought-resistant crops** 2. **Grow different crops** that cope better with a warmer climate eg. oranges in the UK 3. Move water long distances from cold wet places to where people live (eg. from Kielder Reservoir to London) 4. **Build homes on stilts** to avoid flooding 5. Plant mangrove trees to block sea levels rise

Paper 1 Section B: The Living World – Ecosystems

What is an ecosystem?	An **ecosystem** is a community of **plants and animals** interacting with each other and their **physical environment**. **Biotic components** = **living** things (plants, animals). **Abiotic components** = **non-living** things (climate, soil, water).
What are the roles within an ecosystem?	**Producers**: Plants that use **sunlight** to make food through photosynthesis. **Consumers**: Animals that **eat plants or other animals** for energy. **Decomposers**: Organisms (e.g. bacteria, fungi) that **break down dead material**. 1. They **release nutrients into the soil**, which plants reuse. They work at **all levels of food chains and food webs**.
What are food chains and food webs?	**Food chain**: A **simple sequence** showing who eats whom. Example: **blackberry → mouse → fox** **Food web**: A **complex network** of connected food chains.
What is a UK ecosystem case study?	**Small-scale UK ecosystem: Epping Forest** A **deciduous woodland ecosystem** in the UK. • **Vegetation**: Birch, beech and oak trees; bluebells grow in spring before trees fully in leaf. • **Climate**: Average temperature **14°C**, rainfall **780 mm per year**. • **Wildlife**: **Foxes and owls** are top predators. • **Soils**: **High nutrients** due to rapid decomposition. • **Human pressures**: Tourism and **urban sprawl**.
What affects balance in ecosystems?	Ecosystem **components are linked and interdependent**. Example: Plants take nutrients from soil. When plants die, decomposers return nutrients to the soil. **A change to one component of an ecosystem affects others**. **Hedgerow example**: Fox disease → fewer foxes More rabbits and mice More plants eaten Hedgerow plants decrease Animal populations later fall
What are biomes?	**Biomes** are **very large ecosystems** with similar climate, plants and animals. **Key biomes:** • **Polar**: Very cold, little vegetation. • **Tundra**: Cold, permafrost, mosses and grasses. • **Temperate deciduous woodland**: Four seasons, trees lose leaves. • **Mediterranean**: Hot dry summers, mild wet winters. • **Temperate grasslands**: Grass, few trees, inland. • **Hot desert**: Very dry, extreme temperatures. • **Savannah grasslands**: Hot with wet and dry seasons. • **Tropical rainforest**: Hot and wet all year, dense vegetation.

Paper 1 Section B: The Living World – Tropical Rainforests

What are the characteristics of tropical rainforests?	**Example: Amazon Rainforest** **Climate: Hot** all year: temperatures between 26–28°C. **Rainfall all year:** highest in January -April and lowest in August **Soils: Very thin and nutrient-poor.** Nutrients are taken up quickly by plants. Heavy rainfall washes nutrients away (leaching). High iron content, giving soil a red colour. **Plants:** • **Dense vegetation** due to hot, wet conditions. • **Layered structure** (emergent, canopy, understorey, forest floor). • **Evergreen trees** because there is no cold season. • High levels of **photosynthesis all year**. **Animals:** • Very high **biodiversity** (many species). • Different animals live in **different layers** of the forest. • Plenty of food due to year-round plant growth.
What is interdependence?	**Interdependence** = parts of the ecosystem depend on each other Soils depend on climate → warm, wet conditions = rapid decomposition. Soils depend on plants → dead leaves break down and form soil. Plants depend on climate → controls photosynthesis and adaptations. Plants depend on animals → seed dispersal and pollination. Animals depend on plants → food and habitat. Animals depend on climate → animals are adapted to hot, wet conditions.
What is biodiversity?	**Biodiversity** = the number of different plant and animal species in an area. • Why rainforests have high biodiversity: Hot and wet conditions → constant photosynthesis. Dense plant growth → layered habitats. Species become highly specialised, reducing competition. • Biodiversity matters because it provides medicines, food, and resources for humans. Rainforest biodiversity is under threat from deforestation and climate change.
How have plants adapted in the rainforest?	1. **Buttress roots** – support tall trees in shallow soils. 2. **Waxy leaves** with **drip tips** – allow water to run off quickly. 3. **Climbing plants** (vines/lianas) – reach sunlight using other trees.
How have animals adapted in the rainforest?	**1. Gliding** – move between trees without reaching ground predators. **2. Camouflage** – helps avoid predators (e.g. blue morpho butterfly). **3. Poison** – tastes bad to predators. **4. Swimming** – move across rivers (e.g. jaguars).
What is deforestation?	**Deforestation** is the large-scale cutting down of trees. It causes economic benefits (creates jobs for loggers), but also serious environmental damage (loss of habitat). Since 1978, around 750,000 km² of the Amazon rainforest has been destroyed. Deforestation increased in 2019 as burning was encouraged to boost Brazil's economy.
What has caused deforestation?	**Subsistence farming** • Small-scale farming to feed a family. • Forest is cleared and burnt, then left to regrow after 5–10 years. • Common in indigenous communities. **Commercial farming** • Farming for profit (e.g. cattle ranching and soya beans). • Cattle ranching causes around 70% of deforestation in the Amazon. **Logging** • Trees cut down and sold for timber. • Often illegal, especially in remote areas. **Settlement** • Brazil's population is growing. Government offered land in the rainforest to poor urban families. **Mineral extraction** • Mining for resources eg. Carajás iron ore mine • Requires roads and towns to be built in the rainforest **Energy development eg.** Itaipu Dam • Forest cleared for hydroelectric power (HEP) dams. These produce cheaper electricity. • Causes flooding and displacement of people

