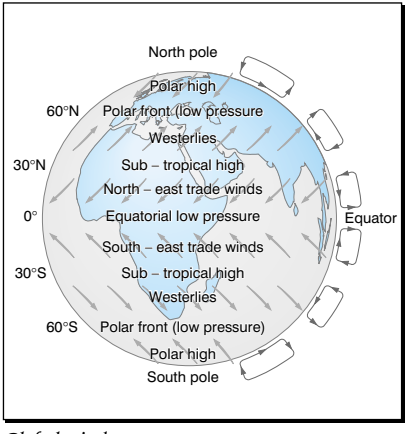
Weather and Climate (1)

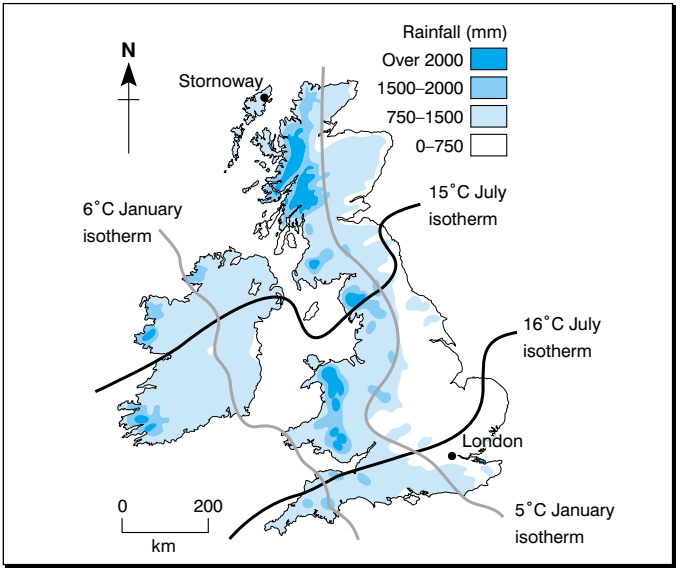
- **Weather** is the day-to-day variations of temperature, precipitation, sunshine, wind and atmospheric pressure. **Climate** is the seasonal average of the weather based on records kept for a minimum of 35 years.
- The location of a place determines its climate. Temperature generally decreases with latitude because the sun's rays are concentrated in smaller areas closer to the Equator. The rays have to pass through less atmosphere too. Temperatures are also affected by variations in the length of day and night. Temperatures fall on average 6.5 °C for every 1,000 m altitude.
- The further a place is from the sea the more extreme or **continental** its climate (e.g. Kiev). The location will have a greater range of temperature. This is because of the effect of the sea which warms up slowly in the summer and cools less quickly in winter. Precipitation decreases with increasing distance from the sea. An inland location is more likely to have a summer maximum of precipitation. Places near the sea have a **maritime climate**.
- Winds are air movements from high to low pressure. Winds produce a global pattern of pressure and wind belts. Some locations, e.g. the British Isles, remain in the same wind belt all year around. Mediterranean areas lie in a westerly wind belt in winter but receive easterly, offshore winds in summer. This produces wet winters and a period of summer drought. The great extremes of temperature



Global winds

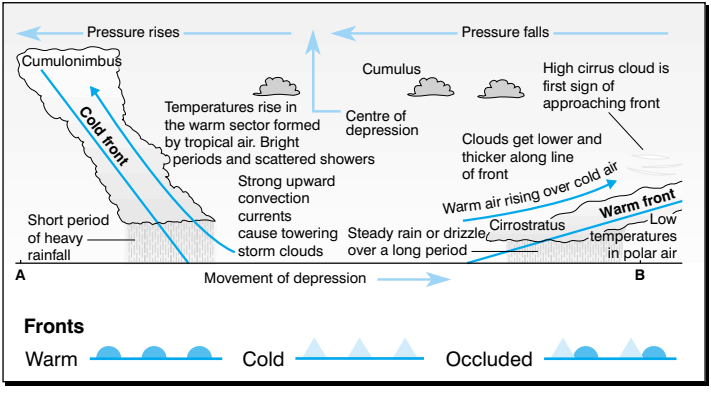
in the centre of large landmasses cause seasonal changes in pressure. This results in a seasonal reversal of wind directions.

- The British Isles have a cool temperate maritime climate. The western parts are wetter than the east because prevailing winds blow from the west off the Atlantic Ocean. The winds rise over the higher land in the west of Britain, then cool and condense to produce precipitation. The east is in a **rain shadow**.
- In winter the **isotherms** run north to south with the warmest areas being in the west. The Atlantic Ocean and the **North Atlantic Drift**, a warm ocean current, are responsible for this. In summer the south of Britain is warmer than the north because of the effect of latitude on isotherms.



