

ELQ Geography

Entry Level Geography

Unit 1: Changeable Weather



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Learning Outcome 1:

Know elements of the weather and how to measure them

Learning Outcome 2:

Know the weather systems that affect the British Isles

Learning Outcome 3:

Know the causes and impacts of climate change

Guidance notes

This resource includes information and suggested tasks relating to Entry Level Geography.

This booklet has been produced to meet the requirements for Entry Level 3. Teachers may amend the material to suit the needs of their learners.

The list of resources is neither prescriptive nor exhaustive.

The website for the Meteorological Office is an excellent source of information:

<https://www.metoffice.gov.uk/learning/learn-about-the-weather>

For weather elements and instruments:

http://www.weatherwizkids.com/?page_id=82

<http://www.weather-climate.org.uk/05.php>

http://www.bbc.co.uk/bitesize/standard/geography/weather_climate/recording_data/revision/1/

For Depressions and Anticyclones:

<http://www.coolgeography.co.uk/A-level/AQA/Year%2013/Weather%20and%20climate/British%20Isles/British-Anticyclones.htm>

For climate change:

<http://www.bbc.co.uk/education/guides/z3bbb9q/revision>

http://www.wwf.org.uk/what_we_do/tackling_climate_change/impacts_of_climate_change/

Introduction

It is often said that we are infatuated with the weather.

When we talk about the **Weather** we are referring to the short term day to day changes in the atmosphere such as changes in temperature, rainfall, wind direction, wind speed and atmospheric pressure. These are known as the elements of the weather.

- **Temperature** is how hot or cold it is.
- **Rainfall** is liquid water in the form of droplets that fall over an area in a given amount of time.
- **Wind direction** is the direction from which the air blows.
- **Wind speed** is the velocity in which the air moves.
- **Air pressure** is the force of air pushing down over a particular area.

Someone who observes and studies the weather is called a **meteorologist**. They measure the weather elements daily so that they can make forecasts on future weather events. The following table names and describes the instruments that meteorologists use to measure the elements of the weather.

Element of the weather	Instrument	
Temperature	<p>Thermometer</p> <p>Traditional thermometers use a liquid such as mercury or alcohol. The liquid in the bulb expands and rises up the tube.</p> <p>Modern thermometers are digital.</p> <p>Temperature is measured in degrees Celsius (°C).</p>	 <p>Fig 1: A Digital Thermometer</p>
Rainfall	<p>Rain gauge</p> <p>Rain falls into the funnel and measured.</p> <p>Rainfall is measured in millimetres (mm).</p>	 <p>Fig 2: A Rain Gauge</p>

<p>Wind direction</p>	<p>Wind vane</p> <p>The arrow points into the wind.</p> <p>Wind direction is measured by using the eight points of the compass (north, north-east, east, south-east, south, south west, west, north-west).</p>	 <p>Fig 3: A Wind Vane</p>
<p>Wind speed</p>	<p>Anemometer</p> <p>This has metal cups which rotate in the wind.</p> <p>Wind speed is measured in knots.</p> <p>The stronger the wind, the faster the anemometer turns.</p>	 <p>Fig 4: An Anemometer</p>
<p>Atmospheric pressure</p>	<p>Barometer</p> <p>Atmospheric pressure is measured in millibars (mb)</p> <p>If the needle moves to the right, this indicates higher pressure and good weather.</p> <p>If needle moves to the left, this indicates a pressure fall and not so good weather.</p>	 <p>Fig 5: A Barometer</p>

Table 1: Elements of the Weather

Weather systems

Two large scale weather systems affect the weather that's experienced in the British Isles. One is called a depression and one is called an anticyclone.

Depressions are low pressure weather systems. They bring unsettled weather with clouds, rain and wind. In the British Isles, most of our weather is associated with the passage of a depression. Depressions form over the Atlantic Ocean and travel across the British Isles from west to east, driven by the winds. Depressions form when cold polar air moving south meets warm tropical air

moving north. The warm tropical air always rises above the cold polar air. As it rises, the air cools and condenses. Clouds form and it will rain.

Fig 6 shows a fully formed depression from a bird's eye view. A depression has two fronts. A front is the boundary between cold air and warm air. At the **warm front** the warm air is rising gently over the cold air. At the **cold front** cold air is pushing under the warm air forcing it to rise sharply. The warm air between the two fronts is known as the **warm sector**.

