



# Weather

**CONTENT STANDARD:** Earth and Space Science

**CONTENT TOPIC:** Meteorology

**CONCEPT:** Atmospheric conditions vary.

**CONTENT OBJECTIVE:** To understand weather and the effect of changing atmospheric conditions

**INSTRUCTIONAL OBJECTIVES:** The learner will:

- Name some conditions that change the weather.
- Define air masses, warm front, cold front, stationary front, occluded front, and low/high pressure.

**OUTLINE OF CONTENT:**

I. Conditions that change weather

II. Definitions

A. Air masses

B. Warm front, cold front, stationary front, occluded front

C. Low pressure, high pressure

**GOAL:** To enable students to acquire scientific knowledge by applying concepts, theories, principles and laws from earth science.

**STANDARD(S):** The learner will understand that:

Science is based upon suppositions derived from observations of natural phenomena.

**BENCHMARK:** Unknown or unobserved variables may lead to unanticipated results.

The critical assumptions behind any line of reasoning must be made explicit so that the validity of the position taken can be judged.

**BENCHMARK:** Prior learning must be accurate and free of incorrect assumptions.

The validity of an investigation cannot be accepted unless the complete investigation can be independently duplicated.

**BENCHMARK:** Scientific truths must be supported by data in conjunction with logical evaluations.



## CLASSROOM CONNECTORS

**TIME REQUIRED:** 30 minutes

### **MATERIALS:**

Plastic container, red food coloring, blue ice cubes, paper and colored markers or crayons.

### **SET:**

What if we were going to plan a class picnic on the playground for one day next week. What are some things we would need to consider before we picked a day? (response, *Look for words indicating weather.*) We would probably want to know which day would have the best weather for us to be outside. Today we will learn about thunderstorms, weather and some conditions that make weather change.

### **INSTRUCTION:**

**Kinder and 1<sup>st</sup>: Emphasis on: heat moves up and cold moves down. When hot air meets cold air thunderstorms will form.**

When a cold air front meets a warm air mass (and vice-versa) thunderstorms tend to form (like what happened when it rained on Halloween this year).

There are several things that can decide what our weather will be like. One is TEMPERATURE, which is how hot or how cold the atmosphere (air) around us is. Thunderstorms, hurricanes, lightning, rain and wind are all factors of weather that we are familiar with. There are some other important things that we've heard the weatherman talk about that we really may not understand. Some of these words are air mass, warm front, cold front, stationary front, and high or low pressure system. (If available use weather maps to demonstrate). Today we are going to learn how thunderstorms form

***For older students:*** An air mass has nearly horizontally uniform temperature and moisture conditions. This means that for a long distance, at the same altitude, the temperature will be the same. It may be hot air (Tropical mass) cold air (Polar mass) moist air (Maritime) or dry air (Continental). Weather forecasting is based on information about air masses, high-low pressure systems and the movements of fronts. Air masses travel east across the United States. Different air masses meet along the way, but they usually don't mix. The surface between the different masses is called a **FRONT**. The forward edge of a cold air mass is called a **COLD FRONT**. The forward edge of a warm air mass would be a **WARM FRONT**. Sometimes cold and warm air masses stay in one place for a while. They do not move. When they don't move, they are called **STATIONARY FRONTS**. This means the weather will not change for awhile.

Sometimes weather forecasters will say something about **high pressure** or **low pressure**. These pressure areas are important to weather forecasters because certain kinds of weather can be expected with each kind of pressure area. Because cool air is heavier than warm air, the barometric pressure would go up when a cold air mass moved in. The weather in a high pressure area (cold air mass dominant) is usually fair. Most of the time high pressure means no clouds and fair weather. Because warm air is lighter than cool air the air moving up would make a low pressure area (warm air mass). This also makes clouds. Most of the time, a low pressure area means bad weather, because the warm air mass is unstable.

All of the above affects the temperature. During all of this, there would continue the water cycle: (Water in the air as gas) **evaporation** (Water that can be seen, becoming water that cannot be seen) and **condensation** (Water that cannot be seen, becoming water that can be seen as clouds) and then **precipitation** as rain.

### ACTIVE PARTICIPATION:

#### Let's make a storm!

1. Fill the plastic container two-thirds full with lukewarm water
  2. Let the water sit for one minute.
  3. Place a blue ice cube at one end of the plastic container.
  4. Add three drops of red food coloring to the water at the other end of the plastic container.
  5. Watch what happens.
- What did you see happen? Draw a picture of what you saw happen in your thunderstorm experiment.

### CLOSURE:

The blue and cold water sinks while the red and warm water rises. This happens because of *convection*. The blue water from the ice cube represents the cold air mass and the red water represents the warm, unstable air mass. A thunderstorm is caused by unstable air and convection plays an important part. A body of warm air is forced to rise by an approaching cold front therefore thunderstorm's form.

- Pretend you are the meteorologist on the news and give your forecast to your team.