

# Oxford Revise | Geography | Answers

## Chapter 2 Climate change

All exemplar answers given are worth full marks.

1.
  - a)
    - i) From 800,000 years ago to the present, Antarctic temperatures have fluctuated up and down from lows around 10°C lower than today to 3°C higher than today.
    - ii) The CO<sub>2</sub> graph shows a very similar pattern to the temperature graph apart from the most recent period when it continues to rise sharply, up to 415ppmv.
  - b)
    - i) The CO<sub>2</sub> content of the air bubbles trapped in the ice from when the snow fell can be analysed. The higher the CO<sub>2</sub> content the warmer the temperatures were when the snow fell.
    - ii) The analysis of rings of trees fossilised in peat bogs show how the climate has changed in the past. Wider rings suggest when the climate was wetter and warmer and so the tree grew more. The opposite would be the case if the climate became colder and drier. Evidence of more recent climatic changes can be found in historical documents such as paintings and harvest records. In the 18<sup>th</sup> century, fairs took place on the River Thames when it froze over, showing that winters were much colder than now.
  - c) The burning of fossil fuels has increased the amount of carbon dioxide emissions into the atmosphere, which has resulted in global warming as temperatures increase by up to 6°C. This results in the melting of the polar icecaps. Other sources of melt water are the glaciers and ice sheets inland. The melt water from these sources eventually reaches the sea where levels could rise by up to a metre by the end of the century.
2.
  - a) The greenhouse effect is caused by natural and human processes. Gases in the atmosphere, such as carbon dioxide, act like a glass roof on a greenhouse. They trap some of the energy radiated from the sun preventing it escaping back into space, increasing the earth's temperature. This benefits the earth, stopping it getting too cold. Human actions, particularly the burning of fossil fuels has had a negative effect. The extra carbon dioxide produced makes the layer of greenhouse gases thicker. This means more of the sun's energy is trapped, increasing the earth's temperature. This results in climate change due to global warming.
  - b) Scientists cannot be sure whether the increase in global temperatures taking place at present will continue. Governments have put forward plans to try and stop temperatures rising further. The replacement of fossil fuel electricity generation by renewable energy may or may not be successful. They

cannot know whether people are prepared to change their lifestyles by recycling more, conserving energy, reforestation, and other mitigating plans.

- c) Evidence for contemporary climate change include actual climate changes and the resultant direct and indirect effects. In the UK there have been more extreme weather events with more frequent storms and higher summer temperatures. Drought conditions and flash floods occur more regularly causing more damage to buildings, and increased erosion by rivers and seas. The UK is now warm enough to grow vineyards, and species of insects and birds which normally were only found in the warmer countries further south are now being found in this country. Ski resorts in the Alps have been forced to use artificial snow or move to higher altitudes, because the warmer winters mean there is less snow falling.
- d) Whether the global effects of climate change can be considered alarming depends on whether it has positive or negative impacts, the ability of people to adapt by adopting mitigating strategies or the extent to which a country has the finance and technological expertise to overcome the challenges caused. Apart from winter sports other forms of tourism have benefited from higher temperatures. It also benefits farming in the UK with longer growing seasons, and more opportunities to grow more and greater variety of food. On the other hand, rising sea levels due to the melting of polar ice caps are very alarming for low lying countries like the Maldives and the millions of people living close to the coast who so face increased danger of flooding. Desertification, partly caused by the increasing drought in poorer parts of the world, mean less water and food is available leading to malnutrition and famine. The living standards of people in these countries suffer as climate change increases the danger from pests and diseases. Attempts to mitigate or manage climate change may make it less alarming. To help reduce carbon emissions many countries are turning to alternative sources of energy such as wind and solar which do not emit carbon dioxide. Planting trees which remove and store carbon dioxide from the atmosphere is another way to reduce the alarming nature of climate change. The more developed a country is the less it is likely to have to cope with the potentially 'alarming' nature of changes to the climate.

3.