What is the impact of deforestation?	**Environmental impacts:** • **Soil erosion** – tree roots removed → nutrients washed away → land becomes infertile. • **Global warming** – burning trees releases **CO_2** and fewer trees absorb it. • **Loss of habitats** – biodiversity decreases. Animals such as the **giant anteater** become endangered. **Economic impacts:** • Brings **income** to Brazil - **$6.9 billion** from cattle trade. • **Employment**: Around **7,000 jobs** at Carajás mine.
How can rainforests be managed sustainably?	**Why rainforests are valuable** • Environmental value • Store large amounts of carbon. Help regulate the water cycle. Home to over 50% of the world's species. • Home to indigenous tribes. Tourism income. Source of new medicines. **Sustainable Management Strategies:** • **Selective logging** – only mature trees cut down. • **Replanting** – replacing trees after logging. • **Conservation** – protected areas (e.g. Jau National Park). • **Education** – teaching people to use forests carefully. • **Ecotourism** – small-scale, low-impact tourism. • **Forest Stewardship Council** (FSC) • **Debt reduction** - countries have debt cancelled in return for protecting rainforest areas

Paper 1 Section B: The Living World – Cold Environments

The Physical Characteristics of Cold Environments	**Climate** - polar areas are very cold (never normally more than 0°C) with winters below -40°C. **Tundra** – the summer maximum temperature is 10°C, and the winter temperature can reach -50°C. **Water** – mainly snows. Less than 100mm in polar areas and less than 380mm in tundra. **Soils** - Polar areas are covered in ice sheets, no soil. In tundra areas there is a thin layer of acidic soil that is not very fertile. Underneath that is a layer of sub-soil that remains frozen (**permafrost**). **Plants** - Very few (e.g. lichens and moss) on the edge of polar regions where it is warmer. Plants in tundra areas are low and grow slow (e.g. grass). Small short trees grow occasionally in sheltered spots. **Animals** - few species. Polar areas have polar bears, whales, seals and walrus. Tundra - lemmings, reindeer, wolves and Arctic foxes.
Issues Relating to Biodiversity	• Very low biodiversity, especially in Antarctica. Because there are few species, changes to one can quickly affect others (for example, if lichen fails to grow, reindeer may starve). • Global warming is reducing biodiversity by causing new species to migrate polewards, where they may outcompete or prey on native species (such as red foxes replacing Arctic foxes), and by destroying cold habitats. • Species adapted to snow and ice, like lemmings, are declining as habitats change, which also reduces food for predators such as the Arctic fox.
Plant adaptations	**Adaptations:** Plants are small, low-growing and round with small leaves to survive strong winds, cold temperatures, and reduce water loss. **Survival strategies:** Plants become dormant in dark, cold winters and have shallow roots due to thin soil and permafrost; they must cope with water-logged soil in summer. **Short growing season:** Plants can only grow above 6°C, adapt to a very short summer, and often reproduce using runners or bulbs instead of seeds.
Animal adaptations	**Keeping warm:** Well-insulated using thick fur or blubber (e.g. seals) and some huddle together to conserve heat (e.g. penguins). **Surviving winter:** Many animals hibernate or migrate to warmer areas to survive the extreme cold and lack of food (e.g. caribou). **Movement and protection:** Animals are adapted to their environment with camouflage (e.g. white Arctic fox) and physical features like wide paws to travel on snow (e.g. polar bears).
Development opportunities:	**Mineral extraction:** Mining of gold, silver, iron ore and copper is important, contributing $2.2 billion to Alaska's economy. **Energy:** Oil and gas provide over 50% of Alaska's economy; oil from Prudhoe Bay is transported by the Trans-Alaska Pipeline to Valdez for export.

	Fishing: Employs around 79,000 people and contributes $5 billion, mainly from salmon, cod, pollock and crab. **Tourism:** Alaska's wildlife and scenery attract 2 million tourists a year, supporting jobs and generating about $2.5 billion annually.
Challenges to development include:	**Extreme climate:** Very cold temperatures, strong winds and low precipitation make living and working dangerous; winters are long and severe, and summers are short. **Inaccessibility and remoteness:** Alaska is very large but sparsely populated, with many remote areas; snow, ice and thawing permafrost make transport difficult and expensive. **Building and infrastructure difficulties:** Permafrost can thaw and damage roads and buildings, and frequent earthquakes increase risk; special designs (e.g. raised pipelines) are needed.
Strategies to Balance the Needs of Economic Development and Conservation	**Use of technology:** Modern building methods (e.g. buildings on stilts) reduce environmental damage by preventing permafrost from thawing. **Government action:** Laws and plans regulate development and protect fragile areas, such as Biodiversity Action Plans and the 1964 Wilderness Act in Alaska. **Global and local protection:** International agreements (e.g. Antarctic Treaty, Kyoto Protocol) and conservation groups (e.g. Greenpeace) help protect cold environments from over-development and climate change.
What is the value of cold environments? Why should they be protected?	• The tundra is extremely fragile; slow plant growth means it recovers very slowly from damage, and melting ice threatens species like polar bears while raising sea levels and altering ocean temperatures. • Human impacts such as oil spills can devastate habitats, killing thousands of animals and damaging vast stretches of coastline. • Permafrost stores large amounts of CO_2, which is released when it thaws—accelerating global warming—and the tundra's unique biodiversity makes it vital to conserve.

