THE DUSTON SCHOOL 4-19

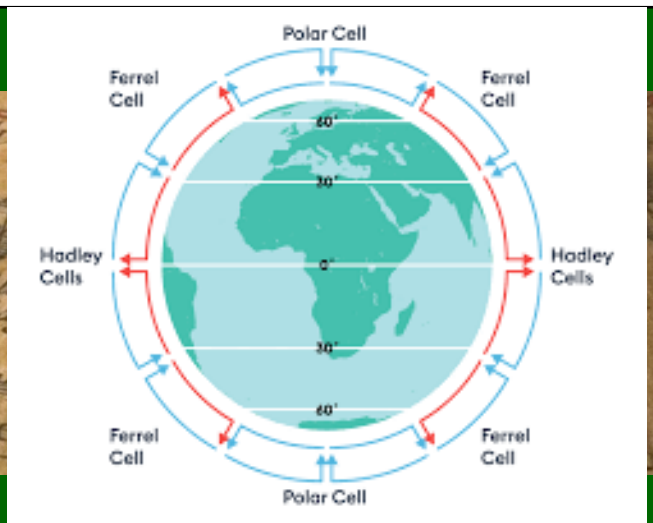
Knowledge Organiser World Studies

KS4 Geography
Topic 1: Hazards Earth EQ1

Name:

Class Teacher:

Big Question	Task	Due Date
3	Exam questions (set end of lesson 2)	
4	Retrieval questions ready for test Lesson 5	
6	Seneca & revision cards	



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Exam structure & Case Studies

Paper 1: Global Geographical Issues (37.5%)

- ❑ Topic 1: Hazardous Earth
- ❑ Topic 2: Development dynamics
- ❑ Topic 3: Challenges of an urbanising world

Written examination: 1 hour and 30 minutes, 94 marks.

Answer all questions

Paper 2: UK Geographical Issues (37.5%)

- ❑ Topic 4: The UK's evolving physical landscape
- ❑ Topic 5: The UK's evolving human landscape
- ❑ Topic 6: Geographical investigations

Written examination: 1 hour and 30 minutes, 94 marks.

