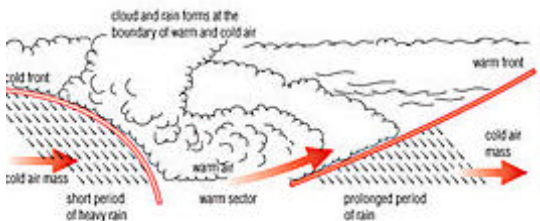
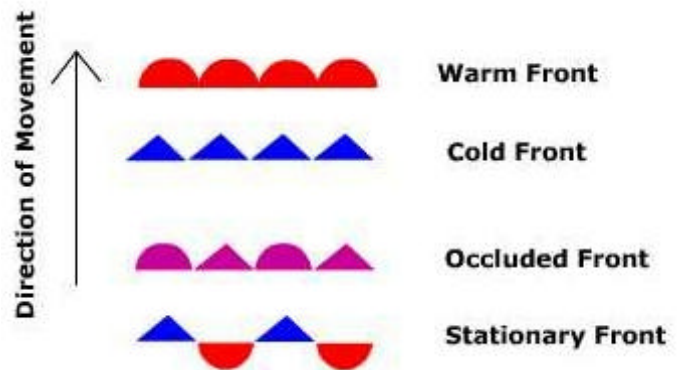


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Fronts

Meteorologists use both symbols and colour to distinguish between synoptic scale fronts on weather maps. If printed in colour, warm fronts are shown as a line of red semi-circles pointing in the direction of movement. Cold fronts are depicted as a line of blue triangles. Occluded fronts appear in purple with both warm and cold front symbols on the same side. The symbols point in the direction of the front is moving. Stationary fronts are alternating warm and cold front symbols on opposite sides, indicating no movement.



The area of transition between two different air masses is called a 'front'. Weather fronts are very important in forecasting the weather.

An area of air has properties that are affected by where the air has come from and the route that the air has travelled. An area of polar air will be cold. It can't mix with warm tropical air, and the area of transition between the two different air masses is called a 'weather front'.

A front is not only seen on the ground, but extends up into the atmosphere too.

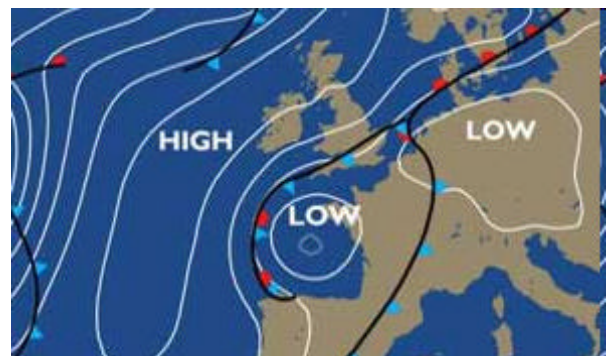
A 'front' can either be cold or warm. If cold air is approaching and replacing warmer air then it is a cold front, and similarly if warm air is replacing colder air, then it is called a 'warm front'. A front is not only seen on the ground, but extends up into the atmosphere too. A warm front has warm air approaching behind some colder air.

Cold air is denser and therefore heavier than warm air, so lighter, warmer air has a tendency to rise above it. As the air rises it cools and the moisture contained within it condenses into clouds and eventually it rains. This is why it often rains as a warm front passes.

In a cold front, as the cold, heavier air approaches, it pushes under the warm air, causing the warmer air to rise, this causes condensation and hence rain.

In the UK, a cold front often follows a warm front. Cold fronts travel faster, so can catch up with the leading warm front. The area of warm area behind the warm front is forced up over the cold air as the cold front approaches, and the cold air behind the cold front will also be pushing under the warm air. This means the warm air can be forced totally off the ground and this is called an occluded front. Fronts are only models. They are the perfect scenario, and in nature of course, things are rarely so cut and dried.

Sometimes it is difficult to tell exactly where the front is. Simply watching the temperature can be misleading. If the sun comes out after a cold front has passed, the temperature may actually rise. The clouds and rain are a better indication, as is a usual change in wind direction. However, mother nature works in mysterious ways and if she doesn't want to follow a model, she won't!