- a)
  - i) The general trend of the graph shows the increase in global carbon dioxide is rising rapidly.
  - ii) The concentration of carbon dioxide rises to a peak in May. The lowest concentration is in September.
- b) One way in which the climate has changed in the past is due to the presents of sunspots. When there is a maximum output from sunspots the sun gives off more heat, and less when there is minimum sunspot activity. Another way the climate has changed is through volcanic eruptions. When violent volcanic eruptions take place, fine particles of ash are sent out into the atmosphere. This blocks out the sun, leading to a lowering of temperatures.

c) This question is level-marked:

Level	Marks	Description
3	6–8	<ul style="list-style-type: none"> <li>● Accurate understanding of concepts and the interrelationship of places, environments and processes.</li> <li>● Applies understanding to deconstruct information and make logical connections throughout.</li> <li>● A balanced, well-developed argument. Judgements are supported with evidence throughout.</li> <li>● Uses geographical skills to obtain accurate information that supports arguments.</li> </ul>
2	3–5	<ul style="list-style-type: none"> <li>● Some understanding of concepts and the interrelationship of places, environments and processes.</li> <li>● Applies understanding to deconstruct information and make some logical connections.</li> <li>● Imbalanced argument with mostly relevant information. Judgements are occasionally supported with evidence.</li> <li>● Uses geographical skills to obtain accurate information that occasionally supports arguments.</li> </ul>
1	1–2	<ul style="list-style-type: none"> <li>● Isolated elements of understanding of concepts and the interrelationship of places, environments and processes.</li> <li>● Attempts to apply understanding to deconstruct information but this is flawed.</li> <li>● Unbalanced or incomplete argument with limited understanding. Judgements are supported with limited evidence.</li> <li>● Uses some geographical skills to obtain information with limited relevance and accuracy.</li> </ul>
	0	No acceptable response

Example answer: *Over the last 100,000 years there have been a succession of cold and warm periods. These were caused naturally, as it is only in the most recent period that human actions have affected the climate. There are three Milankovitch cycles, and these coincide with these glacial and interglacial periods. The earth's orbit around the sun changes from circular to elliptical and back. When there is an elliptical path, the earth is further from the sun and so the temperatures are colder. The tilt of the earth changes over time so when the angle gets larger the places facing away from the sun will get colder and vice versa. The earth also wobbles in space which also affects the amount of heat received by the sun. There are recognised periods of time for each of these cycles to be completed, giving variations in the amount of heat received from the sun and so causing natural climate change. Another natural cause is the sunspot cycle which over 11 years the maximum number of sunspots goes down to a minimum number before rises again. The greater the number of sunspots the greater the heat given off by the sun because more solar energy is being fired out towards earth in explosive flares. Volcanic activity also affects the amount of heat received by the earth from the sun. Ash from an eruption can block out the sun causing a volcanic winter when temperatures are lower. All these are important ways that climate change can be the result of natural forces.*

- 4.
- a) Volcanic eruptions produce ash and sulphur dioxide into the atmosphere. This produces a layer which stops some sunlight reaching the earth's surface, instead reflecting it back into space. This lowers the temperature of the earth.
- b) The enhanced greenhouse is the result of humans putting more greenhouse gases into the atmosphere than occur naturally.
- c) This question is level-marked.

Level	Marks	Description
3	6–8	<ul style="list-style-type: none"> <li>● Accurate understanding of concepts and the interrelationship of places, environments and processes.</li> <li>● Applies understanding to deconstruct information and make logical connections throughout.</li> <li>● A balanced, well-developed argument. Judgements are supported with evidence throughout.</li> <li>● Uses geographical skills to obtain accurate information that supports arguments.</li> </ul>
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	0	No acceptable response

Example answer: *COP 26 was an international conference on dealing with climate change. The argument to maintain the aim from the earlier conference in Paris to keep global temperature from rising more than 1.5°C. can be justified as climate change has to be tackled globally because no one country can be effective on its own. It allowed international pressure to be exerted to reinforce the pledges made at the Paris conference and hopefully make all countries to adopt strategies to achieve the aim of keeping to the 1.5°C target. The need to stop global temperature from rising any further is needed because the resultant effect of higher sea level due to the melting of the polar ice caps means many low-lying coastal areas will be flooded causing economic and social problems for many millions of people. Low-lying islands such as*

*the Maldives would be particularly susceptible to this threat. There are other aspects of climate change apart from increasing temperatures such as increased occurrence of drought, heavy rainfall, and storms. All of which will impact on agriculture with crops being destroyed or yields falling. Many less developed countries are still largely agricultural and so their populations are more likely to suffer famine or malnutrition. Climate change will also have negative effects on some ecosystems leading to the extinction of different species of plants and animals. Plans must be made to adapt to and mitigate the effects of climate change, but the most important strategies must be aimed at achieving the 1.5°C target.*