



Class: VII
Subject: Social Science
Chapter: 2
Understanding the Weather



**A change in the weather is sufficient to create the world and oneself anew.
Marcel Proust, French novelist**



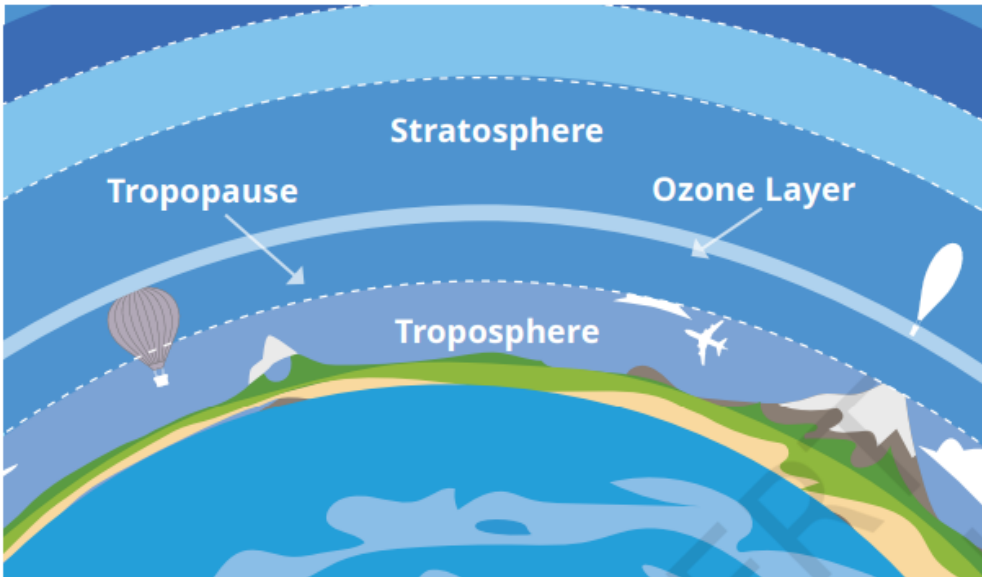
सत्यमेव जयते



The Big Questions?

- How can we measure and monitor the weather around us?
- How do weather predictions help us prepare for events like heavy rain, storms, drought and heat waves?

Weather



- **Weather and the Atmosphere**
- **Weather** is the condition of the Earth's **atmosphere** at a specific time and place.
- The **atmosphere** is a layer of **gases** (air) surrounding Earth.
- The **troposphere** is the lowest layer, where **plants, animals, and humans live**.
- **All weather events** happen in the **troposphere**.
- It extends **6 to 18 km** above the Earth, **thinner at the poles** and **thicker at the equator**.

Elements of Weather

The elements of weather are:

- **Temperature:** How hot or cold the atmosphere is.
- **Precipitation:** Any form of water, such as rain, snow, **sleet** or **hail**, that falls from the sky.
- **Atmospheric Pressure:** The weight of the air above us, felt on the Earth's surface.
- **Wind:** The movement of air, including its speed and direction.
- **Humidity:** The amount of **water vapour** in the air.