Imagine that this picture is a fully formed depression in the Atlantic Ocean and is moving towards the UK. The warm front will pass first, then the warm sector and then finally the cold front. The weather will change at each of the three stages.

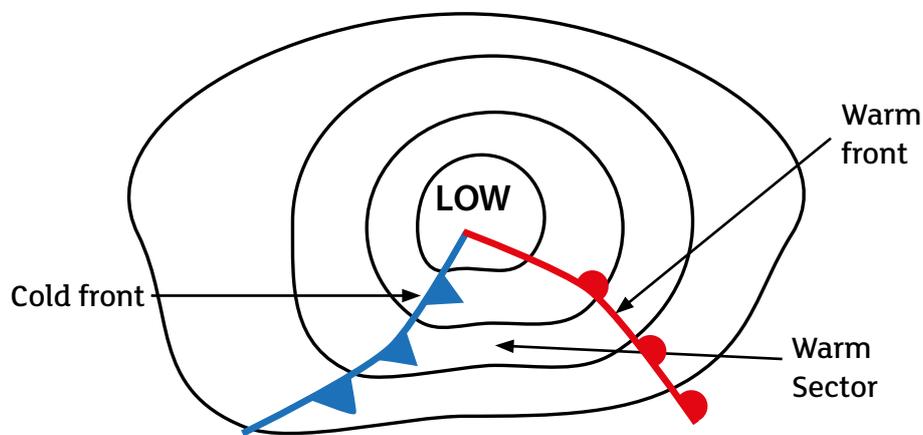


Fig 6: A Depression

Stage 1 of the depression - Warm front:

The warm front approaches the British Isles first. This is where the warm air rises above the cold air. As it rises it cools and condenses forming clouds which produce rain. Winds will change direction to south westerly.

Stage 2 of the depression – Warm sector:

Temperatures starts to rise, clouds usually thin and break and rain turns to drizzle and sometimes stops completely.

Stage 3 of the depression – Cold front:

This is where the cold air undercuts the warm air, causing the air to rise, cool and condense. This causes heavy rain and the winds are strong, sometimes increasing to gale force. Eventually the depression fizzles out and dies.