Paper 1 Section C: Physical Landscapes in the UK – Coastal Landscapes

What are the coastal processes?	**Weathering:** 1. **Mechanical (freeze-thaw) –** water gets into cracks, freezes, expands and then breaks the rock. 2. **Chemical -** rainwater reacts with minerals in rocks like limestone and slowly dissolves them **Mass Movement:** 1. **Sliding –** rocks fall down in a straight line 2. **Slumping -** saturated ground rotates and slides down over clay 3. **Rockfall -** rocks break off and fall when the base of a cliff is eroded **Erosion:** 1. **Hydraulic power –** waves force air into cracks, breaking the rock 2. **Abrasion –** rocks and sand scrape away the cliff 3. **Attrition** – rocks smash together and become smaller and rounder 4. **Solution** – sea water dissolves certain types of rock **Transportation:** 1. **Longshore drift -** waves hit the coast at an angle, moving material along the beach in a zigzag pattern **Deposition: happens when waves lose energy and drop the material they carry** **Constructive waves** (low and gentle) build up beaches as they deposit more material than they erode. **Destructive waves** (larger) have more energy to break rocks and carry out erosion.
How are coastal landforms made?	**Erosional Landforms** 1. **Headlands and bays –** soft rock erodes faster than hard rock, forming a bay. The remaining hard rock forms a sticking-out headland. 2. **Cliffs and wave-cut platforms -** waves erode the base of cliffs causing rocks to collapse and leaving a flat platform. 3. **Caves, arches, stacks and stumps –** cracks in headlands become caves. These erode through the headland to form an arch. When the arch collapses, stacks form. Stacks erode down into stumps.

	Depositional Landforms 1. **Beaches –** made of sand or pebbles. Storm beaches form from strong waves. 2. **Sand dunes –** wind blows sand inland, forming dunes with plants. i. **Embryo dunes –** small and new ii. **Foredunes –** larger and more stable iii. **Grey/mature dunes –** oldest with deep soil and big plants 3. **Spits -** long ridges of sand formed by longshore drift or at a bend in the coast 4. **Bars –** spits that stretch across a bay, trapping water behind it to form a lagoon
UK coastline example	**Example: Dorset** 1. **Chesil Beach –** this is a tombolo which connects the mainland to Portland Island 2. **Old Harry Rocks** – example of a stack 3. **Lulworth Cove** – example of a bay 4. **Discordant coastline** – with headlands and bays
How are coastlines managed?	**Hard Engineering (making changes to nature)** 1. **Rock Armour –** large rocks which absorb waves energy. Positives: effective. Negative: expensive as rocks have to be imported. 2. **Gabions –** wire cages filled with rocks. Positives: cheap. Negatives: cages can go rusty and look ugly. 3. **Groynes –** fences which trap sand transported by longshore drift. Positives: builds up a beach. Negatives: Can lead to erosion further down the coast. **Soft Engineering (working with nature)** 1. **Beach nourishment –** involves adding sand to beaches. Positives: looks natural. Negative: needs regular maintenance. 2. **Dune regeneration -** involves planting grasses to stabilise sand dunes. Positives: forms a natural barrier. Negatives: only covers a limited area as it's expensive. 3. **Managed retreat -** allowing the sea to flood low-value land. Positives: cheap and creates habitats. Negatives: leads to loss of land and buildings. **Case Study: Walton-on-the-Naze, Essex** **Why protect it?** Allows protection of tourist attractions, expensive homes and soft cliffs. **What was done?** Rip rap, groynes, cliff regrading (bulldozing cliffs so they have a gentler slope) **Results:** South was protected and house prices rose. People feel safer. North was left to erode, placing a nature reserve at risk. This will lead to fewer tourists visiting this area.

Paper 1 Section C: Physical Landscapes in the UK – River Landscapes

How do rivers change as they flow?	Rivers change shape from **source** to **mouth**. 1. The **upper course** is steep with **waterfalls** and **gorges** 2. The **middle course** has **meanders** and **oxbow lakes**. 3. The **lower course** has wide **floodplains** and **estuaries**. **Types of erosion**: 1. **Hydraulic action** - when water forces air into cracks. The pressure of this weakens the river banks. 2. **Abrasion** – rocks scrape the riverbed 3. **Attrition** – rocks smash together 4. **Solution** – materials dissolve **Types of transport:** 1. **Traction** – boulders roll along the riverbed 2. **Saltation** – pebbles bounce along the riverbed 3. **Suspension** – floating particles are carried by the river 4. **Solution** – dissolved materials is carried by the river **Deposition** happens when the river slows down, often at the mouth or during floods.
How are river landforms made?	1. **Waterfalls** form where hard rock overlies soft rock. Soft rock erodes more rapidly, forming a step in the river and a **plunge pool**. Water then splashes back and undercuts the soft rock. The overhanging harder rock then collapses. The waterfall retreats upstream forming a **gorge**. 2. **Interlocking spurs –** formed when a river weaves around hills in the upper course 3. **Meanders and oxbow lakes** form from sideways erosion on the outside of a bend and deposition on the inside. **Erosion** cuts through the neck of a meander. **Deposition** then cuts the meander off from the river, forming an oxbow lake.

