UN CLIMATE CHANGE CONFERENCE UK 2021

Climate change: what is it and what has caused it?

1. How long ago was the Earth formed?

2. What is the difference between glacial and interglacial periods?

3. What was the Industrial Revolution?

4. What do greenhouse gases do?

5. What are the chemical symbols for carbon dioxide, methane and nitrous oxide?

Climate Change: The causes

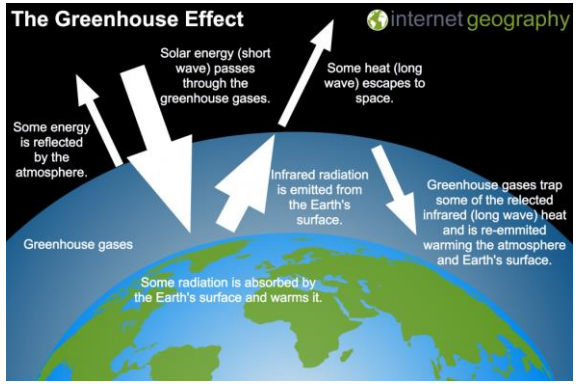
The evidence is clear: the main cause of climate change is burning fossil fuels such as oil, gas, and coal. When burnt, fossil fuels release carbon dioxide into the air, causing the planet to heat up.

What causes climate change?

1. The climate on Earth has been changing since it formed 4.5 billion years ago. Until recently, natural factors have been the cause of these changes. Natural influences on the climate include volcanic eruptions, changes in the orbit of the Earth, and shifts in the Earth's crust (known as plate tectonics).

2. Over the past one million years, the Earth has experienced a series of ice ages, including cooler periods (glacials) and warmer periods (interglacials). Glacial and interglacial periods cycle roughly every 100,000 years, caused by changes in Earth's orbit around the sun. For the past few thousand years, Earth has been in an interglacial period with a constant temperature.

3. However, since the Industrial Revolution in the 1800s, the global temperature has increased at a much faster rate. By burning fossil fuels and changing how we use the land, human activity has quickly become the leading cause of changes to our climate.



How does the climate system work?

4. Greenhouse gases and the greenhouse effect
Some gases in the Earth's atmosphere trap heat and stop it escaping into space. We call these 'greenhouse gases'. These gases act as a warming blanket around the Earth, known as the 'greenhouse effect'.

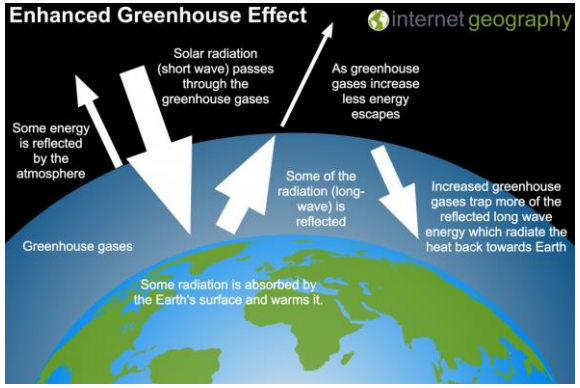
5. Greenhouse gases come from both human and natural sources. Gases like carbon dioxide, methane, and nitrous oxide naturally occur in the atmosphere. Others, such as chlorofluorocarbons (CFCs), are only produced by human activity.

6. When short-wave radiation from the sun reaches Earth, most of it passes straight through and hits the surface. The Earth absorbs most of this radiation and gives off longer-wavelength infrared radiation.

7. The greenhouse gases absorb some of this infrared radiation, instead of it passing straight out into space. The atmosphere then emits radiation in all directions, sending some of it back to the surface, causing the planet to heat up. This process is known as the 'greenhouse effect'.

8. The greenhouse effect is critical to our survival. In fact, without greenhouse gases, Earth would be about 30 degrees colder than it is today. Without greenhouse gases and their warming effect, we wouldn't be able to survive.

9. However, since the Industrial Revolution, we've been adding more and more greenhouse gases into the air, trapping even more heat. Instead of keeping Earth at a warm, stable temperature, the greenhouse effect is heating the planet at a much faster rate. We call this the 'enhanced greenhouse effect' and it's the main cause of climate change.