Answer all questions in Topic 4 and 5

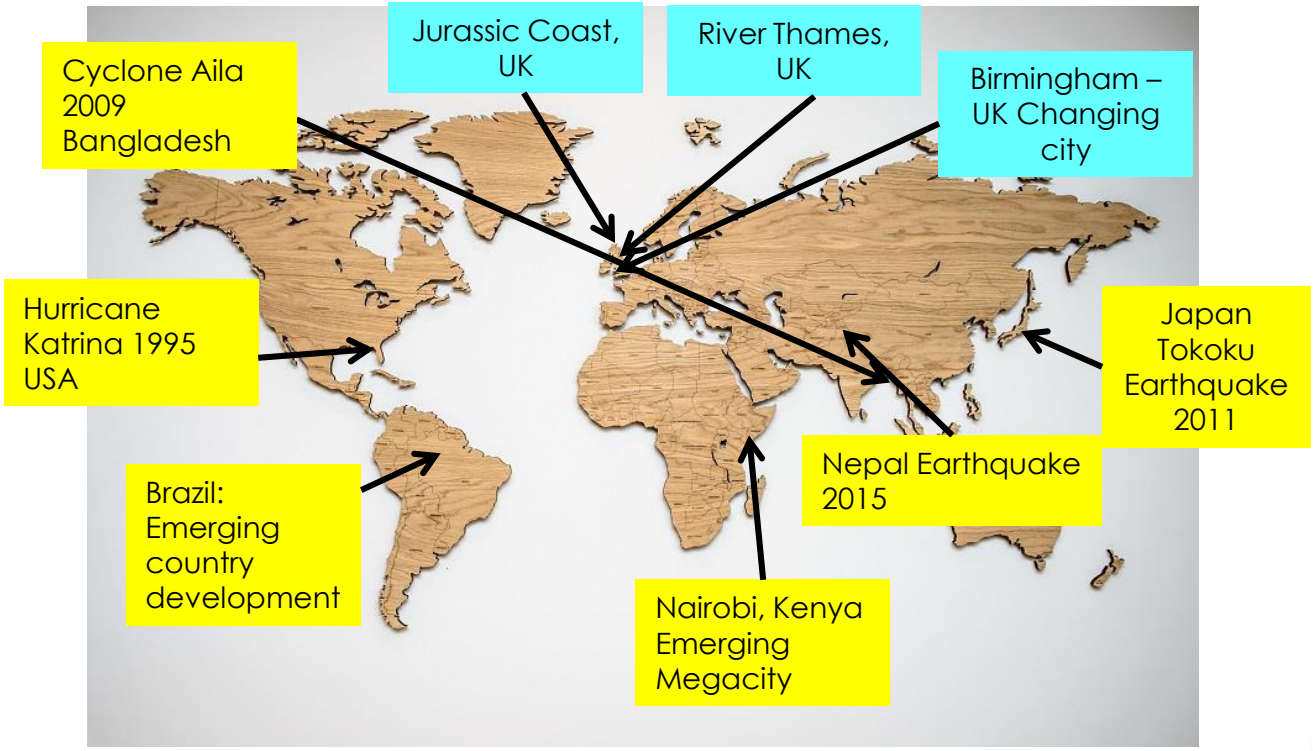
Topic 6: Answer Q 8 & Q10

Paper 3: People and Environment Issues – Making Geographical Decisions (25%)

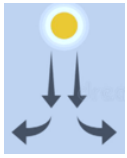
- ❑ Topic 7: People and the biosphere
- ❑ Topic 8: Forests under threat
- ❑ Topic 9: Consuming energy resources

Written examination, 1 hour and 30 minutes, 64 marks.

Answer all questions



Glossary

Key term	Icon	Definition
Atmospheric circulation		The movement of air within the Polar, Ferrel and Hadley Cells controlled by radiation from the sun.
Enhanced greenhouse effect		The trapping of heat radiation around the Earth by excess greenhouse gases produced through human activity.
Greenhouse gases		Human activities such as energy, industry, transport and farming that produce greenhouse gases e.g. carbon dioxide and methane.
High pressure		The 'weight' of sinking air exerts more pressure on the ground and an area of high pressure is formed causing areas to become arid
Low pressure		The warmth of the Earth's surface causes air to rise, exerting less pressure on the ground forming low pressure causing rainfall.
Natural climate change		Natural changes to Earth's climate caused by Milankovitch cycles, solar variation, volcanism and surface impact.

BQ1: How is heat energy redistributed around the Earth?

Global atmospheric circulation

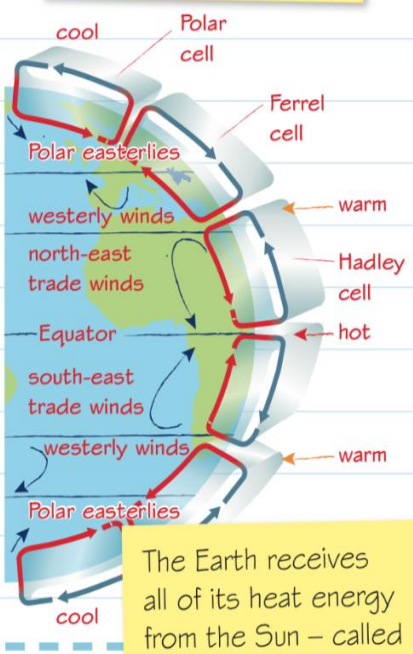
The Earth's atmosphere is in constant motion, transferring heat energy around the Earth.

Circulation cells

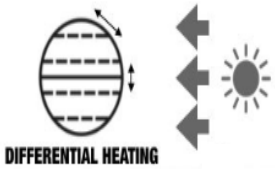
Different areas of the Earth receive different amounts of solar radiation: there is a surplus of heat energy at the Equator and a deficit at the Poles. Three circulation cells in each hemisphere redistribute this heat energy.

1. At the Equator, warmed air rises to 15 km, causing low pressure. The air current divides, cools and moves north and south to form Hadley cells. The cooled air sinks at 30° north and south of the Equator, leading to high pressure.
2. Some of the cooled air moves back towards the Equator as trade winds. The rest travels towards the Poles, forming the lower part of Ferrel cells.
3. At 60° north and south, the warmer air of the Ferrel cells meets colder polar air. The warmer air rises to form Polar cells. This air travels to the Poles, where it cools and sinks, forming areas of high pressure.

