

## FRONTS

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Fronts are boundaries that separate air masses of different densities - one that is often warmer and contains more moisture than the other.

One air mass actively advances into the region occupied by another and collides with it.

No matter which air mass is advancing, it is always the warmer, less-dense air that is forced aloft. The process of warm air gliding up and over a cold air mass is termed overrunning.

Fronts are the typical features of mid-latitudes climate ( $30^{\circ}$ - $65^{\circ}$ N and S).

Front is a three dimensional boundary zone formed between two converging air masses with different physical properties, such as temperature, humidity, density etc.

### ① Frontogenesis and Frontolysis! -

The process of formation of a front is called frontogenesis and dissipation of a front is known as frontolysis.

~~Frontolysis~~ Frontogenesis involves convergence of two distinct air masses.

Frontolysis involves overriding of one of the air mass by another.

In northern hemisphere frontogenesis occurs in anti-clockwise direction and in southern hemisphere, clockwise direction. This is due to Coriolis effect.



## ② General Characteristics :-

i. The thickness of frontal zone is influenced by the temperature contrasted in an inversely proportional manner.

ii. Sudden change in temperature through a front, involves changes in pressure also.

iii. Front experiences wind shift, since the wind motion is a function of pressure gradient and Coriolis force.

iv. Wind Shift: A change in wind direction of 45 degrees or more in less than 15 minutes with sustained wind speeds of 10 knots or more throughout the wind shift.

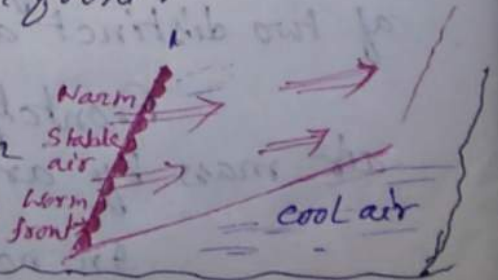
v. The frontal activity is invariably associated with cloudiness and precipitation because of ascent of warm air which gets cooled down adiabatically condenses and causes rainfall.

vi. The intensity of precipitation depends on the slope of ascent and amount of water vapour present in ascending air.

## ③ Warm Fronts :-

When the surface position of a front moves so that warm air occupies territory formerly covered by cooler air, it is called a warm front.

On maps, the surface position of a warm front is shown by a red line with red semicircles protruding into the cooler air, the direction of the front.



Friction slows the advance at the surface more than it does aloft. Thus, the boundary separating the

air masses has very gradual slope.

As warm air ascends, it expands and cools adiabatically to produce clouds and precipitation.

As the front nears, cirrus clouds grade in to cirrostratus which blend into denser sheets of altostratus.

Just ahead of the front, nimbostratus clouds appear, and rain or snow begins bringing light to moderate precipitation over a large area for an extended period.

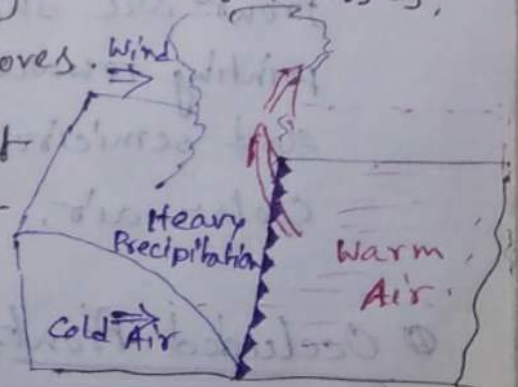
A gradual increase in temperature occurs with the passage of a warm front.

### ① Cold Fronts! —

When dense cold air is actively advancing into a region occupied by warmer air, the boundary is called a cold front.

Friction slows the surface position of a cold front more than its position aloft. But, because of the relative positions of the adjacent air masses, the cold front steepens as it moves.

Cold fronts advance at speeds around 20-35 mph compared to 15-20 mph for warm fronts.



The forceful lifting of air along a cold front is often so rapid that the latent heat released when water vapor condenses the air's buoyancy.



Heavy downpours and vigorous wind gusts associated with mature cumulonimbus clouds often result.

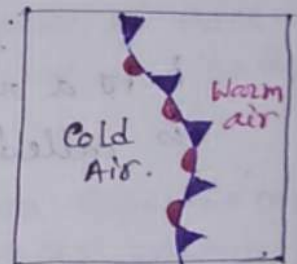
The occasional violent weather and sharp temperature contrast are shown on maps by a blue line with triangles extending into the warmer air mass.

### ① Stationary Fronts :-

Occasionally, the flow on both side of a front is neither toward the cold air mass nor toward the warm air mass but almost parallel to the line of the front.

Thus, the surface position of the front does not move.

This condition is called a Stationary front.



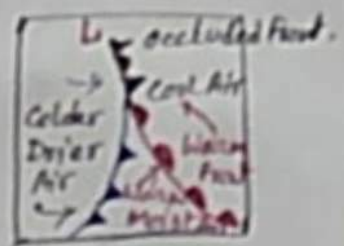
On a weather map; stationary front are shown with blue triangles pointing towards the warmer air and red semicircles pointing towards the cooler air.

### ① Occluded Fronts :-

An occluded front is an active cold front that overtakes a warm front.

Most precipitation is associated with the warm air being forced aloft.

on maps, occluded fronts are shown with black triangles and semicircles pointing in the direction of the front's advance.



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