Key Points

- A 'front' describes the area of transition between two different masses of air
- A cold front is formed if cold air is approaching and replacing warmer air
- A warm front is formed if warm air is approaching colder air
- In a weather system, if warm air is totally forced off the ground by cooler air, this is known as an occluded front.

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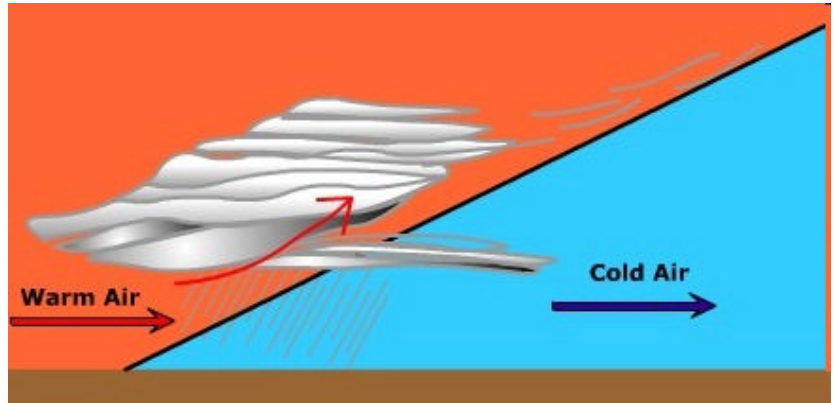


Warm Front Weather

This figure shows the profile view of a warm front and its associated weather.

The warm front slopes gently up into the troposphere that has a direct bearing on the kinds of clouds that are produced. As the warm air behind the front collides with the cooler air ahead, the warmer less dense air is forced to glide upward.

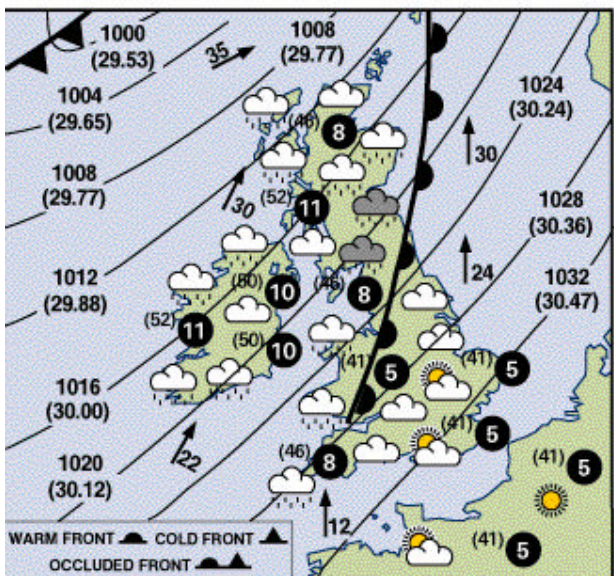
A warm air front is the place where a warm air mass replaces a cool air mass. We already



know that warm air overrides cold air. This is because the air masses have different temperatures and densities. Warmer tropical air is forced over the cooler polar air. This forms a bulge on the front - called a warm front.

Fronts can be several hundred kilometres in width. The air behind a warm front is warmer than the air ahead of it. If a warm front passed overhead when you were standing outside, then you would feel the air warming up. The air would also be more moist than before.

Forecast for Noon Wed 21



Black circles; temps in $^{\circ}\text{C}$ ($^{\circ}\text{F}$ in brackets). Arrows: wind speed in mph. Pressure in millibars (inches in brackets)

This chart shows the progression of a warm front over the UK on the 21st January 1998. The front is the black line with the oval lumps on it. It travels in the direction of the wind - in this case north east. You can see that the weather conditions ahead of and behind the front are different.

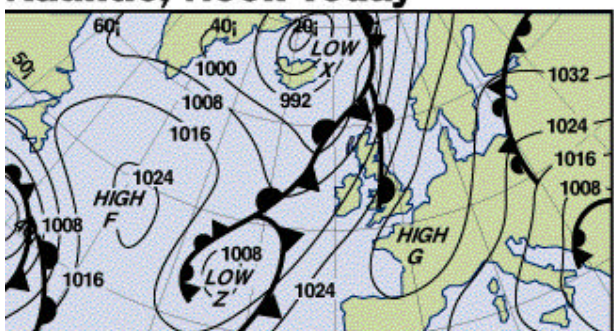
We said before that the temperature ahead of the warm front is usually colder than the temperature behind the warm front. We can see the difference on this map.