	4. **Floodplains** – flatter land either side of a river. Formed by layers of sediment which are deposited when a river floods. 5. **Levees** – embankments on either side of a river. Formed by the river depositing sediment. 6. **Estuary –** the tidal mouth of a river where it meets the sea. The river slows causing more deposition. Large **mud flats** form on the edges of the river channel as a result.
UK river example	**River Tees** 1. **Upper course** – **waterfall at High Force**. This has formed due to a soft rock (sandstone) under a hard rock (limestone). **V-shaped valleys** found around Cow Green Reservoir. 2. **Middle course** – **meanders** form at places like Yarm. 3. **Lower course** – **estuary** has formed at the mouth. Large areas of mudflats due to deposition. This land has been used for chemical factories. Other areas are important sites for wildlife.
What causes flooding?	**Physical:** 1. Heavy/prolonged rain – rain falls faster than it can infiltrate into the soil – causes more surface runoff 2. Steep hills – leads to rapid surface runoff - water quickly reaches a river 3. Hard (impermeable) ground or rock which water can't infiltrate into **Human:** 1. Buildings and **impermeable surfaces** like roads on floodplains stop water infiltrating into the soil 2. **Deforestation** – leads to reduced interception of rainfall 3. Farmers compacting soil with machines – makes it harder for water to infiltrate
How is flooding managed?	**Hydrographs** are used to show the discharge of a river, relative to rainfall, over a period of time. They can show how long it takes for precipitation to reach a river. This can be used to help understand flooding. **Hard engineering** – building things which alter nature 1. **Dams** – hold back water to prevent floods. Positives – last a long time and can generate hydro-electric power. Negatives – very expensive and can be an eyesore 2. **Embankments/flood walls**. Positives – increase the river's capacity which reduces flooding in that area. Negatives – expensive and can be an eyesore. **Soft engineering** – things which do not alter nature eg. **1. Flooding warnings**. Positives: costs reduced as people can evacuate and move belongings Negatives: floods still happen so damage is still caused. **2. Floodplain zoning** - making sure land next to rivers is not used for building. Positives: reduces costs of floods, reduces flood water as infiltration can occur if there are fields around the river. Negatives: not possible in areas which have already been built on **Shrewsbury** has a mix of hard and soft engineering. Flood walls are used to protect a car park. A park is used to soak up water during floods.

Paper 2 Section A: Urban Issues and Challenges

Lesson:	The very key idea:
Urbanisation	**Urbanisation** means more people are living in towns and cities. It happens faster in poorer countries (LICs and NEEs) than in richer ones (HICs) because in HICs urbanisation peaked during the Industrial Revolution; now low growth. Many people in HICs also start to move away from cities due to pollution, noise and lack of green space – **counter urbanisation**. **NEEs**: Rapid urbanisation; fastest growth in Africa and Asia (China, India…) **Causes of urbanisation**: Migration: Push factors (e.g. disasters, unemployment), Pull factors (e.g. better jobs, healthcare). Natural Increase: Birth rate > death rate, especially in NEEs due to improved health/diet. **Megacities** are cities with over 10 million people – most are in LICs and NEEs.
Lagos, Nigeria (NEE)	Importance: • **Regional**: Major university, airport – 80% of flights to West Africa go through Lagos, rail. • **National**: 27% of GDP, 50% of factory jobs, $90bn/year. • **International**: Oil trade hub, Nollywood, top university.
Why is Lagos growing?	**Natural increase**: More births than deaths. **Migration**: People move from the countryside to the city for jobs, schools, and healthcare. **Push factors**: Problems in rural areas (e.g. drought, unemployment, farm mechanisation, Boko Haram – terror group). **Pull factors**: Better services (health and education) in Lagos, more and better paid jobs. **Growth rate**: A lot of people moved to Lagos due to the oil boom = lots of jobs in the oil sector.
Opportunities in Lagos	**Social**: Better access to water, electricity, education (more attend high school than in the countryside). **Economic**: Informal jobs (40%), factories, markets, and recycling. Lagos is building a new business area called Eko Atlantic (a new financial centre for banks in Nigeria) = jobs.
Challenges in Lagos:	**Overcrowding**: Slums (e.g. Makoko), poor sanitation (95% of household there don't have access to clean water, 15 people can share a toilet), limited schools. **Services**: Apart from water, there are electricity cuts out due to illegal hook ups. **Crime**: High rates, lack of policing, so the gang called the 'Area Boys' control the area. **Transport**: Traffic jams lasting 2 hours are common; the Lagos Metropolitan Area Transport Authority (LMATA) is improving public transit - Bus Rapid Transit encourages people to use public transport. **Environment**: Only 40% of waste collected, air pollution 5× safe levels.
Urban Planning example	**Makoko Floating School:** Solar-powered, flood-resistant (floating so it can go up with rising water levels), but limited reach – spaces for only 60 people (two classes). It also collapsed during a storm. Other than this, using water ferries and taxis to ease traffic.
Manchester, UK (HIC)	Location: Manchester is in Northwest England. Importance: • **National**: Historic trading hub, Metrolink, 3rd largest airport (flights to 200 destinations). Russell Group (top) university attracts 1000s students. • **Global**: Foreign company offices - e.g. Coop bank, direct flights from Manchester Airport, linking to over 200 destinations, Premier League teams watched globally.
Migration	**Growth**: Irish migrations during the Industrial Revolution for work, Jewish people in the 1940s to escape prosecution, Indian and Pakistani migrants in the 1950s; 120,000 students, with many often coming from London as Manchester is cheaper to live in. **Character**: Multicultural, studentification, diverse food and culture. Examples are China town, European food markets, part of the city is dominated by student halls, bars and clubs.
Opportunities in Manchester	**Social**: Social: Cultural mix (e.g. Chinatown, LGBTQ+ village), recreation (Media City, Lowry Centre). Tourists encouraged. People feel welcome. **Economic**: Post-industrial redevelopment, transport links, airport connectivity – 3rd biggest airport in UK – handles 19 million passengers every year, over 60 airlines. **Environmental**: Zero Carbon plan – 90% journeys by foot/public transport by 2040.
Challenges in Manchester	**Urban deprivation**: An area where the standard of living is lower than everyone else. Some areas lack good housing, jobs, and schools, following deindustrialisation. Social and economic challenges: Unemployment spray - only 53% of over-16s employed in Manchester. **Inequality**: Poorer areas have worse health and education (inner city). Poorer quality housing in inner city -> higher unemployment and more rented/council housing. Some inner-city areas like Salford Quays have been redeveloped → house prices rise → original residents forced out. House prices in the suburbs like Didsbury have increased by 8% in the last two years. **Health:** poor people are 3x more likely to suffer from health issues. **Environmental**: Old buildings, waste problems, and urban sprawl (building on greenbelt).
Urban Regeneration	**Salford Quays** was redeveloped with new homes, offices, and arts centres. It was a brownfield site, good to build on again as it does NOT cause habitat destruction. This improved the area and created jobs – BBC studios (skilled workers), cafes, bars and restaurants, Lowry Centre – jobs in hospitality.