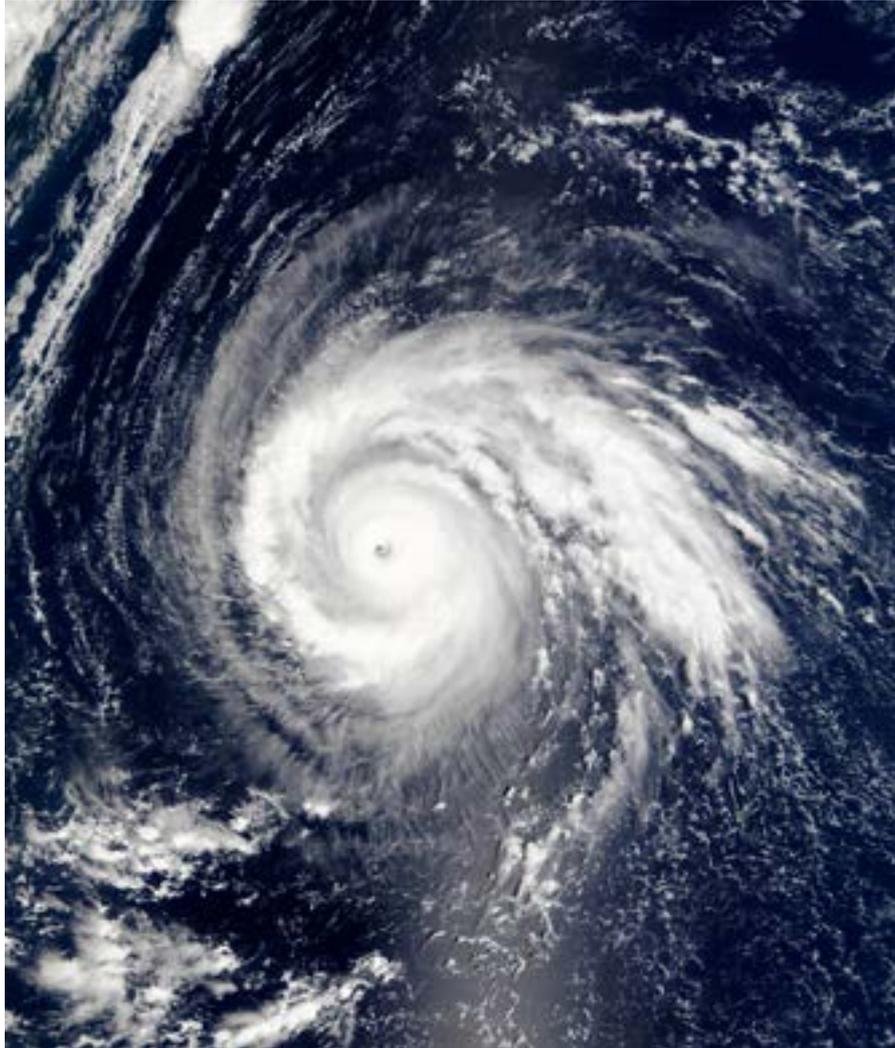


Fig 7: A Satellite Image Showing a Depression in the North Atlantic

Anticyclones are high pressure systems. In an anticyclone the air is sinking which leads to dry and warm conditions with clear skies. The weather in an anticyclone will be the same over a large area.

Fig 8. (below) shows an anticyclone. You can see that the atmospheric pressure is high at the centre of the anticyclone. The isobars (the lines on the map that join places of the same air pressure) are far apart and there are no fronts.



Fig 8: An Anticyclone

In summer an anticyclone brings an extended period of dry, calm, warm and sunny weather. In winter anticyclones often bring periods of dry, very cold weather. Sometimes a low layer of cloud develops and weather forecasters will describe conditions as 'anticyclonic gloom'.

Climate change



Fig 9: Human activity is one cause of climate change

Climate change refers to the changes in long-term temperature and rainfall patterns. Evidence suggests that human activity is a major factor in climate change. Scientists point to increased levels of CO₂ produced by the increased use of fossil fuels such as coal, oil and gas. However, there are also natural causes of climate change. This helps to explain why there is so much debate about the reasons for climate change. For some regions extreme weather events and rainfall are becoming more common while others are experiencing more extreme heat waves and droughts.

Let's look at the main causes of climate change.

Human causes of climate change	Natural causes of climate change
<p>Global warming through the burning of fossil fuels:</p> <p>Global warming is the increase in global temperatures caused by an increased amount of greenhouse gases in the atmosphere.</p> <p>Human activities such as burning fossil fuels cause this to happen.</p> <p>When fossil fuels (coal, oil or gas) are burnt to create electricity, large amounts of carbon dioxide is released into the atmosphere. Carbon dioxide is a greenhouse gas. This allows the sun's rays in but blocks them from leaving, causing global temperatures to rise.</p>	<p>Natural climatic cycles:</p> <p>The earth orbits the sun in both circular and elongated rotations. When moving in a circular orbit, the earth is closer to the sun so it is warmer. When moving in an elongated orbit, the earth is further from the sun so it is cooler.</p> <p>Sunspots</p> <p>Sunspots are bursts of heat so during these times, temperatures will be higher.</p> <p>Volcanic activity:</p> <p>During a volcanic eruption, gases and ash are released into the atmosphere. This can block the sun's rays which will lead to a drop in temperature.</p>



Fig 10: Air Pollution Caused by Burning Fossil Fuels

Global warming through the increased use of motor vehicles:

Cars emit large amounts of greenhouse gases such as nitrogen dioxide into the atmosphere. This allows the sun's rays in but blocks them from leaving, causing global temperatures to rise.



Fig 12: A Traffic jam



Fig 11: The Tungurahua Volcano Erupting

There are many impacts of climate change:

- Melting ice caps – Ice caps will melt due to an increase in temperatures.
- Rising sea levels – Sea levels will rise because as temperatures rise, the water in the seas and oceans will expand which causes water levels to increase. Rising sea levels can also be caused as a result of the ice caps melting which will cause an input of water into the seas and oceans.