What is the change in temperature ahead of and behind the warm front?

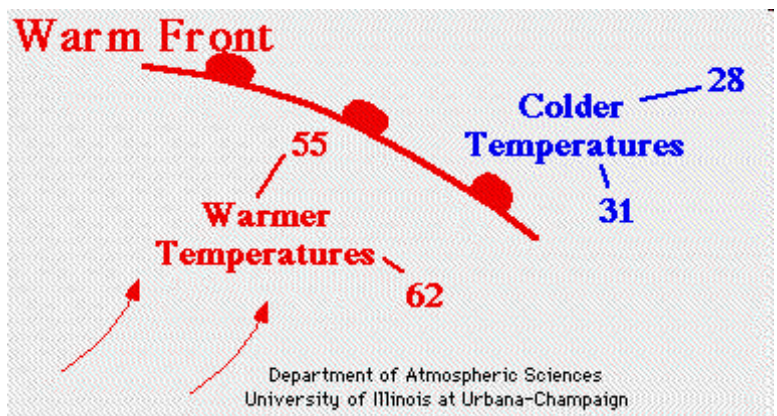
What other weather conditions change ahead of and behind the front?

Do you think that you would now be able to find a warm front on a map?

Atlantic, Noon Today



High G will slowly decline but High F will drift east. Low X will move north-east whilst Low Z drifts south-east.



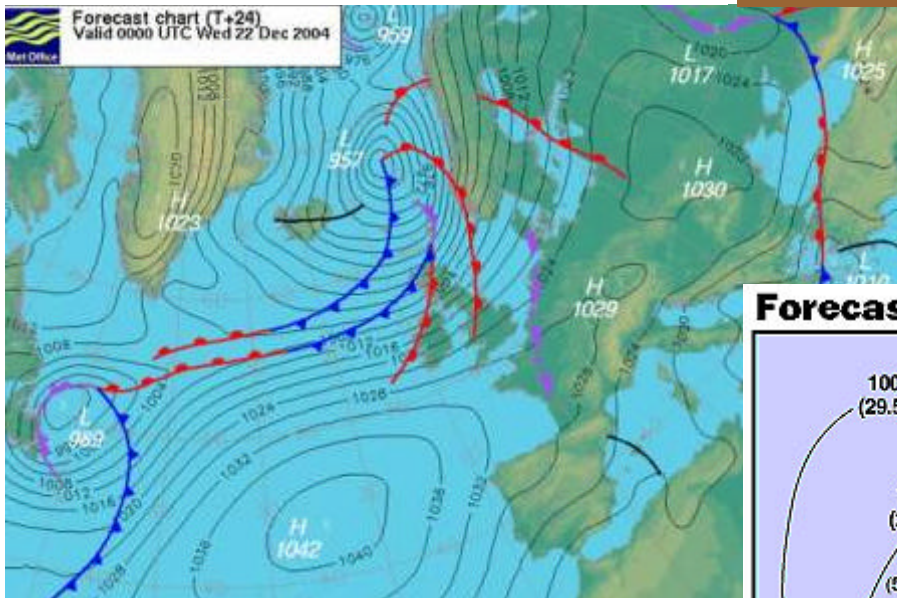
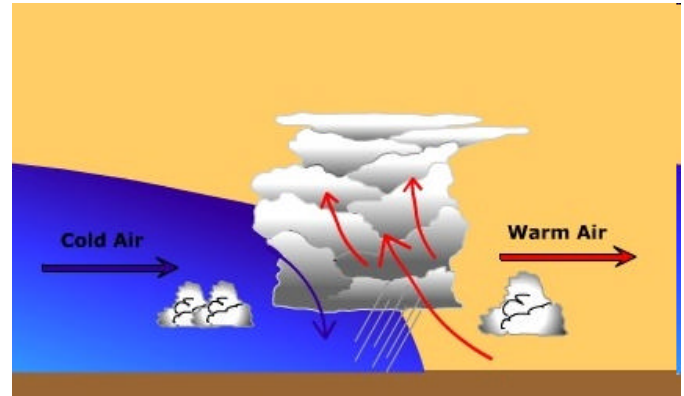
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Cold Front Weather