Global circulation cells

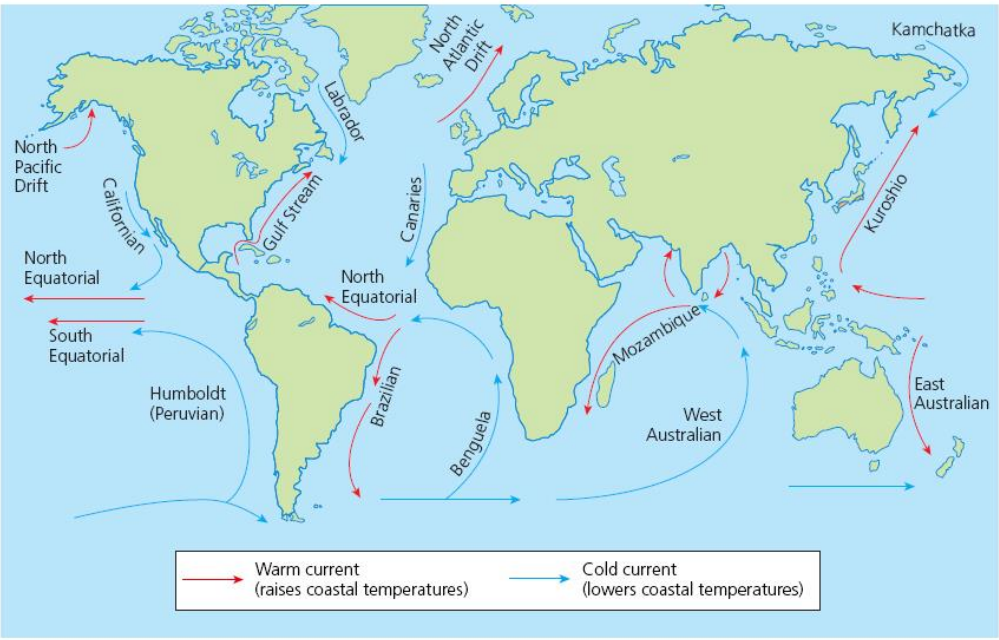


The Earth receives all of its heat energy from the Sun – called **solar radiation**.



- The equator receives the most concentrated radiation because the sun's rays hit the surface at a right angle. This creates a **heat surplus** at the equator
- At the poles, the sun's rays reach the surface at a lower angle and have a large surface area to heat creating a **heat deficit.**

BQ1: How is heat energy redistributed around the earth?

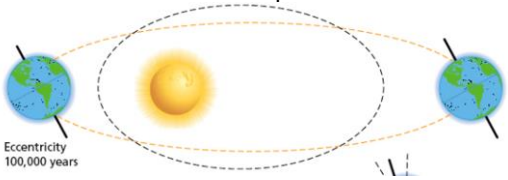


- ❑ Ocean currents transfer 20% of the total heat from the topics to the poles.
- ❑ In the Northern hemisphere the currents move in a clockwise direction
- ❑ In the Southern hemisphere the currents move in an anticlockwise direction
- ❑ Surface ocean currents are driven by the movement of the wind across the top of the water
- ❑ Deep ocean currents are driven by cold water (denser) sinking in the Poles and then rising at the topics when it becomes warmer and more buoyant.
- ❑ The Gulf steam (North Atlantic Drift) moves warm water from the Caribbean Sea across the Atlantic Ocean to the UK

BQ2: What are the causes & evidence of natural climate change?

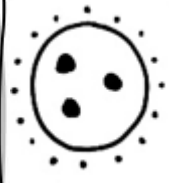
Milankovitch theories:

a. **Eccentricity of the orbit** → changes from being elliptical (interglacial/warmer) to more circular (glacial periods/colder) and back again over a period of 100,000 years. The changes occur due to the interaction with gravitational fields of Jupiter and Saturn.



a. **Axil tilt/Obliquity** → varies from 21.8° to 24.4° (currently 23.5°) on a 41,000 year cycle. With increased tilt the poles, receive an increase in solar radiation, while lower latitudes receive a decrease.

b. **Wobble/Precession**→ the earth wobbles on its axis changing the point in the year at which the Earth is closest to the sun over a 21,000 year cycle. This impacts the seasons and can cause warmer summers.