Distribution of precipitation in the British Isles

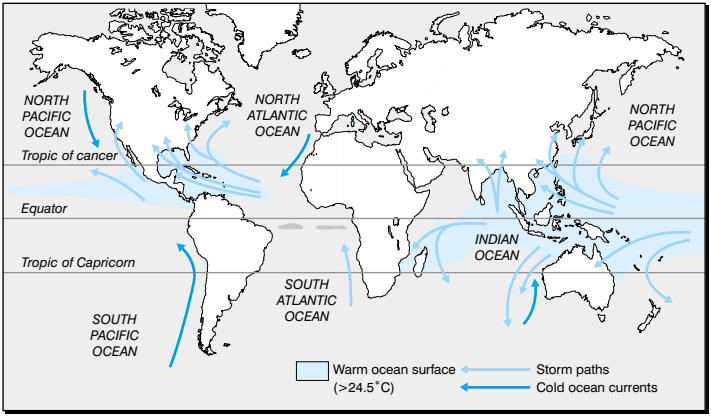
- Precipitation is caused by moist air rising, which makes water vapour cool and condense. **Relief** or **orographic rainfall** forms when air is forced to rise over mountains. **Frontal** or **cyclonic rain** occurs where warm air rises over cold air. High temperatures can result in **convectional rainfall**.
- **Depressions** are areas of low pressure which develop along the **Polar Front**. Winds blow anticlockwise into the centre of a depression. Fronts separate cold air from warm air. Steady rain develops at a **warm front**. Heavier rain, sometimes with thunder and lightening, marks the passing of a **cold front**.



Weather conditions in a depression

- **Anticyclones** are areas of high pressure. The **isobars** are widely spaced so conditions are usually calm. Any winds blow in a clockwise direction. In winter anticyclones can bring foggy weather or very bright conditions with sharp frosts. In summer anticyclones bring sunny conditions with above average temperatures.
- Weather forecasting relies on satellite images as well as weather charts. Satellites can transmit both visible and infra-red images in black and white.

- Extreme weather conditions present serious hazards to people. These may be short term or long term. Weather can cause massive damage to property, crops and livestock as well as loss of life. The impact of extreme weather conditions is greatest in poorer countries.
- **Hurricanes**, **typhoons** and **cyclones** are violent tropical storms. They are areas of extreme low pressure which develop over warm seas. Very strong winds, cloud and heavy precipitation accompanied by sea surges are features of these storms.



Regions where tropical cyclones develop

- Droughts can be seasonal. If they develop over a long period they become significant hazards. The Sahel in West Africa, and Southern Spain have both suffered serious droughts in recent years. Droughts may be caused by physical factors but the effects are often made worse by human actions.

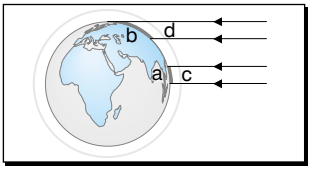
Weather and climate (1–4)

1 Why do climate statistics have to be based on a minimum of 35 years' observations? (1)

2 Why is it sometimes said that the British Isles have "no climate only weather"? (1)

3 What is meant by a range of temperature? (1)

4 How does the following diagram explain why it is hotter nearer the Equator than the poles? (1)



5 Why does temperature decrease with altitude? (1)

6 What is a maritime climate? (1)

7 What is dew point? (1)

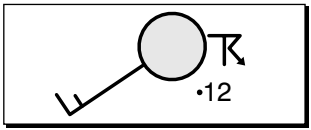
8 What front is found where warm air is replaced by cold air? (1)

9 Why do poorer countries suffer more from climatic hazards? (2)

10 Explain how the climate of Penzance in South-west England differs from that of Norwich in East Anglia. (3)

11 Name three different types of precipitation. (3)

12 Describe the weather conditions at the following weather station. (4)



SCORE

1 To work out the average conditions. (1)
A shorter period could be unfairly influenced by abnormally high or low figures.

2 The day-to-day weather conditions in the British Isles vary so much that it is difficult to suggest what the average conditions are. (1) The British Isles lie on the Polar Front which separates cold polar air from warm tropical air.

3 The difference between the maximum and minimum average monthly temperatures. (1) The months of January and July are normally used.

4 The sun's rays are less effective near the Poles, as they heat a larger area. (1)

5 The atmosphere gets less dense with increasing altitude, so it absorbs less radiated heat. (1) This is why snow can be found on Mount Kenya despite it being on the Equator.

6 A climate that is influenced greatly by the sea. (1)
These climates tend to have a relatively low temperature range and higher precipitation.

7 The temperature at which water vapour in the air condenses to form water droplets. (1) The height at which dew point is reached marks the base of a cloud.

8 A cold front. (1) Remember that a front is named after the type of air that is replacing the existing air.

9 They usually have poorer evacuation and relief measures. (1) People are forced to live in disaster prone areas. (1) Other reasons include: more sophisticated forecasting in richer countries; and more resistant housing and infrastructure.

10 The temperature range is smaller in Penzance (1) and the total precipitation is higher. (1) Penzance has a winter maximum of rainfall compared to Norwich's slight summer maximum. (1)
Norwich's climate is less influenced by the sea.

11 Relief (or orographic) (1), frontal (or cyclonic) (1) and convectional. (1) Remember that the only difference between these is what causes the air to rise in the first place.

12 There is complete (8 oktas) cloud cover. (1) The wind is south westerly at a speed of 13–17 knots. (1) There have been thunderstorms. (1) The temperature was 12°C. (1)

TOTAL