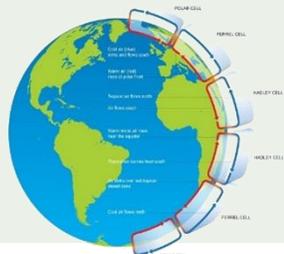


**Global pattern of air circulation**

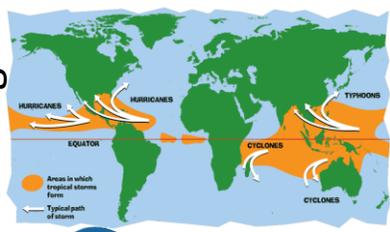
Atmospheric circulation is the large-scale movement of air by which heat is distributed on the surface of the Earth.



Hadley cell	Largest cell which extends from the Equator to between 30° to 40° north & south.
Ferrell cell	Middle cell where air flows poleward between 60° & 70° latitude.
Polar cell	Smallest & weakness cell that occurs from the poles to the Ferrell cell.

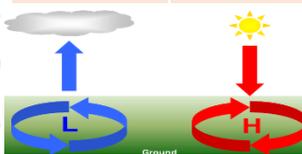
**Distribution of Tropical Storms.**

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.



**High and Low Pressure**

Low Pressure	High Pressure
Caused by hot air rising. Causes stormy, cloudy weather.	Caused by cold air sinking. Causes clear and calm weather.



**Formation of Tropical Storms**

- 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
- 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.
- With trade winds blowing in the opposite direction and the rotation of earth involved (Coriolis effect), the thunderstorm will eventually start to spin.
- When the storm begins to spin faster than 74mph, a tropical storm (such as a hurricane) is officially born.
- 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.
- 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'.

**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 LICs.
<b>Development</b> The scale of the impacts depends on the 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.



**What is Climate Change?**



Climate change is a large-scale, long-term shift in the planet's weather patterns or average temperatures. Earth has had tropical climates and ice ages many times in its 4.5 billion years.

**Recent Evidence for climate change.**

Global temperature	Average global temperatures have increased by more than 0.6°C since 1950.
Ice sheets & glaciers	Many of the world's glaciers and ice sheets are melting. E.g. the Arctic sea ice has declined by 10% in 30 years.
Sea Level Change	Average global sea level has risen by 10-20cms in the past 100 years. This is due to the additional water from ice and thermal expansion.

**Climatic Hazards**  
**The Challenges of Natural Hazards**



**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.
- Shortage of food as crops are damaged.

**Enhanced Greenhouse Effect**

Recently there has been an increase in humans burning fossil fuels for energy. These fuels (gas, coal and oil) emit greenhouse gases. This is making the Earth's atmosphere thicker, therefore trapping more solar radiation and causing less to be reflected. As a result, the Earth is becoming warmer.

**Evidence of natural change**

Orbital Changes	Some argue that climate change is linked to how the Earth orbits the Sun, and the way it wobbles and tilts as it does it.
Sun Spots	Dark spots on the Sun are called Sun spots. They increase the amount of energy Earth receives from the Sun.
Volcanic Eruptions	Volcanoes release large amounts of dust containing gases. These can block sunlight and results in cooler temperatures.

**Case Study Project**

Research a recent Tropical Storm and produce a case study about it. Make sure you include information on location, date, path, strength, formation. DO NOT DO Typhoon Haiyan. You can do this digitally or on paper but submit this as a printed piece of work. Also include:

<b>Effects</b>	<b>Management</b>
<ul style="list-style-type: none"> <li>Almost 6,500 deaths.</li> <li>130,000 homes destroyed.</li> <li>Water and sewage systems destroyed had caused diseases.</li> <li>Emotional grief for dead.</li> </ul>	<ul style="list-style-type: none"> <li>The UN raised £190m in aid.</li> <li>USA &amp; UK sent helicopter carrier ships deliver aid remote areas.</li> <li>Education on typhoon preparedness.</li> </ul>

**Managing Climate Change**

<b>Carbon Capture</b> This involves new technology designed to reduce climate change.	<b>Planting Trees</b> Planting trees increase the amount of carbon is absorbed from atmosphere.
<b>International Agreements</b> Countries aim to cut emissions by signing international deals and by setting targets.	<b>Renewable Energy</b> Replacing fossil fuels based energy with clean/natural sources of energy.



# Hurricane Dorian



## Impacts

Storm surges and flooding caused damage, particularly on the east side of the island.

67 deaths

282 people missing

Contaminated water sources

Estimated damage was \$2.5 billion

Oil Spill on Grand Bahama. Five massive crude oil tanks at the Burmah Oil Terminal had their lids blown off

## Short Term Responses:

The immediate response was complicated because it was across multiple islands.

Emergency health kits and backpacks were handed out

Hand delivery of emergency medicine through large and small boats, air craft and helicopters

Cruise liners, private planes and helicopters were all being used to help those still trapped in the Abaco Islands and Grand Bahama.

International efforts include help from the Royal Navy's RFA Mounts Bay and HMS Protector, and nine cutters from the US Coast Guard.

Some survivors have been taken to Florida or Nassau, further south in the Bahamas.

## Long Term

The British High Commission in Nassau worked closely with the United Nations Government to start to:

- repair and rebuild properties
- rehouse people
- repair the transport infrastructure
- improve forecasting and early warning systems
- provide grants and aid to people to help rebuild their homes

## Tasks...

Explain the condition needs for the formation of tropical storms.

What happens as air rises and what weather will this create?

What are the natural causes of climate change?

What are the human causes of climate change?

What are the impacts of climate change?

Discuss the impacts and responses of Hurricane Dorian.

**Question:** International agreements are critical in the challenge to reduce global carbon emissions" use evidence to support this statement.

1. BUG the question by boxing the command word and underlining the content you need to write about.
2. List the key vocabulary you will use.
3. Create a plan of what you would write in each paragraph.
4. Practice writing your answer from memory.
5. Don't forget about SPAG (spelling, punctuation and grammar)

**Question:** "Describe the primary and secondary effects of a tropical storm. Use a named example and your own knowledge."

1. BUG the question by boxing the command word and underlining the content you need to write about.
2. List the key vocabulary you will use.
3. Create a plan of what you would write in each paragraph.
4. Practice writing your answer from memory.
5. Don't forget about SPAG (spelling, punctuation and grammar)