

Weather

Elements of the Weather

The weather is made up of different elements, which are measured either by special instruments or are observed by a meteorologist. These measurements are then recorded and used in the making of climate graphs and weather forecasts.

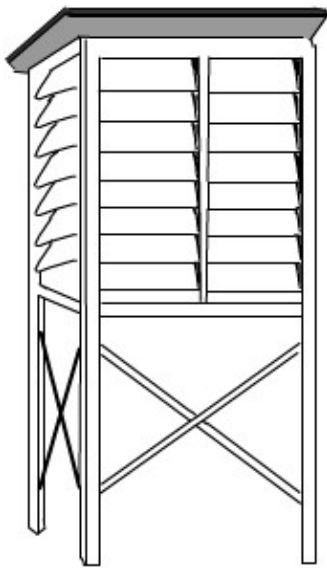
The table below shows the weather element details.

Element	Description	How it is measured	Units of measurement
Precipitation	Moisture from the sky e.g. rain, snow etc.	By a Rain Gauge	Millimetres (mm.)
Temperature	How hot or cold it is	By Thermometers, found inside a Stevenson Screen	Degrees celsius (c)
Wind Speed	How fast the wind is blowing	By an Anemometer	Knots, or by the Beaufort Scale
Wind Direction	Where the wind is blowing from	By a Wind Vane	Points of the compass (north, north-west etc), or bearing in degrees
Element	Description	How it is measured	Units of measurement
Humidity	The amount of water vapour in the air	By a Hygrometer (wet and Dry Bulb Thermometers)	Relative Humidity (% of water vapour that can be held by the air at the actual temperature)
Air Pressure	The "weight" of the air pushing on the surface of the Earth	By a Barometer	Hectopascals (although most people know it as millibars)
Cloud Cover	The amount of cloud in the sky	It is observed by a meteorologist	Oktas – eighths of the sky
Visibility	How far you can see	It is observed by a meteorologist	Kilometres

Sunshine	The hours of sunshine	By a Sunshine Recorder	Hours and minutes
Element	Description	How it is measured	Units of measurement

Weather Stations

The weather instruments are found on land in weather stations. These are locations that are carefully chosen so that accurate and reliable data are collected. Weather stations are clear of obstructions that could block the wind or cast shadows. They are fenced off so that animals cannot get in and damage the equipment.

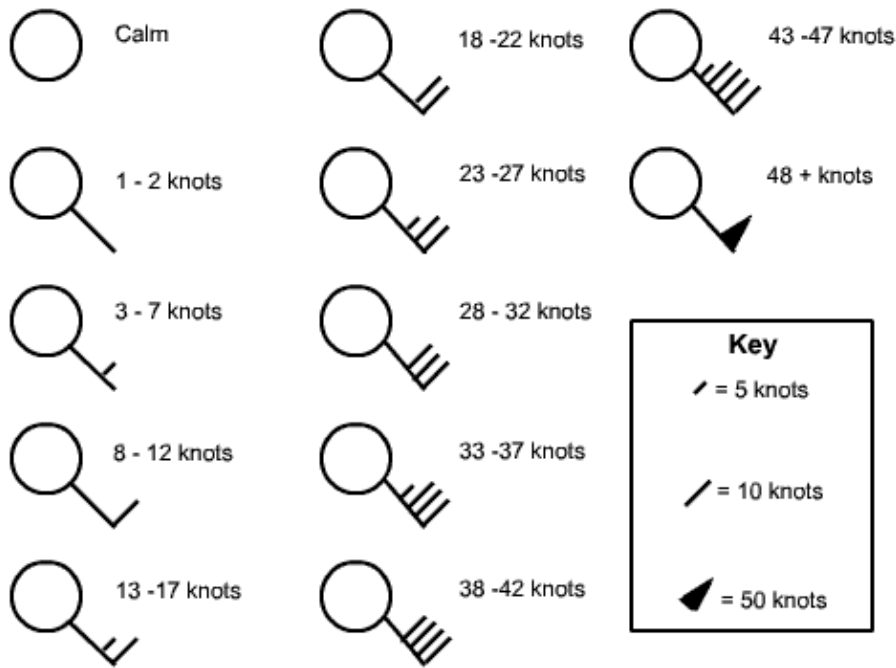


An important part of a weather station is a **Stevenson Screen**, which holds the thermometers.

