

# YEAR 9 UNIT 2: Weather Hazards

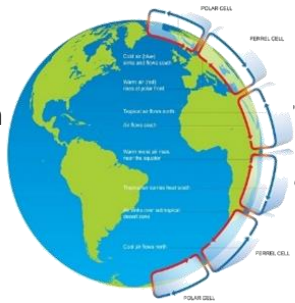
## Global Pattern of Air Circulation

Atmospheric circulation is the large-scale movement of air by which heat is distributed on the surface of the Earth.

**Hadley Cell** – Largest cell which extends from the Equator to between 30° to 40° north & south.

**Ferrel Cell** - Middle cell where air flows poleward between 60° & 70° latitude.

**Polar cell** - Smallest & weakness cell that occurs from the poles to the Ferrel cell.



## Wind

Wind is the movement of air from an area of high pressure to one of low pressure.

## Tropical Storms

Tropical Storms are intense low pressure weather systems with heavy rain and strong winds that spiral around the centre. They have a few names (hurricanes, typhoons, and cyclones) but they're all the same thing.

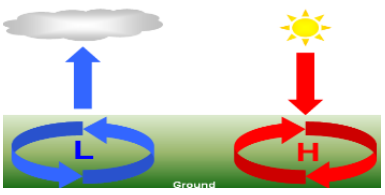
## Formation of Tropical Storms

1. The sun's rays heats large areas of ocean in the summer and autumn. This causes **warm, moist air to rise over** the particular spots
2. Once the **temperature is 27°**, the rising warm moist air leads to a **low pressure**. This eventually turns into a thunderstorm. This causes air to be sucked in from the **trade winds**.
3. With trade winds blowing in the opposite direction and the rotation of earth involved (Coriolis effect), the thunderstorm will eventually start to **spin**.
4. When the storm begins to **spin faster than 74mph**, a tropical storm (such as a hurricane) is officially born.
5. With the tropical storm growing in power, **more cool air sinks** in the centre of the storm, creating calm, clear condition called the **eye of the storm**.
6. When the tropical storm hits land, it **loses its energy source** (the warm ocean) and it begins to lose strength. Eventually it will 'blow itself out'.

## High and low Pressure

**low Pressure** - Caused by hot air rising. Causes stormy, cloudy weather.

**High Pressure** - Caused by cold air sinking. Causes clear and calm weather.



## Types of Wind

**Katabatic** - Winds that carry air from the high ground down a slope due to gravity. e.g. Antarctic.

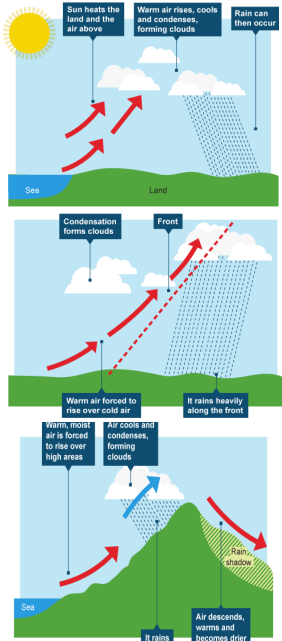
**Trade Winds** - Wind that blow from high pressure belts to low pressure belts.

**Jet Stream** - These are winds that are high in the atmosphere travelling at speeds of 225km/h.

**What is Precipitation?** This is when water vapour is carried by warm air that rises. As it gets higher, the air cools and the water vapour condenses to form a cloud. As water molecule collide and become heavier, the water will fall to Earth as precipitation.

## Types of precipitation

<b>Convictional Rainfall</b>	When the land warms up, it heats the air enough to expand and rise. As the air rises it cools and condenses. If this process continues then rain will fall.
<b>Frontal Rainfall</b>	When warm air meets cool air an front is formed. As the warm air rises over the cool air, clouds are produced. Eventually steady rain is produced.
<b>Relief Rainfall</b>	When wind meets mountains, the warm air is forced to rise quickly and cool. This leads condensation and eventually rainfall. When the air descend however, little very rainfall falls, creating a rain shadow.