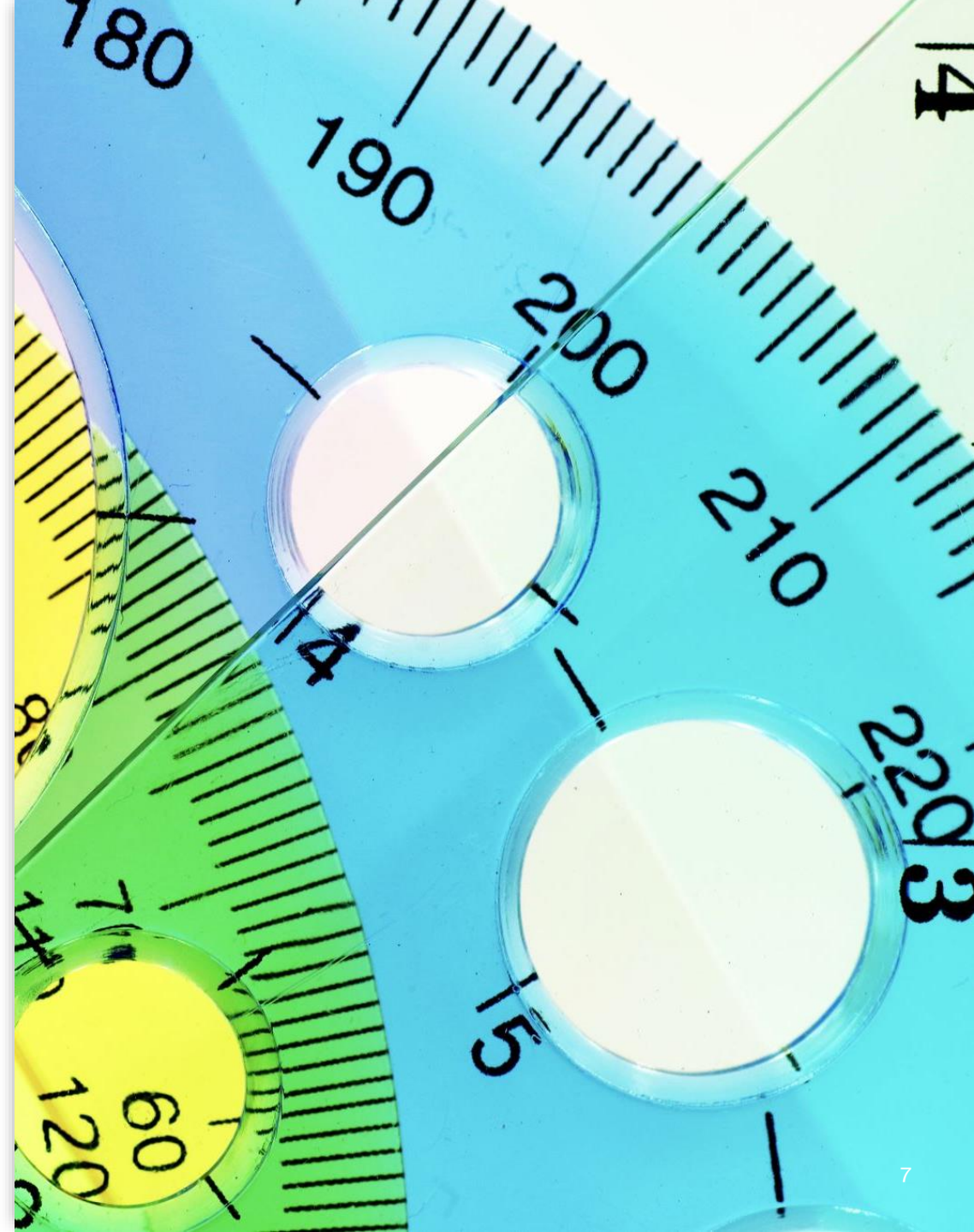
India Meteorological Department (IMD)



- Established in 1875.
- Motto: "*Ādityāt jāyate vṛṣṭi*" – "*From the sun arises rain*".
- Taken from the ancient text **Manusmṛiti**.
- Full meaning: **Sun** → **Rain** → **Food** → **Life**.

Thermometers and Temperature

- Different types of thermometers measure **ambient**, **maximum**, and **minimum** temperatures.
- Traditional thermometers use **liquid** that expands with heat.
- **Digital thermometers** are more **accurate** and can record more **data**.
- **Useful temperature data** includes:
 - **Range** = Max temperature – Min temperature
 - **Mean daily temperature** = $(\text{Max} + \text{Min temperature}) \div 2$



Precipitation and Rainfall Measurement

- **Rainfall** is measured using a **rain gauge**.
- Rainwater is collected in a **cylinder** through a **funnel**.
- A **scale** shows the **depth** of rainwater (e.g., 5 mm of water = 5 mm rainfall).
- **30 mm of rainfall** means 30 mm of water collected in a day.