Sustainable Cities	**Sustainable urban living** –does NOT damage the environment and supports locals in a way that can last into the future. **Example**: Curitiba, Brazil **Water & energy saving:** Water meters, recycling – 2/3 of all waste in the city is recycled. **Green spaces**: Parks help with flooding – 28 parks used for this. **How to reduce traffic congestion:** **UK Examples**: London: Congestion charge, bike hire, Oyster card. **Cambridge**: Park and ride, cycle lanes. **Other examples in NEEs:** Curitiba - Bus Rapid Transport System – used by 70% of commuters, everyone lives within 400m of a bus stop, so easy to use.

Paper 2 Section B: The Changing Economic World

What is Development?	**Development** means a country is improving – people live longer, earn more money, and have better access to services (education and healthcare).
Measuring Development	**Economic measures**: Gross National Income - **GNI** (total money made), **GDP** - Gross Domestic Product – total value of goods and services that a country produces in a year. **GNI per person** - The GNI divided by the population of a country. **Social measures**: Birth rate, death rate, literacy (read and write), life expectancy (how long is a person expected to live), access to clean water. **HDI**: Human development index: Combines life expectancy, education, and income into one score (0 = poor, 1 = rich).
Types of Countries	HICs: High income - rich countries (e.g. UK, France). LICs: Low-income countries (e.g. Chad, Nepal). NEEs: Newly Emerging Economies = Getting richer quickly (e.g. Nigeria, India, Brazil).
DTM – Demographic Transition Model	Level 1: High birth and Death rates = low population. There are no countries on Level 1. Level 2: High birth rate but lower death rate = population remains high (e.g. Bolivia). Level 3: Birth rates begin to slow down; death rate remains low (e.g. Mexico). Level 4: Low birth and death rates = population begins to slow (UK, USA). Level 5: Birth rate starts to be lower than death rate = population declines. (Japan)
Why Some Countries Are Poorer?	**Physical**: Bad climate (fewer crops -> low food supplies -> less to sell -> less income), poor soil (steep relief or impacts of climate change, again low food supply), natural disasters (flooding, hurricanes, earthquakes… means it takes money and time to rebuild instead of investing in development – e.g. Haiti). **Historical**: Colonisation - European countries colonised many African countries e.g. UK in Nigeria, taking slaves and raw materials which made them wealthier, while the African countries didn't benefit. They are still poorer today as a result of this. **Conflict/war** - money needed for weapons, destruction of houses, hospitals, schools… all means less money on development. Lower GNI as a result. **Economic**: Poor trade links, lots of debt, relying on farming. All means less money spent on development.
Effects of Uneven Development	**Wealth**: Rich countries earn more. (e.g. GNI per head in the UK is 40 times higher than in Chad). This leads to the multiplier effect -> higher income – more money to spend of improving quality of life. **Health**: People in poor countries live shorter lives (poor diets, lack of medicine). e.g. the UK's life expectancy is 81, but in Chad it's only 51. Infant mortality (children under 1 dying) is much higher in LICs. e.g. it is 85 per 1000 births in Chad, compared to 4 per 1000 births in the UK. **Migration**: People move from poorer to richer countries (e.g. Mexico to USA).
Reducing the Development Gap – how can we do it?	**Aid**: Money or help from other countries (e.g. mosquito nets in Nigeria). **Fair Trade**: Farmers get a fair price for their produce. The buyers also pay extra that helps the area where the goods game from e.g. funding a new health centre. **Debt Relief**: Cancelling debt so countries can spend on schools and hospitals (e.g. Zambia had debt cancelled in 2005, so it had enough money to start a free healthcare scheme for millions of people). **FDI – Foreign Direct Investment** – when companies in one country buy property or infrastructure in another country. E.g. Shell buying land and setting up oil refineries in Nigeria. **Industrial Development:** Building factories and businesses – creates jobs. E.g. Proton Car Industrial Development in rural Malaysia, new city (Proton City) for workers. **Microfinance**: Small loans to help people start businesses (e.g. farmer can buy cattle), as they may not be able to get it from traditional banks. **Tourism**: Visitors bring money (e.g. Tunisia). Nice beaches on the Mediterranean, Star Wars set, cheap, guaranteed sunshine. Since expanding the tourism sector – girls' education improved, more women go to university, GDP has doubled since 1970s. BUT: **Negatives**: **economic leakage** – only a small % of the money earned goes to locals. Profits are mainly going to big companies (e.g. Hilton Hotels). Tourism is seasonal so income is not secure.
Case Study: Nigeria (NEE)	**Location & Importance**: West Africa, largest economy in Africa, big oil exporter. Many different ethnic groups. The north-east is wealthiest, the south-east is poorest.