Solar variation: Energy emitted by the sun varies due to sunspots, varying every 11 years. Suggested to account for 20% of warming in the 20th Century

Volcanism

- Eruptions release ash and sulphur dioxide into the atmosphere
- Sulphur dioxide has a cooling effect of the climate – mixes with water to form sulphuric acid.
- This absorbs radiation from the sun, stopping the heat from reaching the earth's surface

Asteroid collisions: Large cosmic material, such as asteroids and comets, can impact the Earth's surface. This ejects large volumes of dust into the atmosphere, partially blocking solar radiation.

BQ2: What are the causes & evidence of natural climate change?

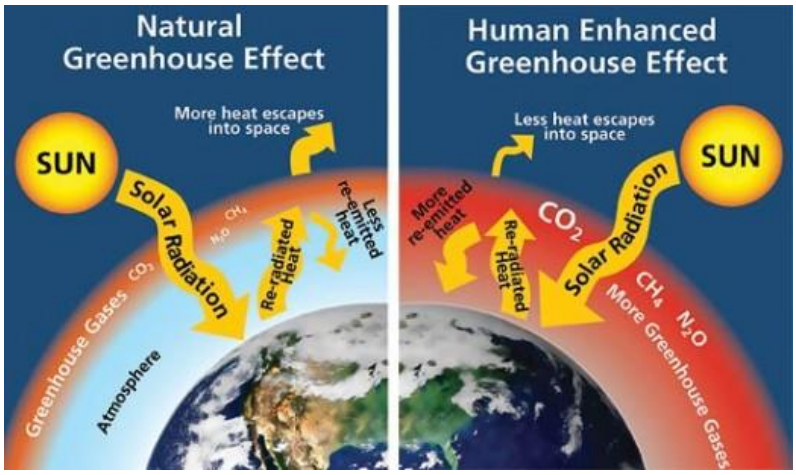
Evidence for natural climate change

1. Ice cores → cores are drilled into ice areas in Antarctica to measure the amount of C02 trapped in the ice for the past 800,000 years. Levels of C02 tend to be lower during cooler periods.

2. Tree rings → Each year of the tree's growth records the past climate. Narrow rings suggests a cooler, drier year and thicker means the temperature was warmer and wetter.

3. Historical sources → Includes cave paintings, diaries, poems etc. Daily weather records have been recorded since 1873.

BQ4: How do human activities contribute to global warming?



Human activities:

Industry –

- ❑ Human activity, since the Industrial Revolution, has increased the amount of greenhouse gases in the atmosphere.
- ❑ This has been driven by the increases in disposal income, leading to increased demand for the production of consumer goods.

Transport - With cars becoming more affordable and more people taking flights over long distances, huge quantities of fuel are used.

Energy –

- ❑ Fossil fuels are very energy dense. Being energy dense means burning a small amount of fossil fuels can generate a lot more energy than burning the same amount of any other type of fuel.
- ❑ The demand for electricity is growing because of increasing population and new technologies. Accounts for 25% of global carbon dioxide emissions.

Farming

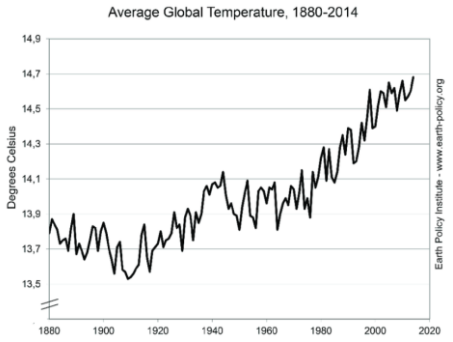
- ❑ Increased demand for Western-style diets which contain meat. = Cattle produce methane as part of their digestion = 1/3rd of emissions from agricultural sector.
- ❑ Mechanisation means more fuel is burnt

BQ5: What's the evidence for human caused climate change & what are the consequences?

There are three main sources of evidence for the enhanced greenhouse effect – global temperature rise, sea level rise and warming oceans, and declining Arctic ice.

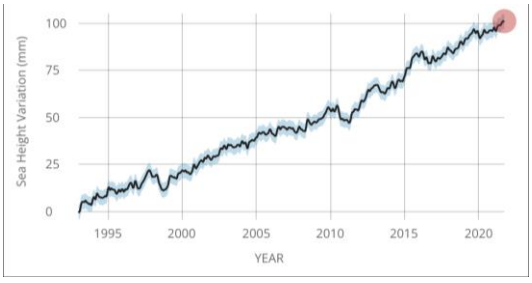
Global temperature rise

Measurements of average global atmospheric temperatures show a steep rise from around the 1950s to the present. The rise is global temperatures is closely associated with the rise in carbon dioxide.