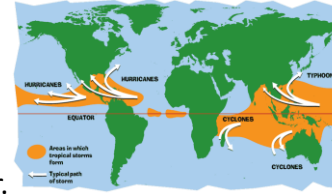
## Changing Pattern of Tropical Storms

Scientists believe that global warming is having an impact on the frequency and strength of tropical storms. This may be due to an increase in ocean temperatures.



## Distribution of Tropical Storms

They are known by many names, including hurricanes (North America), cyclones (India) and typhoons (Japan and East Asia). They all occur in a band that lies roughly 5-15° either side of the Equator.



## Management of Tropical Storms



<b>Protection</b> Preparing for a tropical storm may involve construction projects that will improve protection.	<b>Aid</b> Aid involves assisting after the storm, commonly in LIDs.
<b>Development</b> The scale of the impacts depends on whether the country has the resources cope with the storm.	<b>Planning</b> Involves getting people and the emergency services ready to deal with the impacts.
<b>Prediction</b> Constant monitoring can help to give advanced warning of a tropical storm.	<b>Education</b> Teaching people about what to do in a tropical storm.



## Primary Effects of Tropical Storms

- The intense winds of tropical storms can destroy whole **communities, buildings** and **communication networks**.
- As well as their own destructive energy, the winds can generate abnormally high waves called **storm surges**.
- Sometimes the most destructive elements of a storm are these subsequent **high seas and flooding** they cause to coastal areas.



## Secondary Effects of Tropical Storms

- People are **left homeless**, which can cause distress, poverty and ill health due to lack of shelter.
- Shortage of clean water and lack of proper sanitation** makes it easier for diseases to spread.
- Businesses are damaged** or destroyed causing employment.

## UK Weather Hazards

**Prolonged rainfall** – over a long period of leads to river floods, such as the very wet winter of 2013/14 causing flooding across much of southern England.

**Strong winds**, such as in February 2014 cause disruption to power supplies, damage from fallen trees and coastal battering from large waves.

**Heavy snow** and extreme cold are less common nowadays, but can cause great hardship to people in the north of the UK. December 2010 was the coldest in a century!

**Thunderstorms** follow hot weather bringing lightening and torrential rainfall linked to Flash Flooding.

**Drought and extreme heat** cause rivers to dry up and reservoirs run dangerously low. The heatwave of 2013 over much of Europe killed over 20000 people.

**Storm Desmond 2015 - Causes** – The warm air from the mid-Atlantic caused relief rainfall over the Cumbrian Mountains. The warmer the air, the more moisture it holds. 341.4 millimetres of rain falling over a 24-hour period.

**Effects** – Over 43,000 homes across Cumbria and Lancashire suffered from power cuts. Approximately 5,200 homes were affected by flooding. Rail and road services were disrupted. Many businesses suffered through damage to property and stock. Landslides and mudslides were reported.

**Response** – Following the earlier 2009 floods in Cockermouth, a flood prevention scheme was implemented. River dredging was used to increase the capacity of the river channel so it could hold more water in the future. A self-closing flood barrier was also installed in 2013 to increase the height of the river banks - however, the record breaking rainfall of December 2015 was too much for the barrier to contain.

## Hurricane Katrina - 2005

**Effects** - 1 million people were made homeless and about 1,200 people drowned in the floods.

Despite an evacuation order, many of the poorest people remained in the city. Oil facilities were damaged and as a result petrol prices rose in the UK and USA.

**Responses** There was much criticism of the authorities for their handling of the disaster. Although many people were evacuated, it was a slow process and the poorest and most vulnerable were left behind. \$50 billion in aid was given by the government.

The UK government sent food aid during the early stages of the recovery process.

The National Guard was mobilised to restore and maintain law and order in what became a hostile and unsafe living environment.

**Drought in the UK** - Drought develops over a period of time where rainfall is below average.

Reserves in soils, lakes and rivers are 'used up', resulting in water shortages. Factors contributing to the 2012 drought were; **less Rain** – The area affected received only 55-95% of usual rain between April 2010 and May 2012. **Warmer Temperatures** – the weather was warmer than usual so more water evaporated from reservoirs. **Dry Soils** – it was difficult for the rain that did fall to soak into the ground. **High water usage** – people are in the habit of using large amounts of water.

## Consequences of Drought

Problems for farming as it is difficult to grow crops. Environmental damage from wild fires in moorland areas. Restrictions on homes such as hosepipe bans.