6. What happens to most of the short-wave radiation for the Sun?

7. What is the greenhouse effect?

8. What would happen if there were no greenhouse gases?

9. What is the difference between the greenhouse effect and the enhanced greenhouse effect?

Keywords:
Atmosphere = the thin layer of gases that protects the Earth from the vacuum of space and allows life on Earth to exist (air)
Global warming = the long-term warming of the Earth's temperature
Climate change = the long-term change in the Earth's temperature, can be warmer or cooler

10. What are 'forcings' and what can they do to the climate?

11. What evidence do Climate Scientists use to show that natural changes are not the main cause of the current increase in global temperatures?

12. Why is releasing carbon dioxide into the atmosphere a problem?

Natural changes to the climate

10. Natural cycles can cause the climate to alternate between warming and cooling. There are also natural factors that force the climate to change, known as 'forcings'. Even though these natural causes contribute to climate change, we know that they are not the primary cause, based on scientific evidence.

11. Some of these natural cycles include:

•**Milankovitch cycles** – As Earth travels around the sun, its path and the tilt of its axis can change slightly. These changes, called Milankovitch cycles, affect the amount of sunlight that falls on Earth. This can cause the temperature of Earth to change. However, these cycles take place over tens or hundreds of thousands of years and are unlikely to be causing the changes to the climate that we are seeing today.

•**El Niño Southern Oscillation (ENSO)** – ENSO is a pattern of changing water temperatures in the Pacific Ocean. In an 'El Niño' year, the global temperature warms up, and in a 'La Niña' year, it cools down. These patterns can affect the global temperature for a short amount of time (months or years) but cannot explain the persistent warming that we see today.

•**Solar irradiance** – Changing energy from the sun has affected the temperature of Earth in the past. However, we have not seen anything strong enough to change our climate. Any increase in solar energy would make the entire atmosphere of Earth warm, but we can only see warming in the bottom layer.

•**Volcanic eruptions** – Volcanoes have a mixed effect on our climate. Eruptions produce aerosol particles that cool Earth, but they also release carbon dioxide, which warms it. Volcanoes produce 50 times less carbon dioxide than humans do, so we know they are not the leading cause of global warming. On top of this, cooling is the dominant effect of volcanic eruptions, not warming.

Human causes of climate change

12. Humans cause climate change by releasing carbon dioxide and other greenhouse gases into the air. Today, there is more carbon dioxide in the atmosphere than there ever has been in at least the past 2 million years. During the 20th and 21st century, the level of carbon dioxide rose by 40%.

13. We produce greenhouse gases in lots of different ways:

•**Burning fossil fuels** – Fossil fuels such as oil, gas, and coal contain carbon dioxide that has been 'locked away' in the ground for thousands of years. When we take these out of the land and burn them, we release the stored carbon dioxide into the air.

•**Deforestation** – Forests remove and store carbon dioxide from the atmosphere. Cutting them down means that carbon dioxide builds up quicker since there are no trees to absorb it. Not only that, trees release the carbon they stored when we burn them.

•**Agriculture** – Planting crops and rearing animals releases many different types of greenhouse gases into the air. For example, animals produce methane, which is 30 times more powerful than carbon dioxide as a greenhouse gas. The nitrous oxide used for fertilisers is ten times worse and is nearly 300 times more potent than carbon dioxide!

•**Cement** – Producing cement is another contributor to climate change, causing 2% of our entire carbon dioxide emissions.

13. What can we do to mitigate against climate change?

Keyword: Mitigate = make something less severe, serious or painful

Are humans responsible for climate change?

14. When looking at all the evidence, there is a large scientific consensus that humans are the leading cause of climate change. In their latest report, the Intergovernmental Panel on Climate Change stated unequivocally that human activity is the cause of global warming.

Natural climate cycles can change the temperature of Earth, but the changes we are seeing are happening at a scale and speed that natural cycles cannot explain. These cycles affect the global temperature for years, or sometimes just months, not the 100 years that we have observed. Meanwhile, longer-term changes like Milankovitch cycles and solar irradiance take thousands and thousands of years.

There are lots of things that affect climate change, but the evidence is irrefutable. Human activity, such as burning fossil fuels and changing how we use the land, is the leading cause of climate change.

14. What adaptations will we need to make to our ways of life in the future as a result of climate change?

Keyword: Adaptations = make changes to who things are done


HOW MUCH HAS THE EARTH WARMED?
GLOBAL CLIMATE CHANGE IMPACT

https://showyourstripes.info/s/globe

Check out the #showyourstripes webpage to see how temperatures have increased in different places around the world

Also check out the board outside H5 (Miss McCutcheon's room) to see the effects