

Activity 7
Weather Maps and Fronts
Level 1

Objective:

Students will use symbol knowledge learned from previous lessons to read and understand warm and cold fronts on a weather map.

National Science Education Standards: All students should develop an understanding of: properties of earth materials and changes in earth and sky.

Teacher Note: The activity website is located at <http://www.uni.edu/storm/activities/level1/>.

Engage:

1. Ask your class how many have ever watched a weather forecast program on television.
2. Have them share the kinds of things that weather maps and forecasts show and tell viewers.

Explore:

1. Access the US Fronts map at the activity website and display it to the class.
2. Ask the class if any of the students know what the red and blue lines/symbols represent. Some might know these are cold fronts and warm fronts.
3. Have your students draw these fronts on their copies of the accompanying USA map.
4. Ask students to predict how these lines might help determine what parts of the country are having cool or cold temperatures and what parts of the country might be having warm or hot temperatures.

Explain:

1. Tell the class that the lines with blue triangles are cold fronts, or the front edge of cold air that is moving across the country.
2. Tell them that the red semicircles are warm fronts, or the front edge of warm air that is moving through parts of our country.
3. Explain to the students that the fronts are moving in the direction the triangles and semicircles point.
4. If a front has both red semicircles and blue triangles pointing in opposite directions, this is a stationary front. The warm air is forced to move one direction, and the cold air is being forced to move in the opposite direction. A stationary front represents a kind of tug-of-war contest with no winner.

Extension:

1. Have students present the predictions they made in Explore question 4.
2. Access the US Temperatures and Fronts map.
3. Have students study the image and the relationship between fronts and surface air temperatures. Ask what they observe.
4. Have students write cold or cool on their maps where colder temperatures are located.
5. Have students write warm or hot on their maps where warmer temperatures are found.

6. Tell students that cold air is located “behind” cold fronts, and warmer air is found “ahead” of cold fronts and “behind” warm fronts.
7. If there is a stationary front on the current map, ask students to find a relationship between the front and warm and cold temperatures.
8. Access the Satellite and Fronts map. Have students try to determine some kind of relationship between fronts and clouds. Repeat this several days in a row to see if their prediction is indeed a true relationship.

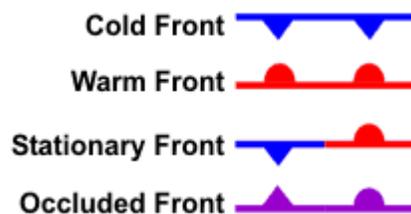
Evaluate:

1. Have students write a current weather report about fronts and temperatures.
2. Collect student map sheets, monitor discussions and weather reports, and collect stories.
3. Display the temperature map *without fronts* on it and print the map. Direct students to draw at least one front by looking at the temperatures. Have them tell what kind of front they identified. This can be done in large or small groups.

For Further Inquiry:

Challenge students to make a weather forecast for an area that is ahead of a cold front or warm front. Have them design an investigation to answer this or any other question they might have about weather fronts.

Science Background:



Fronts

Fronts are the boundaries between two air masses. Fronts are classified as to which type of air mass (cold or warm) is replacing the other. For example, a cold front demarcates the leading edge of a cold air mass displacing a warmer air mass. A warm front is the leading edge of a warmer air mass replacing a colder air mass. If the front is essentially not moving (i.e. the air masses are not moving) it is called a stationary front.



Cold Front

Fronts don't just exist at the surface of the earth, they have a vertical structure or slope as well. Warm fronts typically have a gentle slope so the air rising along the frontal surface is gradual. This usually favors the development of widespread layered or stratiform cloudiness and precipitation along and ahead of the front. The slopes of cold fronts are steeper and air is forced upward more abruptly. This usually leads to a narrow band of showers and thunderstorms along or just ahead of the front, especially if the rising air is unstable.

Cold fronts typically move faster than warm fronts, so in time they "catch up" to warm fronts. As the two fronts merge, an occluded front forms. In the occluded front, the cold air undercuts the cooler air mass associated with the warm front, further lifting the already rising warm air.

Fronts are usually detectable at the surface in a number of ways. Winds usually "converge" or come together at the fronts. Also, temperature differences can be quite noticeable from one side of the front to another.