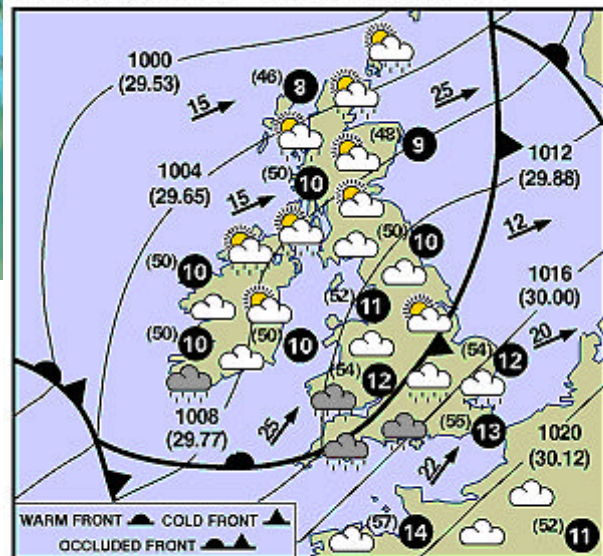
Weather along an advancing cold front is much different than that along a warm front

Friction slows the advancing cold air causing a steep slope to the front. The steep slope pushes the air ahead of it rapidly upwards and vertically developed clouds (cumulus) are produced along the front. As with a warm front, you experience a drop in the atmospheric pressure as the front approaches.



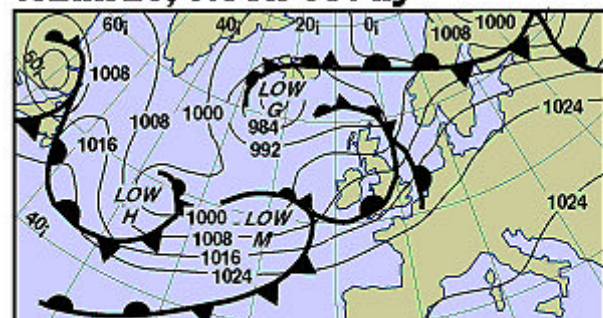
Cold fronts can be identified on weather charts as bold lines with triangles. These are blue when displayed on colour charts. On the weather chart above, a cold front stretches from northern Scotland out into the Atlantic. The points of the triangle indicate the direction in which the front is moving. A cold front indicates a change in air mass, where warmer air is being replaced by colder air. They often bring short spells of heavy rainfall in the form of showers and squally winds, and are accompanied by a decrease in temperature, a veer in wind direction and a change to brighter showery conditions. Pressure falls ahead of the cold front, but usually rises after its passage.

Forecast for Noon Wed 24



Black circles; temps in C (°F in brackets). Arrows: wind speed in mph. Pressure in millibars (inches in brackets)

Atlantic, Noon Today

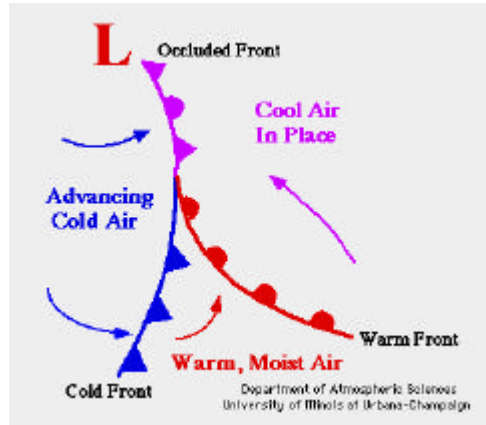
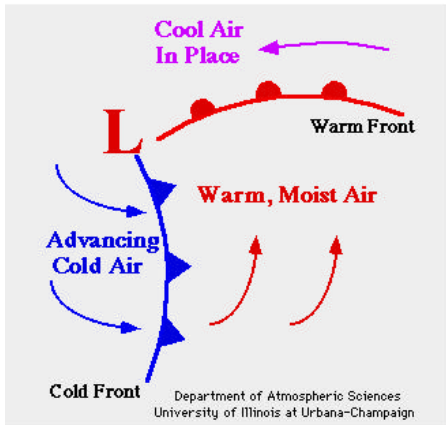


Low M will move north east and deepen. Low H will move north-east with little change. Low G will slowly fill.

