Year 9 Geography: Climate Change

Week 1

What is the evidence for climate change?

1. The world's climate has always changed. During the Medieval Warm Period grapes were grown in London but during the time of the Stuarts, the River Thames would freeze.
2. **Since 1880** the Earth's climate has increased by approx. **0.8 degrees**.
3. However, the increase in temperature has **not been steady**.
4. 16 out of the 17 warmest years in the last 136 years have all occurred since 2001.
5. Also, since the 1980s the **Arctic sea ice has been in decline**. fluctuated, with the lowest km² recorded in 2012.

Ice Cores

1. **Ice sheets** are huge blocks of ice made up of **layers**. A new layer forms each year.
2. **Gases trapped in the ice** give information about the **temperature** when they were trapped.
3. One ice core from Antarctica shows the temperature change over 400,000 **years.**

Tree Rings

1. As a tree grows, a **new outer layer (or ring)** is formed each **year**.
2. These are thicker in warm, wet conditions.
3. Tree rings can go back **10,000 years**.

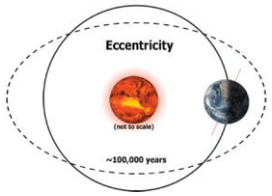
Temperature records

Since the 1850s, global temperature has been measured.
Thermometers are used to measure temperature and are very **accurate**.

Week 2

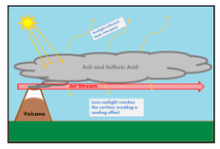
Physical cause of climate change

Orbital change is about how close the Earth is to the sun. Every 100,000 years the proximity of the **Earth's orbit** will move from **circular to elliptical (oval)**.
The further the Earth is from the sun, the colder the temperature. A more eccentric **(elliptical)** orbit makes the distance from the Earth to the sun fluctuate.



These are **dark spots** that appear on the surface of the sun.
The **more** the sunspots, the **greater** the **heat** produced.
They come and go in **11-year cycles**.
This is known as the **sunspot cycle**.

Lots of **material** is released into the **atmosphere** during a volcanic eruption.
This **reflects the sun rays back out** (so they do not reach the Earth).
This leads to **cooling** e.g. after the Mt Pinatubo eruption (1991), global temperature fell.



Week 3

Manmade greenhouse effect

- **Sun rays** travel through the **atmosphere** to Earth.
- As they **reflect** off the **Earth,** some of the outgoing rays **escape** back out of the atmosphere.
- **Some** are **trapped.**
- This balance is needed to keep the Earth warm enough for life.

- The atmosphere is made up of many gases, two important gases are carbon dioxide **(CO_2)** and **methane**.
- **Human activity** e.g. driving cars and using electricity often requires the burning of **fossil fuels** such as oil and coal, which give off **CO_2**.
- These **greenhouse gases** are released into the **atmosphere** and they trap more and more rays that would normally escape into space.
- So, the **global temperature increases.**

Examples
Cars (and other transport) Coal and gas power plants
Building factories
An increase in the standard of living
Increased farming
Deforestation

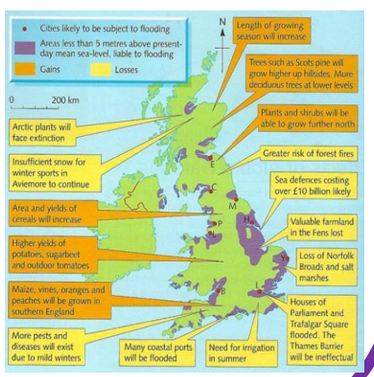
Week 4

Social impacts of climate change

1. **Temperature rise** so there are more **droughts & deaths** from dirty water in places like the Sahel.
2. **Rising sea levels** means coastal areas are flooded, leading to migration. For example, **Shanghai** is at risk with 24.5 million people.
3. **Lower yields of crops** (e.g. Maize) due to warmer temperatures means farmers go bankrupt.
4. Droughts cause **crop failure**, which can cause famine and starvation.
5. **Sea temperatures increase**, causing more **tropical storms,** causing death / homelessness.