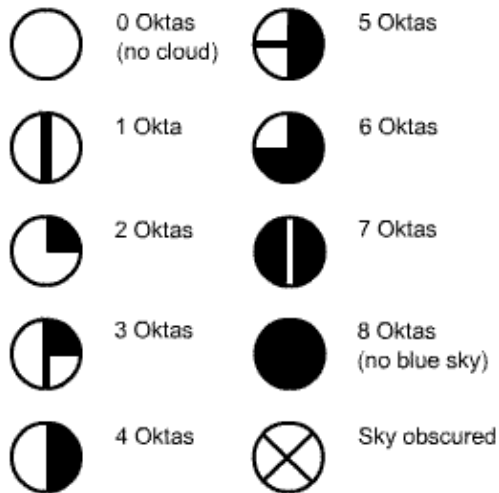
This is a white box with slatted sides. The white colour reflects the direct sun's rays and slats on the sides allow air to pass through freely. The box is raised on stilts so that it is easier to read the instruments and there is no effect from the ground. Accurate **temperature** and **humidity** readings can then be taken.

The information collected from weather stations and other sources is shown on **synoptic** (weather) charts. A weather station symbol is used to show as much information about the weather in a very small diagram.

Weather



The shows the pattern used to display wind speed. The line sticking out of the circle points to the direction the wind is coming **from**. In the above symbols the wind is a south-easterly.



The amount of cloud is shown by the amount of shading in the circle. It is measured in eighths, or **oktas**.

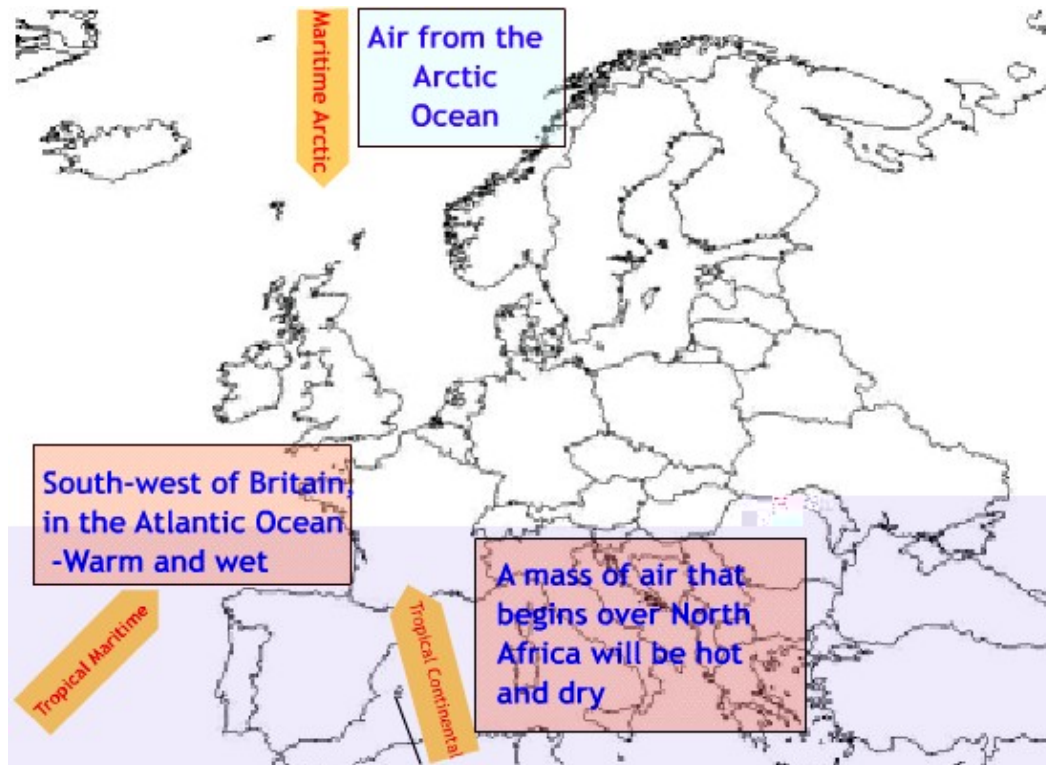
The symbols below are added to the weather station circles to show the precipitation.