	Economic Growth: More people working in factories and services. Companies like Shell bring jobs and build roads. But oil spills and pollution are problems. **Improvements**: Life expectancy and access to clean water have increased. More money from taxes helps improve schools and hospitals. **The changing trading relationship with the wider world:** Globally important due to large population and economy – major oil exporter. Exports mainly to EU, USA and India. Imports manufactured goods from China (eg. phones) and EU. Taking a leading role in Africa – 5th largest contributor of UN peacekeepers. **The changing industrial structure:** 65% of Nigerians world in the primary sector. 25% work in oil extraction. Those working in secondary is increasing. Employment in manufacturing -> higher and more reliable income than a farmer. Can afford to buy things for better quality of life, such as food and medicine. Also, more factories, more tax paid to the gov, which can be invested in healthcare and schools, boosting literacy levels and life expectancy. **TNCs in Nigeria:** Shell employs 65,000 people in Nigeria. Positives: more money for infrastructure (e.g. roads), other businesses supply Shell with parts creating 250,000 jobs. More taxes -> better services. Negatives: Some oil refineries and pipelines are not well maintained, oil spills reduce fish yields and make farmland infertile. Boko Haram target oil pipelines causing conflict. Shell keep most of the profits. **Environmental impacts from development:** Air pollution. Oil flares release toxic fumes. Traffic fumes. Deforestation – habitats for animals are destroyed. Waste – more rubbish and sewage in urban areas. **Types of aid Nigeria receives:** Most aid is multi-lateral (from an organisation involving many countries) e.g. the World Bank funding medical supplies. The USA and UK are major donors. If more people are healthy they can work -> income increases -> people can afford better quality of life. BUT there are problems with aid: corruption (aid money spent on other things it shouldn't be spent on). **The effects of economic development**: GDP of Nigeria has risen. Literacy improved.
Case Study: United Kingdom (HIC)	**Economic Change**: Fewer people work in factories. More work in services (shops, banks) and research (science, IT). **Rural Changes**: Some areas (e.g. Cornwall) are losing people and jobs. Others (e.g. Warwickshire) are growing but house prices are rising. **Transport Improvements**: New motorways, railways (HS2), ports, and airports help trade and travel. **North–South Divide**: The south (e.g. London) is richer than the north. Plans like the Northern Powerhouse aim to fix this.
UK in the World	**Trade**: Mostly with EU, USA, and China. **Culture**: TV, music, and festivals shared globally. **Transport**: Channel Tunnel and Heathrow connect the UK to the world. **Commonwealth**: Group of 53 countries working together.

Paper 2 Section C: The Challenge of Resource Management

Why Are Resources Important?	Resources like food, water, and energy are essential for: **Economic wellbeing:** earning money, working, and living well. **Social wellbeing:** staying healthy, happy, and educated. **Surplus** – means you have more than enough of something. **Deficit** – means you don't not have enough of something.
Food	**Malnourishment** (not enough healthy food) leads to poor health, bad school results, and low income. Food security means having enough affordable food. Food insecurity – the opposite. Rich countries use **technology** and **imports** to stay food secure. Poor countries may struggle due to bad farming conditions or expensive imports.
Water	Clean water is needed for health, farming, and education. Dirty water causes diseases like cholera (social factor). Illness from dirty water means people cannot work and lose income. **Water surplus**: more water than needed (e.g. Wales). **Water deficit**: not enough water (e.g. London). **Solutions**: transfer water from wet areas to dry ones, store water in reservoirs.
Energy	Needed for homes, transport, and factories. Energy security: having reliable and affordable energy. Rich countries often have more energy or can afford to import it (energy surplus). Poor countries may rely on unreliable sources = energy insecurity or energy deficit.
UK Resource Challenges	
Water	More people and homes = more water needed. Pollution from farms (fertilisers) and factories (chemical spills) affects water quality. Oil spills can contaminate groundwater. **Water Transfers Schemes** – move water from wet areas (northwest) to dry areas (southeast).

Energy	UK used to rely on coal and oil, now moving to renewables like wind and solar. This is because fossil fuels are running out and pollute the air (linked to climate change). All coal power closed by 2025. Renewable energy is cleaner but can be expensive and needs investment. The UK pays to import some energy as it can't generate enough from renewable sources all of the time. How our energy mix has changed: 1970 = 91% of energy from coal and oil 2014 = 19% from renewable sources, over half of this is from wind farms. Use of gas to replace coal continues to increase. 42% comes from coal Oil and gas reserves are in the North Sea but are rapidly decreasing. New supplies possible from fracking, but this can pollute groundwater. Nuclear has risk of accidents which could release radioactive material.
Food	Demand for food is growing. People want high-value foods (e.g. exotic fruits) and seasonal foods (e.g. strawberries) all year due to more disposable income. This increases **food miles** (distance food travels) and carbon footprints. Buying local food helps reduce pollution. **Organic product** means no chemicals used in farming, tastes better but more expensive. More of this is wanted as people worry about the impact on their health from the chemicals. **Production and transportation** create large carbon footprint: due to greenhouse gasses (such as methane), which are released while growing, packaging and transporting food. **Agribusiness** means big farms with fewer workers (replaced by more machines). Controlled by large companies who control all stages in production from seeds and fertilisers to packaging. Environmental impacts from agribusiness = reduced biodiversity as hedgerows are removed and pesticides are used. Soil erosion and air pollution from the heavy machinery.