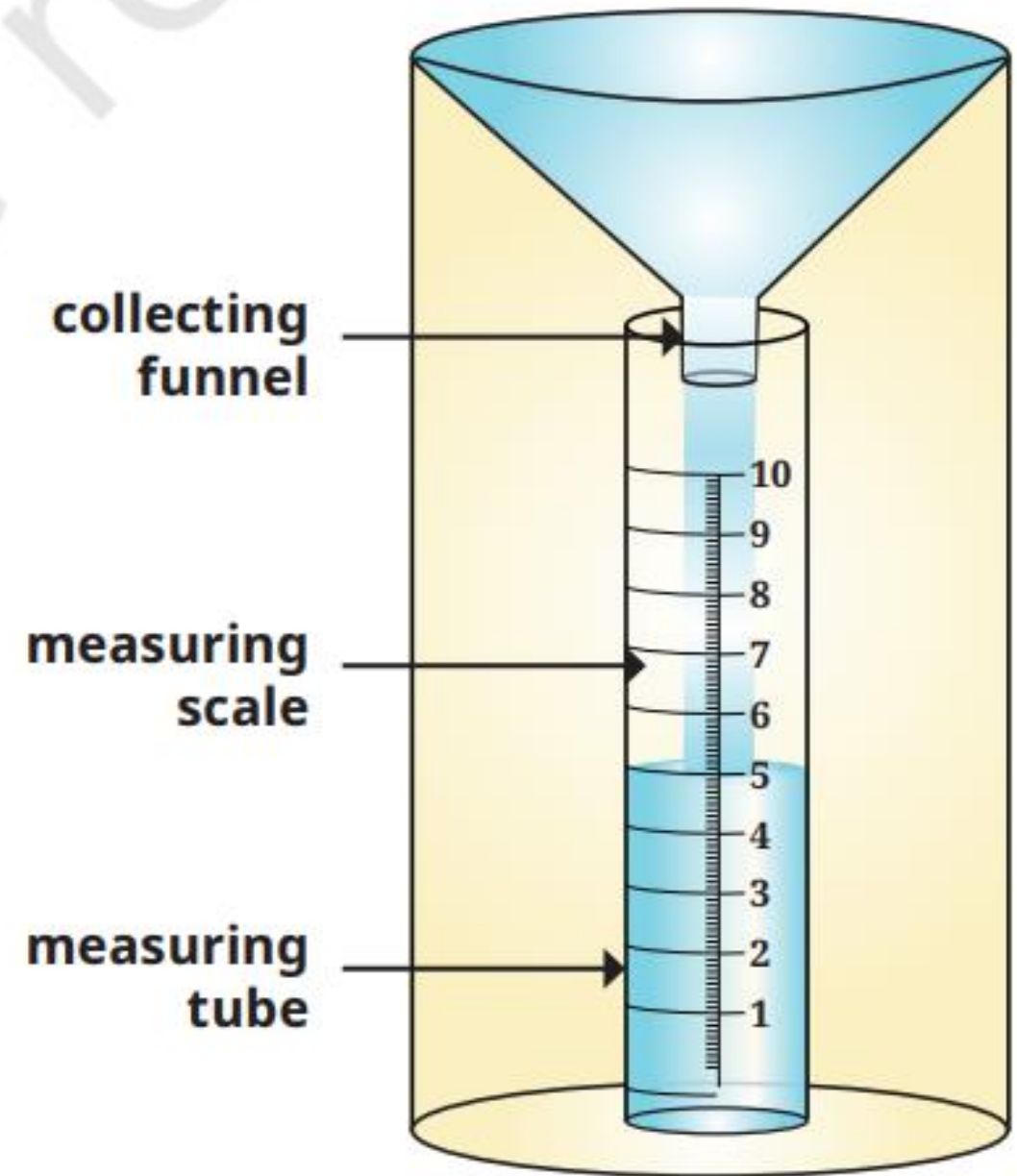
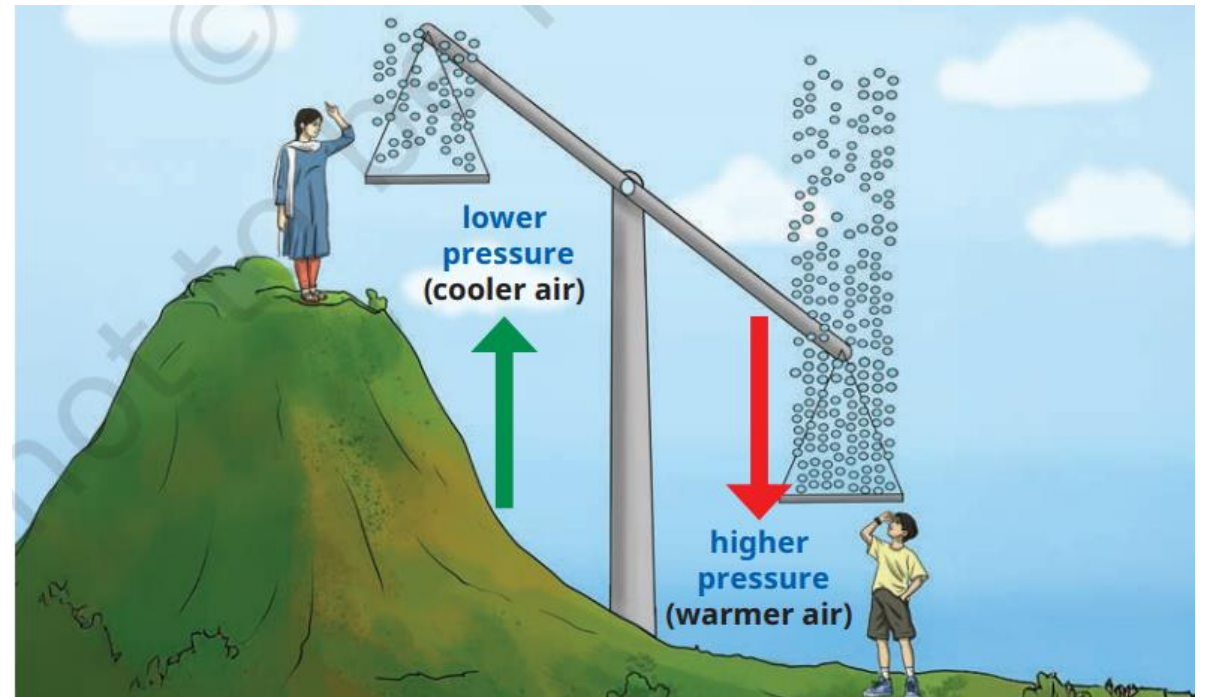