Weather symbols			
☁	Mist	❄	Snow
☁	Fog	⬇	Rain shower
☂	Drizzle	❄	Snow shower
⬇	Shower	⬇	Hail shower
⚡	Hail	⚡	Thunderstorm
●	Rain		
●●●	Heavy rain		

Air Masses and Air Streams

Air in the atmosphere picks up the characteristics of the area it comes from. For example, the air above the Sahara Desert tends to be hot and dry. A large volume of air that has similar temperature and humidity is called an **air mass**.

If an air mass moves from its source region it will bring its "weather" with it. So air that starts over the Sahara stays hot and dry for a while and brings hot and dry weather. The name given to this body of moving air is an **air stream**.

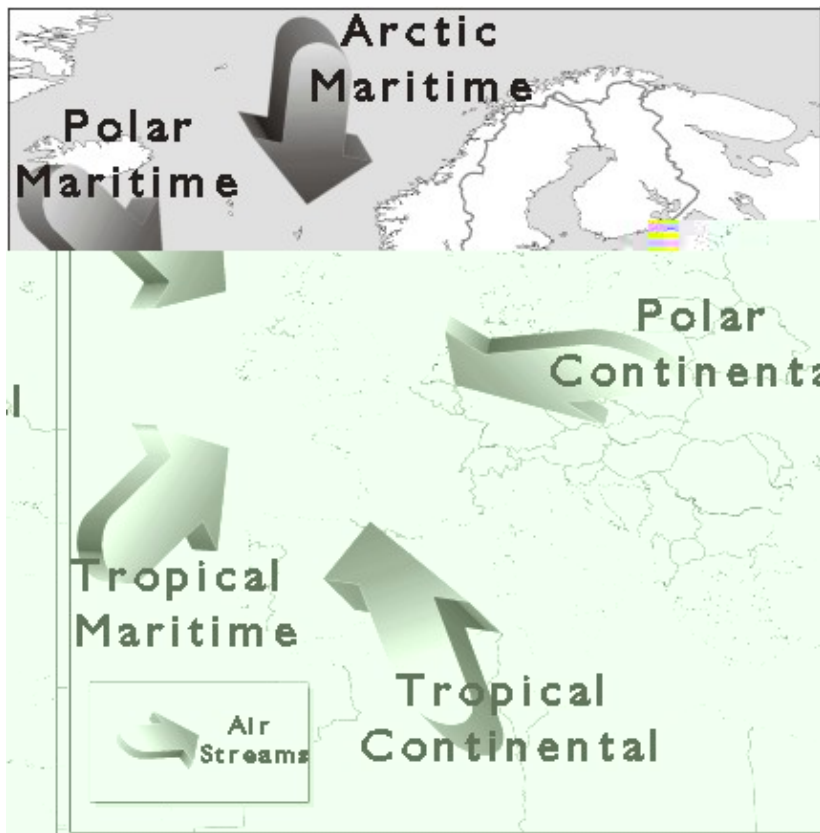


Weather

There are five air streams that affect Britain. They are shown in the table below.

Name	Source Area	Weather
Tropical Maritime (mT)	The Atlantic Ocean, south-west of Britain	Warm and wet
Tropical Continental (cT)	South Europe and North Africa, including the Sahara Desert	Warm and dry
Polar Maritime (mP)	The North Atlantic	Cold and wet
Polar continental (cP)	Northern Europe and Siberia	Dry, and in winter, very cold
Arctic maritime (mA)	Arctic Ocean	Very cold, but not very wet due to the low humidity

The map below shows these air streams.