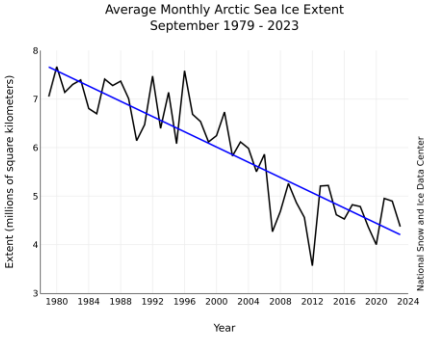
Sea level change

Sea levels shows that globally they have risen by about 20cm since 1900. Sea level rise is caused by melting glaciers and ice caps, and significantly by thermal expansion.



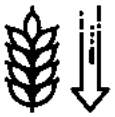
Declining Arctic ice

The extent of Arctic sea ice has decreased. Every year sea ice melts in spring and reaches its lowest extent in September. Warmer global temperatures have meant more ice has melted.



BQ5: What's the evidence for human caused climate change & what are the consequences?

Increased temperatures:



- ❑ Countries closest to the Equator will see their crop yields decrease African countries
- ❑ Spread of diseases and pests

- ❑ Crops such as vines and olives with grow in Southern UK.
- ❑ Melting of high mountain glaciers i.e. Himalayas, can lead to flooding of the local area in the short term.

- ❑ Arctic melting could cause the Gulf Stream to be diverted further South = colder temperatures for western Europe.

Rising sea levels

Global mean sea level predicted to rise of 0.8-2m by 2100.

A rise in global temperatures will cause the oceans to expand in volume **i.e. thermal expansion**, further adding to sea level rise.

Maldives – at its highest point is 2.4m above sea level – all predictions put the islands at serious risk. Groundwater supplies could be contaminated with sea water.

Extreme weather events

- ❑ Tropical cyclones, long droughts, flooding from intense, prolonged rainfall and heavy snowfalls.

HOMEWORK 1

(a) Study Figure 1 which shows a climate graph for Timbuktu, Mali located 16°N of the equator.

(i) Identify which one of the following describes Timbuktu's climate. (1)

- ☐ **A** Temperature is highest in November
- ☐ **B** August is the wettest month
- ☐ **C** October is the driest month
- ☐ **D** Temperature decreases from January to May

(ii) Calculate the annual temperature range in Timbuktu. (1)

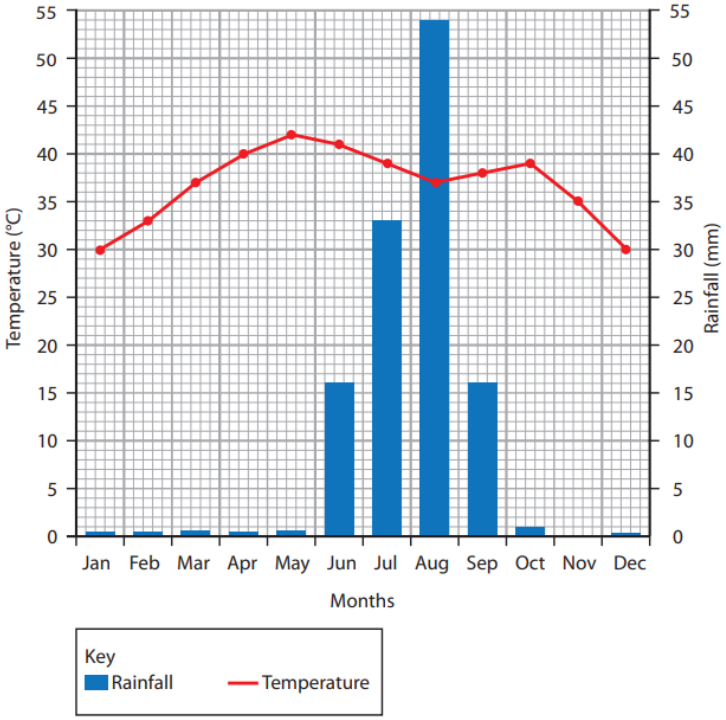


Figure 1

..... °C

(b) Explain one reason why some areas are arid (have low rainfall). (2)

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Explain two ways in which changes in the area of Arctic ice may have consequences for people. (4)

1.....