Fig. 2.6. Rain gauge

Atmospheric Pressure

- Caused by the **weight of air** around us.
- **Higher** at sea level, **lower** in the mountains.
- Less oxygen at high altitudes can cause **breathlessness**.
- A drop in pressure can lead to **storms or cyclones** (low-pressure system).





Barometer and Atmospheric Pressure

- **Barometer** is used to measure **atmospheric pressure**.
- Pressure is measured in **millibars (mb)**.
- **Normal pressure** at sea level: **1013 mb**.
- Pressure **below 1000 mb** indicates a **depression** (low-pressure area).

Wind

- **Wind** is the movement of air from **high** to **low-pressure** areas.
- **Speed** and **direction** are key in weather forecasting.
- Pilots, sailors, and farmers rely on wind data for various purposes.



Wind Measurement Instruments



A **wind vane** (or **weather vane**) measures wind direction.

- It has a **rotating arm**, with a **tail** at one end and a **pointer** at the other.
- The **tail** moves with the wind, and the **pointer** shows wind direction, even with a light breeze.

A **wind sock** on the tarmac indicates wind direction for pilots during take-off and landing.

Fig. 2.10. Left: Wind va

Anemometer

- **Anemometer** is the simplest tool for measuring both **wind direction** and **speed**.
 - It has **metal cups** that rotate with the wind.
 - The **faster the rotation**, the stronger the wind.
 - A meter calculates the wind speed in **km/h** based on the rotations.



Humidity

- **Humidity** is the amount of **water vapour** in the air, affected by temperature, wind, pressure, and location.
- **Relative humidity** is the measure of moisture in the air:
 - **0%** means no water vapour, and **100%** means air is fully saturated.
- Dry weather: **20% - 40%** humidity; Humid weather: **60% - 80%**.
- Humidity is measured using a **hygrometer**.
- Important for industries like **food processing** and **museums** that need to maintain specific humidity levels.