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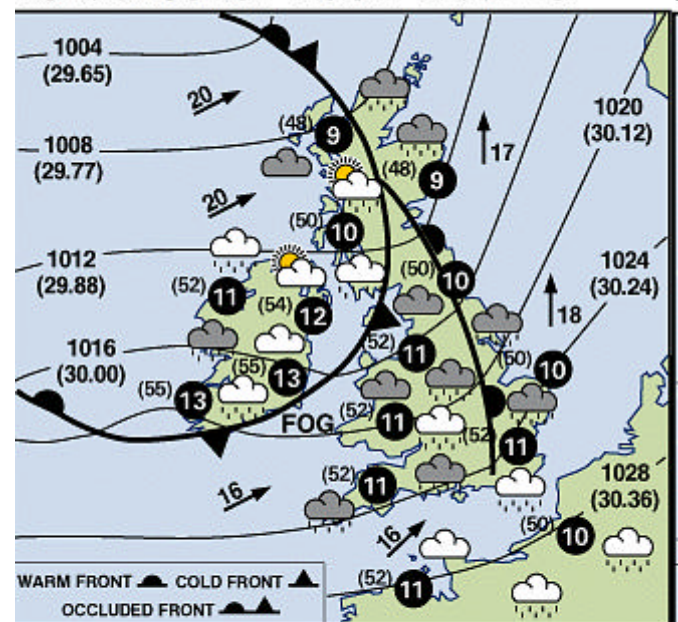
Occluded Front Weather



The diagrams above show the formation of an occluded front. When a depression (or a low pressure system) forms, it usually consists of a warm front and a faster moving cold front. To the north of the warm front is the cool air that was in the area before the depression developed.

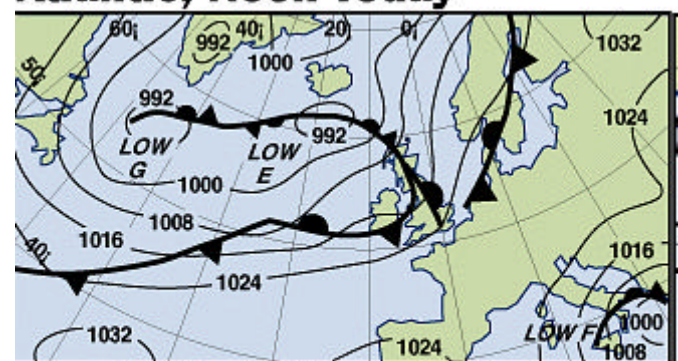
As the depression intensifies, the cold front catches the warm front. The line where the two fronts meet is called an occluded front. When an occluded front passed overhead, you would feel changes in temperature and wind speed.

Forecast for Noon Wed 25

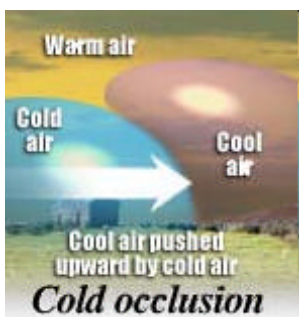


Black circles; temps in $^{\circ}\text{C}$ ($^{\circ}\text{F}$ in brackets). Arrows: wind speed in mph. Pressure in millibars (inches in brackets)

Atlantic, Noon Today



Lows E and G will move east and deepen.
Low F will also move eastwards.



This chart shows the progression of an occluded front over the UK on the 25th March 1998. The front is represented by the black lines. It travels in the direction that the wind is - in this case in an anticlockwise direction. You can see that the weather conditions ahead of, within and behind the front are different.

What is the change in temperature ahead of, within and behind the warm front?

What other weather conditions change ahead of, within and behind the front?