Weather Fronts

Weather fronts are where two air streams meet. These air streams have different temperatures and humidity. The warmer air, being less dense, rises up over the cooler air. The warm air expands and therefore cools as it rises. Colder air can hold on to less water vapour. The water condenses out of the atmosphere, forms clouds and eventually rain.

Warm Fronts

There are two main types of front. Warm fronts are where warm air "catches up" with colder air. The angle that the warm air moves up is gentle at the warm front. Clouds are slowly formed over a large area and this makes long periods of drizzle.

Cold Fronts

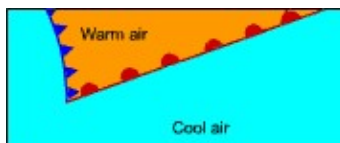
At the cold front, the cold air cuts underneath the warm air and forces the warm air up a much steeper angle. At cold fronts the air is cooled quickly and forms a narrow band of thick cumulonimbus clouds.

These produce a short burst of very heavy rain.

Occluded Fronts

Occluded fronts are found when the cold front has caught up with the warm front and pushed the warm air up into the atmosphere. This warm air cools and condenses.

Occluded fronts also make a short period of very heavy rain.



Remember one thing above all –

**Fronts
mean
rain!**

Depressions

Depressions are usually known as lows. They could also be called cyclones but this would probably panic too many people watching weather forecasts. They are areas of low pressure that pass over Britain and are responsible for a lot of our weather.

Lows bring the following conditions.

- Windy weather
- Cloudy conditions
- Periods of rain, and in winter, snow
- Unsettled, changeable weather

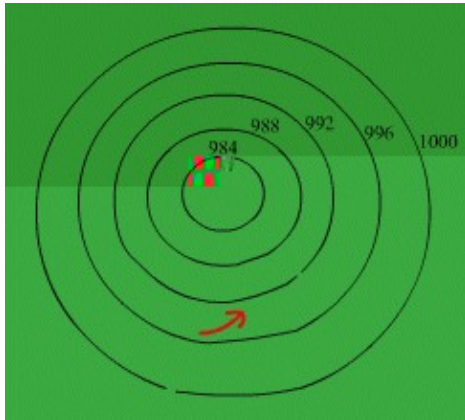
It is easy to identify depressions on synoptic charts (weather maps).

- The isobars (lines joining places with equal air pressure) are close together
- The air pressure gets lower as you move into the centre of the low
- Frequently they have weather fronts

To be able to "read" a depression on a weather map it is important to remember the following points.

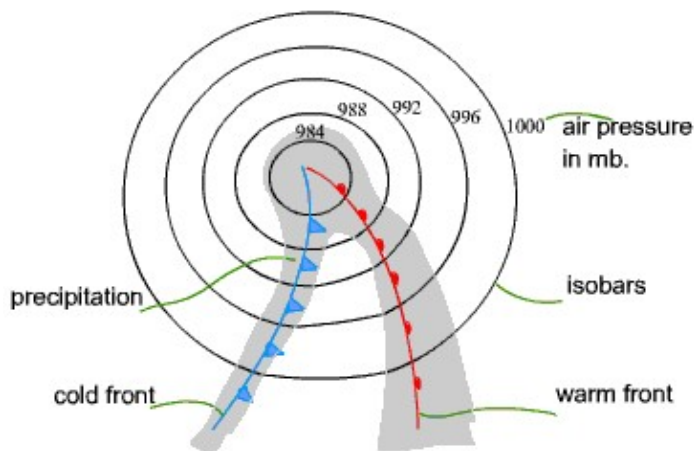
- Winds blow (more or less) parallel to the isobars
- The closer the isobars the faster the wind
- In the northern hemisphere winds blow **anticlockwise** around the centre of the low
- Fronts mean rain – warm fronts a long period of steady rain, cold and occluded fronts a shorter spell of heavy rain
- The temperature between the warm and cold fronts is higher than outside them – this hotter area is called the warm sector
- Usually depressions move west to east over Britain

Wind Direction 2



In the northern hemisphere winds blow **anticlockwise** around the centre of the low.