Weather Stations

- A **weather station** combines various instruments to measure and track weather conditions.
- It takes **regular readings** to help with **mapping** and **forecasting** the weather.



Automated Weather Station (AWS)



An **AWS** is a self-operating system that uses sensors to measure weather data (temperature, humidity, wind speed, precipitation, pressure).



It provides **accurate, real-time weather information** without human intervention.



Used in fields like **agriculture, aviation, navigation, and environmental monitoring.**

National Disaster Management Authority

In 2023, the **National Disaster Management Authority** set up an **AWS** at a glacial lake in **Sikkim** (4800m above sea level) to provide **early weather warnings**.



Fig. 2.12. AWS at a glacial lake of Sikkim

Predicting the Weather



Meteorologists use data to predict weather.



Predictions help prepare for extreme weather events.



Governments can take action, like evacuations or warnings.



Example: Fishermen are warned, and coastal areas may be evacuated during cyclones.

Weather warning for India on 19 May 2024

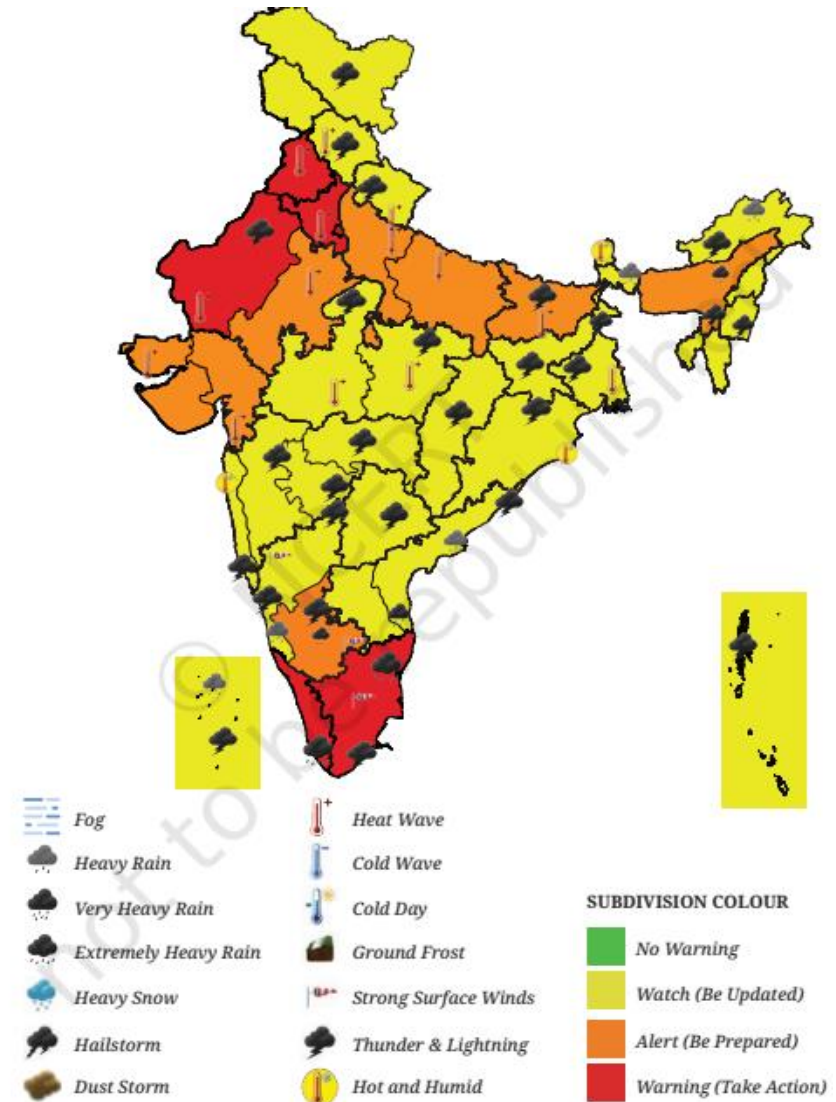


Fig. 2.13. India: weather warning for India on 19 May 2024



THANK YOU