Environmental impacts of climate change

1. **Warmer climate** means glaciers and **ice sheets melt** (e.g. Greenland) so sea levels will rise.
2. **Sea ice shrinking** means lost habitats e.g. **polar bears** risk **extinction.**
3. **Rising sea levels** means coastal areas flood which **destroys habitats** e.g. Norfolk Broads.
4. **Sea temperatures rise** so **coral reefs are bleached** and habitats are lost e.g. the Great Barrier Reef.



Week 5

Adaptation:

Coping with rising sea levels:
Sea levels are predicted to rise by 82cm by 2100. Physical barriers – flood embankments (levees) could be built e.g. The Thames Barrier.

Changing agricultural systems:
Crop patterns are charging. In Kenya drought resistant crops are being used to provide food even when rainfall is low.

Managing water supply:
Areas will get drier, so adding water meters may reduce use. Also, using water storage facilities.

Mitigation:

International agreements:
Countries agree to reduce their carbon emissions (carbon footprint) by setting emission targets.

Alternative energies:
Using wind farms, solar energy, nuclear and tidal.

Carbon Capture:
Some power plants are designed to capture the CO_2 they create when they burn fossil fuels. Once caught, it is stored underground.

Key words:

1. **Climate change**: long-term shifts in temperatures and weather patterns
2. **Global warming**: long-term heating of Earth's surface
3. **Greenhouse effect:** the trapping of the sun's warmth in a planet's lower atmosphere
4. **Mitigation**: the action of reducing the severity of something
5. **Adaptation:** Changing to fit in with the environment

Year 9 Geography: Climate Change

Week 1

Questions	Answers
How much has the earths temperature increased by since 1880?	0.8 degrees
How far back can ice cores go in Antarctica?	One ice core from Antarctica shows the temperature change over 400,000 years.
How far back do tree rings go?	10,000 years
What is used to measure temperature?	Thermometers
What are the 3 ways to measure climate change?	Ice cores, tree rings, temperature records

Week 2

Questions	Answers
What is orbital change?	Orbital change is about how close the Earth is to the sun.
How many years does it take for the earths orbit to change?	Every 100,000 years the proximity of the Earth's orbit will move from circular to elliptical (oval).
What are sun spots?	These are dark spots that appear on the surface of the sun.
How often is a sun spot cycle?	Every 11 years
Will a volcanic eruption heat or cool earths temperatures?	Cool (block suns rays)

Week 3

Questions	Answers
How do cars affect climate change?	Burning fossil fuels increasing CO_2 into the atmosphere.
How does coal affect climate change?	Coal gives off CO_2 whilst burning fossil fuels to make electricity.
How does an increase standard of living affect climate change?	A better standard of living means more electricity used in homes so more CO_2 is released.
How does increased farming affect climate change?	Pastoral farming means more dung so more methane.
How does deforestation affect climate change?	Cutting down trees means less trees to absorb CO_2

Week 4

Questions	Answers
What are social impacts of climate change?	Temperature rise, Rising sea levels, Lower crop yields, drought, sea temperature increase
What are the environmental impacts of climate change?	Ice sheets melt, sea ice shrinks, rising sea levels, sea temperature rise
Explain how rising sea levels would be a social impact?	Rising sea levels means coastal areas are flooded, leading to migration. For example, Shanghai is at risk with 24.5 million people.
Explain how rising sea levels would be an environmental impact?	Rising sea levels means coastal areas flood which destroys habitats e.g. Norfolk Broads.
Explain how sea ice shrinking is an environmental impact?	Sea ice shrinking means lost habitats e.g. polar bears risk extinction.

Week 5

Questions	Answers
What is mitigation?	the action of reducing the severity of something
What is adaptation?	Changing to fit in with the environment
Give 3 examples of mitigation	International agreements, alternative energy, carbon capture
Give 3 examples of adaptation	Coping with sea level, Changing agricultural systems, managing water supply
What are the positives and negatives of Carbon capture?	Good – reduces CO_2, so reduces consequences e.g. flooding. Bad – expensive = higher bills. The ground could crack causing CO_2 to escape.

Key words:

1. Climate change: long-term shifts in temperatures and weather patterns
2. Global warming: long-term heating of Earth's surface
3. Green house effect: the trapping of the sun's warmth in a planet's lower atmosphere
4. Mitigation: the action of reducing the severity of something
5. Adaptation: Changing to fit in with the environment