Paper 2 Section C: Energy

Global Energy Issues	**Surplus vs Deficit: Surplus**: countries like Russia, Saudi Arabia, USA have lots of oil and gas. **Deficit**: countries like those in Africa have less energy and rely on imports. USA, Western Europe, China and Japan use most energy. **Why Energy Use Is Rising**: More people and more technology (TVs, cars, phones). Developing countries and NEEs use more energy for **industry** and better living standards (they also have a higher and faster rising population than HICs). **Problems with Energy Supply:** Climate and land affect what energy can be used (rainfall levels – e.g. hydro cannot be used in the Sahara). Technology helps (e.g. solar panels, fracking). Politics and conflict can stop energy sharing (e.g. Russia and Ukraine war – Russia cut off gas supplies to East Europe). Oil spills– some companies damage nature and have to pay to clean up, e.g. Chevron.
Impacts of Energy Insecurity	**Environment**: oil spills, pollution, damage to nature or drilling in environmentally sensitive areas such as the tundra or Alaska. **Economy**: countries pay more if they import energy. China uses lots of coal, so it does not have to import but this creates smog problems. Those who rely on others (such as Japan and France) have to pay a higher price. **Industry**: factories need energy to work = that costs more. E.g. Iceland has an aluminium plant that uses 70% of the whole country's energy - they produce cheap geothermal and hydro electric energy. **Conflict**: dams and pipelines can cause arguments between countries. E.g. - Ethiopia wants to build a dam on the Blue Nile so their people have access to electricity. This would reduce river levels downstream in Egypt.
Increasing Energy Supply	**Renewable Energy**: **Wind** (wind turbines convert air movements into electricity, this is good option for UK due to consistent winds), **solar** (solar panels can be fitted on buildings or fields, the UK wants to increase our use but they depend on sun output), **Hydroelectric power** (HEP – when river water is trapped behind a dam and used to turn turbines. T**idal** (energy harnesses the power of small movements on the surface of the sea. The technology is new and currently expensive. We use very little, the Swansea tidal lagoon not built), **geothermal** (uses heat within the Earth to generate electricity. Easier where geothermal heat is more accessible, e.g. Iceland. There are few suitable locations, so it is rare in many countries), **biomass (**burns recently formed material from living things, e.g. chicken droppings waste to make electricity). **Non-Renewable Energy**: Fossil fuels: coal, oil, gas – pollute and are running out. Nuclear: reuses fuel but has risks and issues with storage of radioactive material. Example: Gannet Oilfield - 180km east of Aberdeen. **Pros**: jobs, money, less need to import. **Cons**: oil spills, pollution (1300 barrels leaked in 2011), running out.
Sustainable Future	**Carbon footprints:** measure pollution from our actions. Smart tech: helps us use less energy. Energy conservation: insulation, LED lights (use less electricity), cycling. Demand reduction: using less when demand is high. Carbon capture: stores pollution underground. Companies like Kiwi Power pay people to be allowed to turn off devices like air conditioning. This means less has to be made when demand rises. Example of local renewable energy in an LIC: **Nepal Microhydro**: Small water-powered stations give electricity to villages. Takes water from rivers flowing on steep slows – the river turns a turbine, hooked to a generator, which produces electricity. **Impacts**: Helps with health (store vaccines in refrigerator), education, improves standard of living. But small scale – cannot be made bigger if there is more need for electricity.

Paper 3: General Fieldwork Skills

Data collection

Primary – collected yourself

Secondary – collected by someone else, e.g. the government

Qualitative – involving numbers

Quantitative – involving opinions, descriptions, and images

Physical data examples – coasts: beach profile, pebble shape & size, sand dune transect, species identification

Physical data examples – rivers: rived width & depth, velocity, channel gradient, pebble shape & size, ecology

Human data examples – cities: land use mapping, bipolar surveys, environment & shop quality surveys, photographs, questionnaires, traffic & pedestrian counts, transport mapping

Data presentation

Graphs

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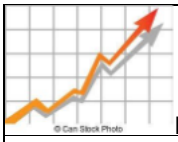
<td> 
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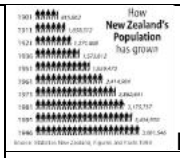
<td> 
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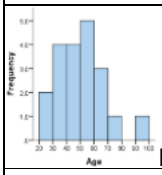
<td> 
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 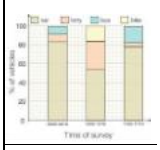 </td>
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 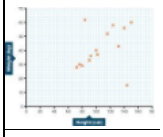 </td>
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 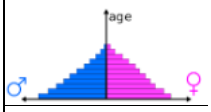 </td>
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 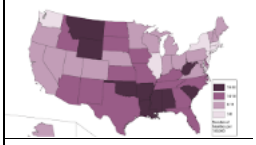 </td>
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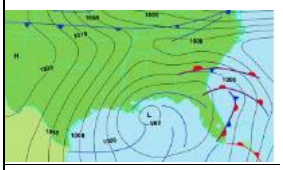
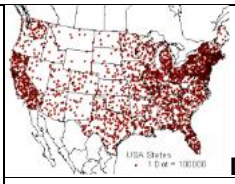
  </td>
<td> 
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 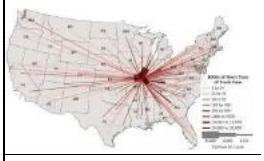 </td>
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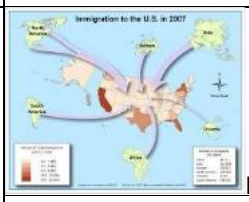
<td> 
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OS map skills

