

S4E3-4: Weather

Dates: 2/29 – 3/31

Key Terms

Water cycle²

Solid²

Liquid²

Gas²

Evaporation²

Condensation²

Precipitation²

Hail²

Rain¹

Snow¹

Sleet²

Dew²

Fog¹

Anemometer³

Barometer³

High pressure²

Low pressure²

Humidity³

Rain gauge²

Thermometer¹

Temperature²

Wind vane²

Weather²

Climate²

Clouds¹

Cumulus³

Nimbus³

Cirrus³

Stratus³

Meteorologist²

Weather map²

Weather symbols²

Weather Fronts²

Framework for Teaching:

Students Will Be Able To:

1. Compare and contrast the different phases (states of matter) using water.
2. Compare and contrast freezing, melting, boiling, evaporation, and condensation.
3. Identify temperatures at which water freezes and boils using degrees Celsius and Fahrenheit.

4. Explain the water cycle using the appropriate terminology (evaporation, condensation, and precipitation).
5. Relate temperature to changes in the state of matter of water.
6. Relate water and humidity to cloud formation.
7. Describe and relate different forms of precipitation and sky conditions to the water cycle.
8. Analyze weather maps and relate the map to identify fronts, temperatures, and precipitation.
9. Relate weather instruments to weather data and forecasts. (i.e. thermometer = temperature, rain gauge = inches of precipitation, barometer = atmospheric pressure, wind vane = wind direction, anemometer = wind speed)
10. Compare and contrast weather and climate.
11. Predict weather patterns during different times of the year using old data sets from prior years.

For the teacher to know for their own understanding and to avoid misconceptions:

1. The water cycle is an example of the Law of Conservation of Mass and the Law of Conservation of Energy. Mass cannot be created or destroyed it only changes forms (mass of a cup of ice is the same before and after it melts. The energy gained by the ice is equal to the energy lost by the environment)
2. Ice gains energy to melt, water loses energy to freeze. Heat travels from hotter objects to colder objects which is why ice melts when left at room temperature.
3. Water freezes and boils at **0°C/32°F** and **100°C/212°F**. Students may get the units mixed up so be mindful when teaching these ideas.
4. Boiling and evaporation both lead to liquid water becoming water vapor (gas). The difference is that boiling happens to the bulk of the liquid and evaporation only happens at the surface of the water. Water can evaporate at any temperature (as long as it is liquid at that temperature).
5. Humidity is a strong factor related to cloud formation.
6. Rain is liquid, Sleet is liquid and solid, Hail is solid, Snow is a softer solid in thin crystal form.
7. Make sure that you differentiate between a wind vane and anemometer.
8. Fronts are the point at which two air masses meet. Make sure you cover air masses before you cover fronts.
9. Weather is short-term conditions of the atmospheric conditions and climate is the average temperature and condition of an area over a long amount of time.

Activities (Suggestions)

- ✓ Weather Journal (high level writing using sources)
- ✓ Water Cycle Simulation using ice, water and thermometers. Use graphs and time to show changes in temperature. Journal about the comparison of the experiment to what happens in nature.

Notes:

This unit lends itself to writing and journaling. Students should collect qualitative and quantitative data over long periods of time. This is instrumental in making predictions because making predictions is directly aligned to observing patterns. Energy and mass are underlying themes in this unit because they justify the movement of energy from different states of matter as well as the movement of air masses (i.e. fronts). It is imperative that you have deep conversations with your students as they may have already developed misconceptions about water and weather. Students may have misconceptions about weather and water.