

# Weather Patterns Associated with Mid Latitude Depression & Anticyclones | Sample Answer

## Examine the formation of mid latitude depressions and anticyclones; and the weather patterns associated with them (2015 Q24)

These weather influencers are in a constant battle over the atmospheric conditions in our latitude as the tropical warm air masses meet the polar air masses. The jet stream has also a big part to play in what weather we are due to receive.

### Aspect 1 - Depressions

A depression is a large mass of warm, rising air forming low pressure. It is surrounded by high pressure area with heavy, cold, descending air. Low pressure cells develop at specific areas globally depending on the weather conditions. The mid – latitudes are one such area. Their formation is as follows...

They are common at latitude 60° North and South of the equator and on the equator. This is where the warm tropical air mass meets the cold polar air mass.

Warm light air rises causing low pressure. These swirling masses of warm air move from southwest to northeast over the North Atlantic at 60° .

Air cools as it moves away from the warm earth and some of the water vapour condenses to clouds. When this air continues to rise, it cools further forming low pressure areas.

When cold polar and warm tropical air meet, they form fronts in mid latitude areas. Fronts are boundaries where warm and cold air masses meet.

A cold front forms and cold air pushes into the warm air, they are fast moving. A warm front forms when warm air pushes into cold air, they are slower moving than the cold fronts.

The air moves off the Earth in an anti-clockwise motion due to Coriolis and as the cold front moves into the warm front it tries to wrap itself around the warm air creating the warm sector of the depression.

It pushes the warm air up creating an area of low pressure in the centre forming a depression. When the cold front catches a warm front and occluded front forms lifting the warm sector off the ground, with the cold front to the West of the warm front. The depression has now died.

## **Aspects 2 – Different Depressions**

Depressions are areas of low atmospheric pressure, creating certain weather patterns. Depressions at mid-altitudes can bring strong, gusting winds and wet, cloudy weather patterns.

As the warm front approaches high cirrus clouds appear. Cloud cover increases; cumulus and then stratus clouds develop due to warm air cooling as it rises.

The air pressure temperatures as the warm front approaches. It drops further as it passes. Fronts can create stratus clouds and long-lasting rain.

Temperatures may rise slightly as the warm sector moves over an area. Wind speed in the warm sector may rise also. Warmer, windy weather is expected here.

As the air cools, water vapour condenses and clouds form. Rain is common in this sector as the cold front approaches the stratus clouds clear and cumulonimbus clouds develop bringing gusty winds and showers.

At the cold front violent showers and strong breezes can occur; - temperatures drop as the colder air passes over and visibility improves. Blue skies may appear as clouds dissipate.

Low pressure cells are extremely common in the mid latitudes as wind blowing in from the south west (tropical zone) is commonly warm and moisture laden. These then mix with the cold air masses from the polar north.

It is also at the top of the Ferrell cell. Air pressure increases as you move from the centre of a low-pressure cell to the outside of it and wind direction follows the isobars in an anti-clockwise direction.

## **Aspect 3 - Anticyclones**

Anticyclones (Highs) are large slow moving bodies of air. In an anticyclone air is sinking and so the air pressure is higher at the centre. Formation...

They form at high-pressure belts 30degrees north and south of the equator and 90° North and South Poles.

Anticyclones form from air masses cooling more than their surroundings, which causes the air to contract slightly making the air more dense.

Since dense air weighs more, the weight of the atmosphere overlying a high-pressure location increases causing increased surface air temperature; above 1013 millibars equals high pressure.

The air mass cooling results in an anticyclone forming. It can be caused by conduction as the air flows over a relatively cool ocean surface, making it colder and denser.

Highs can also be formed by the loss of infrared radiation over land during autumn, winter or spring when there is little sunlight available to warm the air mass. These are temporary highs.

Anti-cyclonic circulation has a local circulation that is opposed to the Earth's rotation. They rotate in a clockwise direction in the northern hemisphere and in an anticlockwise direction in the southern hemisphere.

Anticyclones do not have fronts in them. The air in them is one single air mass, however, the barometric pressure drops as you move from the centre to the outside.

## **Aspect 4 – Weather Patterns**

Highs, or anticyclones, may be warm or cold depending on the season and latitude at which they form. In summer they bring warm dry calm conditions; the kind of weather we associate with 'lazy summer days' and in winter they can bring frost, cold and crisp atmospheric conditions at our latitude 60degrees.

The weather patterns in a high are good because the air is sinking, and air pressure is uniform. Any moisture in the air tends to evaporate and so anticyclones are associated with dry conditions and clear skies as there is not enough water vapour for clouds to form.

Air sinks much more gently than it rises so anticyclones have gentle winds or windless conditions. They commonly bring slack winds.

In very cold conditions anticyclones may bring fog and mist. This is because the cold forces moisture in the air to condense at low altitude.

In summer highs bring dry, hot, settled weather. Highs at our latitude in summer are a result of the permanent high that shifts north. This is called the Azores high or North Atlantic high.

If this occurs, we can be assured of a long or settled period of predictable weather with high temperatures. To a certain extent this is determined by the Jet stream moving north.

In winter anticyclones bring cold nights and clear skies. This may be because the air has come from the polar air mass. Temperatures may drop well below freezing. There will be very little precipitation, however.

At mid-latitudes these massive weather influencers can vary or battle with each other for dominance; neither winning outright. One thing is certain that the weather will never last long as the next air mass is usually waiting in the wings to have its moment. We are fascinated with the weather as a result.