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2.....

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Homework 2

Try to answer all of these key knowledge questions. Then check your answers using the answer page. These are some of the questions that will be in the knowledge quizzes and the mid and end of unit tests.

Key knowledge question	**Your answer**
Explain how volcanic activity causes climate change (2)	
Explain how asteroid collisions causes climate change (2)	
Explain the three Milankovitch cycles (6)	
Explain how ice cores provide evidence for natural climate change (2)	

Homework 2

Key knowledge question	Your answer
Explain how tree rings provide evidence for natural climate change (2)	
Explain how historical sources provide evidence for natural climate change (2)	
What is the difference between the natural and enhanced greenhouse effect? (2)	
Explain the source of carbon dioxide (2)	
Explain the source of methane (2)	
Explain the source CFCs (2)	
Explain two human activities that are causing global warming (4)	

Homework 3

You should complete revision in preparation of your end of topic test. This includes:

1. Completing the SENCA revision work as outlined on class charts.
2. Producing revision cards on the key areas outlined below:

Key content	Revision notes completed	Revised?
I can describe the global atmospheric circulation model		
I can explain how the global atmospheric circulation model affects weather around the world.		
I can explain the evidence both for and against climate change.		
I can explain both the natural and human causes of climate change.		

Video resources:

What is global circulation? | Part One | Differential heating

https://www.youtube.com/watch?v=7fd03fBRsuU

What is global circulation? | Part Two | The three cells

https://www.youtube.com/watch?v=xqM83_og1Fc

What is global circulation? | Part Three | The Coriolis effect & winds

https://www.youtube.com/watch?v=PDEcAxfSYaI

Key knowledge questions

Key knowledge question	Your answer
Explain how volcanic activity causes climate change (2)	Large-scale eruptions eject ash and dust into the atmosphere. (1) This blocks out solar radiation, reducing global temperatures and causing cooler periods. (1)
Explain how asteroid collisions causes climate change (2)	Large asteroids and comets, can impact the Earth's surface. (1) This ejects dust into the atmosphere, partially blocking solar radiation and leading to glacial periods. (1)
Explain the three Milankovitch cycles (6)	**Eccentricity (100,000 years)** (1) sometimes the earth's orbit is more circular (slightly warmer) and sometimes it is more of an ellipse (oval) making it slightly colder. (1) **Axial tilt (40,000 years) (1)** Over time, the angle of tilt changes, so the Earth is tilted further away from the sun, meaning the differences in the seasons is more pronounced (summers are warmer and winters colder). (1) **Precession or wobble (26,000 years) (1)** – As the Earth rotates on its axis, it 'wobbles' similar to a spinning top as it slows down. The direction the axis is facing changes creating greater or smaller differences between winter and summer. (1)
Explain how ice cores provide evidence for natural climate change (2)	When the loose snow it contains the exact amount of gases currently in the atmosphere. (1) We use this to reconstruct historic atmospheres and temperatures in the past (1).
Explain how tree rings provide evidence for natural climate change (2)	Each year the growth of a tree is shown by a single ring. (1) If the ring is narrow it indicators a cooler, drier year. If it is thicker it means the temperature was warmer and wetter. (1)
Explain how historical sources provide evidence for natural climate change (2)	These include cave paintings, diaries and documentary evidence (1) . Since 1873 daily weather reports have been kept. (1)