Fig 13: Polar Bears are experiencing a loss of ice due to climate change

- There will be more coastal floods – This is because as sea levels rise, floods will be more common along coastal regions.
- There will be changes to the way plants and animals live – This is because when places become drier for example, some plants that need water to survive will die.
- Health impacts of heat waves and extreme weather – As a result of warmer conditions, hospital admissions and even death tolls may rise, especially among the elderly population.

Activity 1

What are the 5 main elements of the weather? For each one, describe its meaning in your own words.

1. _____

2. _____

3. _____

4. _____

5. _____

Activity 2

Unscramble the words below and write the names of the 5 instruments that are used by meteorologists to measure the weather.

- NMEAMEREOT = _____
- EANWIDVN = _____
- EMRMTREEOHT = _____
- IGAUERANG = _____
- RMARBOEET = _____

Activity 3

Study Resource A which shows five instruments that are used to measure the weather. Write the name of each instrument beside the correct picture.

Resource A



Name: _____



Name: _____



Name: _____



Name: _____



Name _____

Activity 4

Study **Resource B** which shows a range of weather instruments. For each instrument, identify the weather element it measures. Briefly describe in your own words how each instrument is used to measure the weather element.

Resource B

Instrument	What does it measure?	How does it work?
		
		
		
		
		

Activity 5

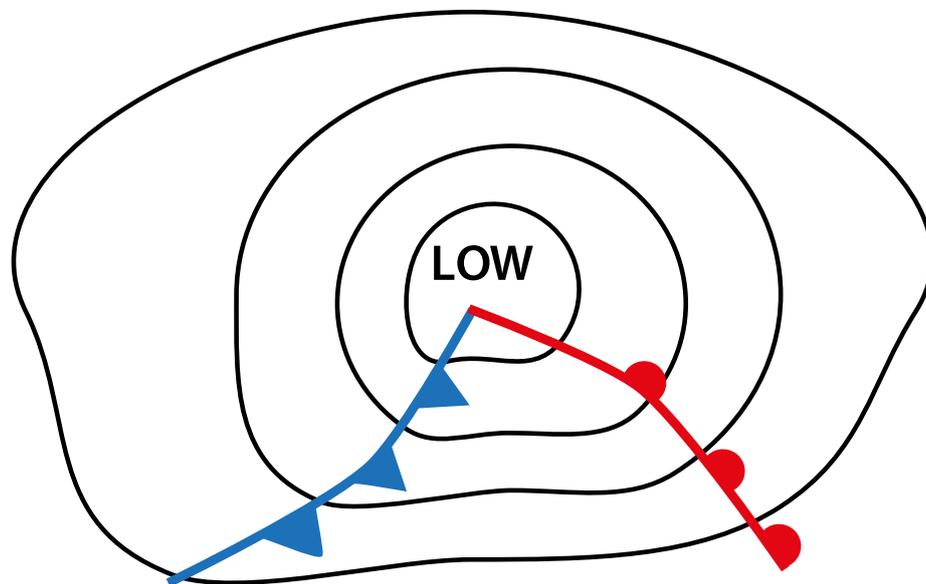
Weather systems called depressions frequently affect the UK.

Study **Resource C** which shows a diagram of a depression.

Complete Resource C by labelling:

- the warm front
- the cold front
- the warm sector

Resource C



Circle the correct words/phrases that best describes the type of weather a depression brings to the UK:

- Settled Rain Dry Cloudless Light winds
Windy Unsettled Clouds
Low pressure High pressure

Activity 7

Another weather system affecting the British Isles is an anticyclone.

Circle the correct words/phrases that best describe the type of weather an anticyclone brings to the UK:

Settled **Rain** **Dry** **Cloudless** **Light winds**
Windy **Unsettled** **Clouds**
Low pressure **High pressure**

Activity 8

Imagine you are a weather forecaster on TV. Your weather chart shows that a large anticyclone has moved over Northern Ireland.

Write a weather forecast for the next 24-48 hours. Make sure you refer to the five main elements of the weather.

It is July, what advice would you give to the public as part of your weather forecast? You can use a map and diagrams or photographs if you want to.

Activity 9

Explain in detail one human cause of climate change.

Explain in detail one natural cause of climate change.

Activity 10

Complete the following table by describing two impact of climate change. Use the Internet to find appropriate pictures for your description.

Remember – the impact of climate change may not always be bad.

One impact of climate change is...	A second impact of climate change is...