Depression - Low Pressure System



Fronts mean rain – warm fronts a long period of steady rain, cold and occluded fronts a shorter spell of heavy rain

The Passing of a Depression

It can be helpful to split a depression into five parts and consider the weather each part brings. The following list is in the order it passes over Britain.

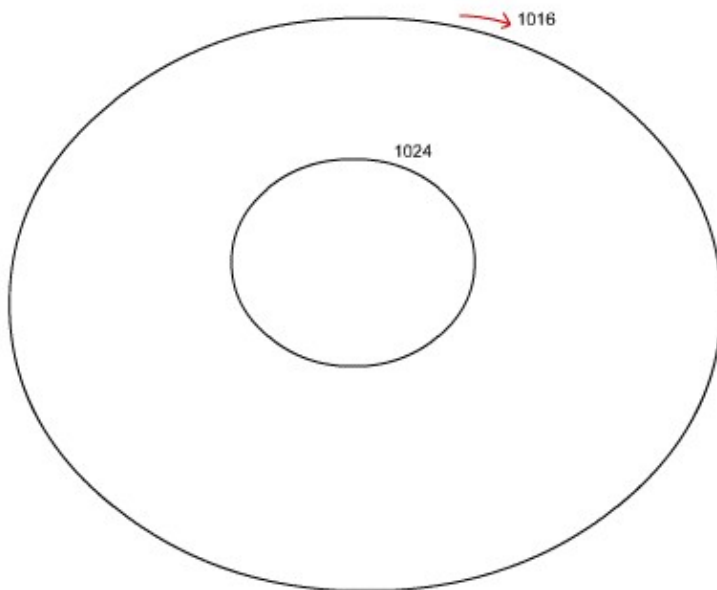
1. In "front of" (east of) the warm front. The wind is increasing, the temperature is relatively cool, clouds are high and thin and it is dry.
2. At the warm front. The wind is stronger, veers in direction (e.g. from south–west to west), cloud cover is lower and thicker, the temperature is warmer and it is raining.
3. In the warm sector (between the fronts). As the name suggests this is the warmest part of a depression. It has broken cloud and occasional showers.
4. At the cold front. Thick cloud, heavy rain and hail, sudden drop in temperature. Wind

direction continues to veer (e.g. from west to north-west) and the wind picks up in speed.
5. "Behind" (west) of the cold front. Cold, with clearing showers. Wind speed drops off.

Anticyclones

Anticyclones are areas of **high** pressure. In the northern hemisphere the wind blows **clockwise** around the centre of the high. The isobars are widely spread so the wind blows more slowly than in a low. Highs also bring **more settled** weather, clearer skies, and in summer, sunny warm days.

Winter high pressure systems bring the same calm conditions but this often leads to frosts as there are few clouds to trap the heat at night. High pressure in winter can also produce fog – this and the freezing temperatures can make driving hazardous. Highs tend to stay around for longer than lows and this means that the weather can be unchanged for a week or more.



Winds blow clockwise around the high

Weather Forecasting

Modern weather forecasting is based on collecting a huge amount of data and then quickly processing this information so that predictions can be made. The sources of weather information are

- Ground Weather Stations – both staffed and automatic
- Radiosonde Balloons – gathers information from the upper atmosphere
- Satellites – shows cloud patterns and snow cover
- Radar – precipitation patterns
- Aircraft
- Weather Ships
- Automatic Weather Buoys

Weather

The data is sent to the **Meteorological Office** in Bracknell where powerful computers process it into more useable and understandable synoptic charts. These are interpreted by the meteorologists who provide the forecasts for the public. Weather information is available from a wide range of sources, for example

- Newspapers
- Television, including teletext
- Radio
- Telephone
- Internet e.g. [The BBC](#) or the [Met Office](#)