Key knowledge questions

Key knowledge question	Your answer
What is the difference between the natural and enhanced greenhouse effect? (2)	The natural greenhouse effect is caused by gases naturally present in the atmosphere affecting the behaviour of the heat energy radiated by the sun. (1) increased concentrations of greenhouse gases (1) has led to an increase in the global average surface temperatures which is the enhanced greenhouse effect (1).
Explain the source of carbon dioxide (2)	Chopping down trees increases the amount of carbon dioxide in the atmosphere (1) Whenever fossil fuels are burned CO2 is released into the atmosphere. (1)
Explain the source of methane (2)	Methane is piped into homes for domestic heating and cooking purposes. (1) Methane comes from the increased farming of cattle (1)
Explain the source CFCs (2)	Chlorofluorocarbons can include aerosols and polystyrene. (1) CFCs break down ozone (03) which protects us from harmful UV rays. (1)
Explain two human activities that are causing global warming (4)	**Industry** ❑ Since the Industrial Revolution the amount of greenhouse gases have increased (1) ❑ Due to increases in disposal income, = production of consumer goods. (1) **Transport** With cars becoming more affordable and more people taking flights over long distances, huge quantities of fuel are used. (1) **Energy –** ❑ Fossil fuels are very energy dense. Being energy dense means burning a small amount of fossil fuels can generate a lot more energy than burning the same amount of any other type of fuel. (1) ❑ The demand for electricity is growing because of increasing population and new technologies. (1) **Farming** ❑ Increased demand for Western-style diets which contain meat. = Cattle produce methane as part of their digestion = 1/3rd of emissions from agricultural sector. (1) ❑ Mechanisation means more fuel is burnt (1)

Question 1:

Always read the question carefully before you start writing your answer. Make sure you are clear about what the topic of the question is.

In this question, up to four additional marks will be awarded for your spelling, punctation, grammar and use of specialist terminology.

Assess the view that human activities causing climate change have become more important than the natural causes of climate change. **(8 marks)**

Structuring your answer

1. **Point** - identify your first impact
   - This needs to be one sentence that is clear and concise
   - **Connectives:** Firstly/Secondly/Finally or On one hand/On the other hand/Overall or To begin with
2. **Explain** your first impact. Use the so what effect.
   - Always go into detail, aim for 2-3 sentences
   - **Connectives**: This means that, Therefore, This links to, This causes, Consequently
3. **Evidence**
   - Give an example or some evidence – the more specific you are, the better you will perform overall.
   - **Connectives:** For example/For instance, Such as, This links to, As seen by/in
4. **Counter argument (be critical)**
   - You should be critical i.e. consider counter arguments to your initial point
   - **Connectives:** However, On the other hand, Although, Alternatively
5. **Evaluation** (link to the question)
   - This is where you link your paragraph back to the question by stating what you think overall and how your response answers the question
   - **Connectives:** Overall, To summarise, In conclusion, I believe that, Ultimately

Level 1	1–3	• Demonstrates isolated elements of understanding of concepts and the interrelationship of places, environments and processes. (AO2) • Attempts to apply understanding to deconstruct information but understanding and connections are flawed. An unbalanced or incomplete argument that provides limited synthesis of understanding. Judgements are supported by limited evidence. (AO3)
Level 2	4–6	• Demonstrates elements of understanding of concepts and the interrelationship of places, environments and processes. (AO2) • Applies understanding to deconstruct information and provide some logical connections between concepts. An imbalanced argument that synthesises mostly relevant understanding but not entirely coherently, leading to judgements that are supported by evidence occasionally. (AO3)
Level 3	7–8	• Demonstrates accurate understanding of concepts and the interrelationship of places, environments and processes. (AO2) • Applies understanding to deconstruct information and provide logical connections between concepts throughout. A balanced, well-developed argument that synthesises relevant understanding coherently, leading to judgements that are supported by evidence throughout. (AO3)

Assess the view that human activities causing climate change have become more important than the natural causes of climate change. (8 marks)

Human activities like increased use of fossil fuels from vehicles has had an immense impact on climate change, as it has polluted air and seas, which kills some animals/fish populations. It also heats up the Earth causing ice caps to melt, and sea levels to rise, which increases chances of coastal flooding, potentially affecting crops and animal habitats.

Natural causes of climate change, like volcanoes, release a layer of ash in the air, which blocks the suns rays from heating the Earth, and increases pollution into the air which kills animals and destroys their habitats. Some also have a long pyroclastic flow which destroys vegetation, killing sources of food and income.

I think that human activities on climate change have had an increasing detrimental affect on animal habitats, and loss of vegetation etc. Natural causes of climate change have always affected the world, and they're unpreventable, whereas we can stop human activities which affect climate change.

Results Plus: Examiner Comments

This is a typical lower level 2 response. The candidate identifies some human causes of climate change without establishing a link to the mechanics of the greenhouse effect. There is also some brief coverage of some of the natural causes of climate change with some limited assessment towards the end of the response. Level 2 - 4 marks.

Results Plus: Examiner Tip

In 'assess the view' questions try and produce an argument in support of the view and also mention why some people may have an alternative viewpoint.