

Atmosphere and Weather Revision Notes

Atmosphere

- The blanket of gases that surrounds the Earth is called the atmosphere.
- The main gases are nitrogen (78 %), oxygen (21 %), water vapour, ozone and carbon dioxide (1 %).
- The atmosphere has weight and places pressure on the Earth.
- The troposphere is the lowest layer of the atmosphere where weather forms.

Latitude and unequal heating of the Earth

(Marking Scheme: 6 marks, 2 reasons @ 3 marks each.)

- The Earth receives solar energy from the sun.
- The sun heats the Earth unevenly.
- The amount of solar energy that an area receives depends on its latitude.
- **Latitude** is shown as lines on a map that join places of equal distance from the equator.
- Places close to the equator at low latitudes, receive lots of sunshine and are hot. As the sun is directly overhead and it is concentrated on a small area.
- Places near the poles, at high latitudes, receive less sunshine and are cold. As the sun's rays are slanted and are spread out over a larger area.

Wind and Atmospheric pressure

- Atmospheric pressure is the weight of the air pressing down on the Earth.
- Air moves from areas of high pressure to low pressure forming wind.
- Winds that blow from the equator to the poles are warm winds.
- Winds that blow from the poles to the equator are cold winds.
- A **prevailing wind** is the most common wind in an area, e.g. Ireland = Southwesterly.

Higher Level Only

Global wind patterns

The **Coriolis Effect** causes wind to be deflected to the right in the northern hemisphere and to the left in the southern hemisphere.

Ocean Currents

- Ocean currents are giant rivers of cold or warm water that flow through the seas in a similar direction to the prevailing winds.
- **The North Atlantic Drift:** A warm current that comes from the Gulf of Mexico and flows along the west coast of Ireland. It brings wet weather and it raises winter temperatures preventing our ports from freezing over.
- **The Labrador Current:** A cold current that flows along by Greenland and Canada. It causes the ports to freeze in winter for many months.
- **The Canaries Current:** A cold current that flows along the west coast of Africa. The air over it is also cold and holds little moisture therefore causing dry wind to blow over Africa causing the Sahara desert.

(Hint: Called Canaries current because it flows by the Canary Islands e.g. Lanzarote, Tenerife.)

Weather Systems

Air Mass: A large body of air, that is uniform in temperature, atmospheric pressure and humidity.

Front: The boundary between two air masses.

Cold Front: A cold front forms when warm air has to rise quickly over a large cold air mass. The warm air cools and condenses forming heavy clouds and rain.

Warm Front: When warm air moves slowly over cold air. It cools and condenses to create dark clouds and continuous rainfall.

Types of Irish Weather

(Marking Scheme: 6 marks, three descriptions @ 2 marks each.)

Depression (Bad Weather)	Anticyclone (Good Weather)
(Hint: You must also be able to describe this weather system from a weather chart.) (Hint: If the isobars are in the 900's at the centre, it is always a depression.)	(Hint: You must also be able to describe this weather system from a weather chart.) (Hint: If the isobars are in the 1000's at the centre, it is always an anticyclone.)
A depression is ascending air and therefore it has low atmospheric pressure. It is also called a low or a cyclone.	An anticyclone is descending air and therefore has high atmospheric pressure. It is also called a high.
A lot of depressions develop over Ireland due to the warm moist air from the North Atlantic Drift meeting cold polar air from the North.	In the summer this brings hot sunny days but in the winter it can lead to rapid heat loss and frost.
Depressions bring wet, windy and cloudy weather.	It brings dry settled weather with clear, cloudless skies.

Water Cycle (Hydrological Cycle)

(Marking scheme: 6 marks, three statements @ 2 marks each.)

1. **Evaporation:** The sun's heat causes the water to turn into vapour.
2. **Condensation:** As the air rises it cools and condenses to form clouds.
3. **Precipitation:** The clouds condense further to form raindrops. This then falls as rain, snow, sleet or hail.
4. **Run-off:** The water that falls onto the land makes its way back to the sea through the bedrock or rivers.

Clouds

There are 3 types:

Cirrus: Wispy clouds, high up and indicate good weather.

Cumulus: Fluffy clouds at medium heights, if dark bring bad weather.

Stratus: Low blanket of clouds that brings persistent drizzle.