Scale and distance – use the scale bar and a ruler to measure distances between locations
Direction – use the compass to refer to places as north, south, east or west
Four and six figure grid references – "along the corridor and up the stairs"
Contour lines – show the height and shape (relief) of the land

Maths and statistics

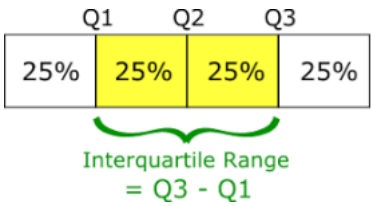
Mean – sum of all the values divided by the number of values

Median – middle value when values placed in order

Mode – most common value

Range – lowest value subtracted from the highest value

Interquartile range – subtract the lower quartile value from the upper quartile value



Human Fieldwork Enquiry

Title: Does **environmental quality** vary across different land uses in **regenerated areas** of **Salford Quays**?

Summary:

Justification for area chosen:	It has recently undergone massive regeneration. It has many visitors and workers, so we can give people questionaries and assess the environmental quality. Also, it is a public area, so we don't need permission.
How we stayed safe:	We carried our phones in case we got lost. We stayed in groups and within a view of a teacher.
Sampling chosen:	Stratified sampling. This is where we choose areas based on a specific group and deliberately take data from different land uses –e.g. Media City, residential and shopping areas.
Methodology for Environmental Quality:	Environmental survey and took photos of each site, then gave each site a score of 1-5 (5 is the best). We looked at noise, litter, greening, street furniture, graffiti, and traffic. We chose those factors because they did not need any special equipment and can be judged within a few minutes. We ensured that the scores were accurate by asking several people and giving clear descriptions for each number used. **Problems with this method**: It **relies on outsider impression**, and we might not notice everything. Counting litter or graffiti would be more objective and less influenced by our impression.
Methodology for the Questionnaire:	Gives a direct idea of how people view the environmental quality. Local people will have a better idea of what it's usually like e.g. traffic might not normally be this bad. We asked at least 10 people so that it gives us an accurate sample within the time available and allows us to plot located radar graphs to show the spatial difference. We also asked people from a range of sites. **Problems with this method**: Very subjective, depends on the time of day (less or more people available), hard to replicate.
Data presentation method chosen:	Located radar graph because it allows different parts of the environmental quality to be shown, and we can see more detailed patterns. Locating them on the map allows the spatial pattern to standout i.e. where it is similar or different.
Secondary data:	• House prices online are a strong indicator of how desirable an area has become over time. Rising property prices in Salford Quays suggested that regeneration had made the area more attractive, supporting our primary data findings about improved environmental quality. • Looking at older photographs from the area – allows us to visually compare how the area has changed over time and better understand the scale of environmental improvements, such as the development of green spaces.
Possible problems with the validity of our overall results:	• Only done on one day • Small sample of people • Photos are of only one or two time periods • People refused to answer • Not enough of the area covered

Physical Fieldwork Enquiry

Title: How does biodiversity and plant cover change from the strand line at Talacre, Wales?

Justification for area chosen:	We chose Talacre because it has a full sand dune system, so we could see how plants change as you move inland. It's a public beach, so we didn't need permission to go there. It was easy to access and safe for our group.
How we stayed safe:	We looked out for rabbit holes to stop anyone twisting their ankle. One person in our group acted as a spotter. We wore long trousers and made noise to avoid snake bites from adders. We stayed far away from the sea, which was at low tide, so there was no risk of drowning.
Sampling chosen:	Systematic. We walked in straight line and every 10 metres, we recorded the % of vegetation cover in the quadrat. This sampling methods is best because it allows us to cover the whole dune system.
Data collection – was it effective?	Our method was quite effective. We collected data every 10 metres, which helped us see changes in plant types and cover. We used a booklet and an app to help identify plants, which worked well. But measuring plant cover wasn't always accurate because the plants got flattened. We tried to fix this by pulling the plants through the quadrat, but it was tricky. We also stopped at the boardwalk, so we didn't get data from the whole dune system.
Data presentation method chosen:	We used kite diagrams to show the types and numbers of plants every 10 metres. This helped us see how plant life changed across the dunes. We could easily spot where pioneer plants like marram grass were and where other plants like daisies and dandelions started to grow.
Our conclusion:	Our conclusion wasn't fully reliable. We used a method that might have missed some plants, especially ones that show changes in dune type. It was hard to measure how much of the ground was covered by plants because they got squashed under the quadrat. Some plants were hard to tell apart, like marram and sand couch grass. We also saw garden plants that weren't on our ID sheet, which made it harder to identify them correctly. Our transect didn't stay in a straight line because we had to avoid thorny bushes. We couldn't study the mature dunes because they had buildings on them. All of this made it hard to say for sure how biodiversity and plant cover changed across the dunes.
How Reliable Were Our Methods and Results	Reliable parts: We used the same method every 10 metres, which helped us compare results fairly. We used tools like ID guides and apps to check plant names, which made our results more accurate. Less reliable parts: Our quadrat sometimes gave wrong results because plants were squashed underneath. We didn't always stay in a straight line, so our transect didn't fully show the changes across the dunes. We missed the mature dunes because they were built on, so we didn't get the full picture. Some plants were hard to identify, which could have led to mistakes. Overall, our results gave us a good idea of what was happening, but they weren't fully reliable.