

Topic 5.3 Weather and climate

Exercise 5.3A Words and meanings

temperature → how hot it is

humidity → how much water vapour there is in the atmosphere

precipitation → rain, hail or snow which falls from clouds

visibility → how far you can see; it depends on the atmospheric conditions or darkness

atmosphere → the layer of gases around the Earth

meteorology → the study of weather

Exercise 5.3B Weather or climate?

- 1 The weather is the atmospheric conditions over the short term, from minute to minute, hour to hour or day to day.
Climate is the average weather of an area over a much longer time, usually at least 30 years.
- 2 Antarctica, northern Canada, Greenland and northern Russia, but both Poles must be included and labelled.
- 3 The climate in the polar zone is very cold and dry all year.
- 4 Areas such as central America, south America (east of the Andes), central Africa, south-east Asia, the north-east tip and south-east coastal strip of Australia.
- 5 The climate in the tropical zone is hot and wet all year.
- 6 Meteorologists record the weather in so much detail because they are looking for patterns to see if they can predict what will happen in the future. Knowing what the weather will be like has a big effect on the agriculture, transport, health and other industries.

Exercise 5.3C Weather data

- 1 Data should be plotted as instructed with the date and time along the horizontal axis and the temperature up the vertical axis. Credit a suitable scale, labelled axes, accurately plotted points and the points joined 'temperature style', that is point-to-point.
- 2 It is difficult to see any pattern in these results but learners may spot that generally the temperature at 00:00 is lower than that for the rest of the day. The temperature often rises during the day and falls a little over night. They should give examples. They may be able to link the small fall in temperature to the fact that Iceland has a very long day length. If they fail to see a pattern, give them credit if they give examples.
- 3 The only 'pattern' in the week is that the temperatures are fairly constant.
- 4 The temperature on this day remained constant from 06.00 to 18.00 and that was not typical of other days during the week.
- 5 The description of this climate zone is cold and dry.
- 6 This week the weather in Iceland was not very cold and there was rain, which is not typical of this climate zone.
- 7 Iceland is an island in the middle of an ocean and a long way from any other land. The winds and weather systems move quickly in this area and are influenced by the Gulf Stream.

Topic 5.4 Climate and ice ages

Exercise 5.4A Wordsearch

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| B | O | I | C | V | W | A | H | O | R | D | E | S | D |
| K | I | C | Y | G | A | B | O | U | L | D | E | R | V |
| M | L | E | X | B | S | L | S | E | A | G | A | I | C |
| G | L | A | C | I | E | R | K | I | F | H | O | C | P |
| N | H | G | L | A | C | I | A | L | M | A | D | E | O |
| O | U | E | S | Q | G | R | U | H | Y | G | O | S | P |
| S | D | U | F | B | L | O | P | G | U | E | S | H | E |
| I | N | T | E | R | G | L | A | C | I | A | L | E | A |
| P | R | O | D | F | W | O | R | S | H | C | Y | E | T |
| L | I | E | X | V | U | R | P | N | M | E | Z | T | B |
| A | M | A | Y | G | O | H | P | D | Y | E | A | O | O |
| M | A | L | O | C | M | L | A | H | A | B | Z | E | G |

Exercise 5.4B Soil cores

- The oldest peat is from the bottom of the bog.
 - The plant material has not rotted because the conditions in the bog slow down decay. There is not enough oxygen and the conditions are acidic.
 - Scientists hope to find out which plants were growing in that area thousands of years ago. If they can identify the plants from their pollen, they can then work out what the climate was like at that time.
- These periods are the glacial periods.
 - These periods are called interglacial periods.

Exercise 5.4C Climate cycles

- The graph should be labelled with the peaks as interglacial periods and the troughs as glacial periods.
- About 75 000 years ago. It lasted from about 75 000 years ago until about 25 000 years ago, so it lasted about 50 000 years.
- In an interglacial period the average temperatures are generally above freezing reaching as high as 20 °C.
- When the temperatures are well below freezing for a long time, most living organisms cannot survive.
- There have been four glacial and five interglacial periods over the past 450 000 years.
The first interglacial period was 85 000 years long and was followed by 25 000 years of a glacial period. The second glacial period lasted 70 000 years the second interglacial period was warmer and lasted longer than the first.
The third glacial period lasted 20 000 years so the glacial periods seem to be getting shorter. During the third interglacial period (about 225 000 years ago) there was a short, sharp dip in the average temperatures. The next glacial period was longer and the next interglacial period had very high average temperatures, the highest of all the interglacial periods in this time span, and lasted until about 75 000 years ago. The most recent glacial period lasted about 50 000 years and we have been in the current interglacial period for about 25 000 years.
- The evidence we have comes from core soil samples from peat bogs and from the evidence in the landscape from the effect of glaciers.

Topic 5.5 Atmosphere and climate

Exercise 5.5A

In the first billion years after the Earth formed there were lots of **volcanoes**. These produced **gases**, which made up the atmosphere. The **water vapour** that was produced condensed, to form lakes and **oceans**. The early atmosphere was mainly made up of **carbon dioxide** gas. There was little or no **oxygen** gas. This is like the atmosphere of the planet **Venus** today.

As plants began to grow on Earth, they used up the carbon dioxide gas and produced food by the process of **photosynthesis**. Over billions of years the **carbon** in the carbon dioxide gas became **locked up** as **fossil fuels**, such as oil and coal and as **carbonates** in sedimentary rocks such as **limestone**. This caused the levels of carbon dioxide in the atmosphere to **fall**.

Exercise 5.5B

- 1 80%
- 2 10%
- 3 0.038%
- 4 It decreased very quickly at the start and then continued to decrease, but at a much slower rate.
- 5 The level of carbon dioxide has increased quite dramatically over the past 200 years. This is because, as industry developed, more fossil fuels were burnt to provide energy for factories and transport. More forests have been cut down to use the wood and make room for people, crops and farm animals, so this means less carbon dioxide from the atmosphere is being used up.

Exercise 5.5C

- 1 There is evidence that iron oxide was formed in rocks after the period 2.1 to 2.0 billion years ago, not before. There is evidence from the pockets of air trapped in the ice cores from Greenland and Antarctica. We have measurements of the percentage of gases in the atmosphere over the past 100 or so years.
- 2 There is evidence from the ice cores about the way the ice was formed over time. There is evidence of an increase in the rate at which the polar ice caps and glaciers are melting. There is evidence of the sea levels increasing.
- 3 The evidence from a long time ago is not direct evidence, but has been inferred from other things, whereas the records over the past 100 years were taken directly and there are lots of records. However, even with the more recent records we cannot be sure of the way in which they were taken unless they were taken and recorded by professionals that we can trust.