Relief Rainfall

(Marking scheme: 6 marks, 2 statements @ 3 marks each)

(Hint: Picture will always have a mountain in it!)

- Relief rainfall is caused when warm air blows in from the sea.

- It rises as it meets mountains, cools and condenses to form clouds and then rain.

Convectional Rainfall

(Marking scheme: 6 marks, 2 statements @ 3 marks each)

(Hint: Picture will always have a sun in it or a lighting flash!)

- Convectional rainfall mainly occurs in Ireland in the summer.
- The sun warms the land, the air above it heats up and rises quickly.
- The air holds lots of moisture, cools and condenses to form cumulus clouds and heavy showers.
- It may be followed by thunder.

Frontal (Cyclonic) Rainfall

(Marking scheme: 6 marks, 2 statements @ 3 marks each)

(Hint: The picture will always have two air masses!)

- Frontal rainfall forms when cold and warm air masses meet.
- The warm air is forced upwards.
- It cools and condenses forming stratus clouds with light rain at first becoming heavier.

Weather

- **Weather** describes the state of the atmosphere in any moment in time.
- **Climate** is the average weather of a large area over a long period of time.
- The study of weather is called meteorology.
- The information for weather forecasts is collected from a number of locations, e.g. satellites, weather stations and ships.
- It is transmitted by Met Eireann and is of huge importance to farmers, pilots, fishing and tourism.
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Weather Instruments

(Marking scheme: 4 marks, explain two instruments @ 2 marks each, 1 statement and 1 development)

Temperature

Instrument: Max and Min thermometer

Unit of measurement: Degree Celsius (°C)

Lines on a map that join places of equal temperature: Isotherms

Relative Humidity (Amount of water vapour)

Instrument: Hygrometer, wet and dry bulbs.

Unit of measurement: Percentage (Saturated air is 100 %)

Wind Speed

Instrument: Anemometer

[The Beaufort scale can also be used. It describes wind speed by looking at its effects on the landscape from a scale of 0 (Clam)-12 (Hurricane).]

Unit of measurement: Km/hr

Lines on a map that join places of equal wind speed: Isotachs

Wind Direction

Instrument: Wind Vane

Unit of measurement: North, South, East, and West.

Precipitation

Instrument: Rain Gauge

Unit of measurement: Millimetres (mm)

Lines on a map that join places of equal rainfall: Isoyets

Sunshine

Instrument: Campbell-Stokes sunshine recorder

Unit of measurement: Hours per day

Lines on a map that join places of equal sunshine: Isohels

Atmospheric Pressure

Instrument: Barometer

Unit of measurement: Millibars (mb)

Lines on a map that join places of equal pressure: Isobars

Climatic Tables

Temperature Range: max temp – min temp [17.5 - (-4.5) = 22 °C]

Mean Temperature: Sum of monthly temp [For April, May, June]

Amount of months

$$\frac{6+8.5+12.5}{3}$$

$$\frac{27}{3} \quad \text{equals } 9^{\circ}\text{C}$$

Case Study: Global warming and the Greenhouse effect

(Hint: Called greenhouse effect because it acts like a common garden greenhouse keeping things warmer than they should!)

(Marking Scheme: 10 marks)

What? Rapid warming of the Earth.

Where affected? Polder Region of the Dutch coast.

Why? The Greenhouse Effect is caused by an increased amount of gases e.g. carbon dioxide and methane, in the air. (2 marks define terms)

They hold the sun's heat increasing world temperatures and causing global warming.

Causes? People burning fossil fuels e.g. coal, in homes and factories. (4 marks outline main causes) (2 statement, 2 explaining it)

Cutting down rain forests, removing trees that could take in carbon dioxide.

Releasing CFC's found in aerosols, fridges and plastics.

Increased methane released from paddy fields, landfills and animal dung.

Effects? Negative? The polar ice caps will melt causing sea levels to rise flooding areas such as the polder regions. (2 marks effects @ 1 statement, 1 explaining it)

Positive? Some regions will become milder e.g. Central Canada, which will lead to an increase in agriculture.

Solutions? Use renewable energy, e.g. solar, wind. (2 marks define a solution)

Reduce deforestation.

Use cleaner fossil fuels, e.g. gas.

Kyoto Agreement (1997) to reduce world CO² emissions