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Highs, Lows and Patterns in the Wind

STORM Project

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Activity 10
Highs, Lows and Patterns in the Wind
Level 1

Objectives:

1. Students will learn that H is the symbol for high pressure and L is symbol for low pressure on weather maps.
2. Students will properly identify areas of high pressure and areas of low pressure on current U.S.A. surface maps.
3. Students will begin to develop an understanding of weather associated with high pressure and low pressure areas.

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

Teachers Notes: For this activity you will need internet access or copies of the maps found at the activity website <http://www.uni.edu/storm/activities/level1/>.

Engage:

1. Ask the class whether they ever watch the weather reports on television.
2. Has anyone ever heard the weather person talk about Highs and Lows?
3. Where do they see the Highs and Lows?

Explore:

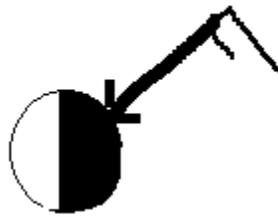
1. At the activity website, access the US Fronts and Pressure Centers map. .
2. Have students observe the map. Ask them to share things they notice about the highs (H) and lows (L) on the map. (*Students might notice such things as L's are colored red and H's are blue on the map. They might also notice that the fronts are connected to L's but the H's have no fronts connected to them.*)
3. Now have them look out the window and check what they see.
 - a. What is the weather outside right now?
 - b. Ask students if they think their area is closer to a High (H) or Low (L).

Explain:

Explain to students that near areas of low pressure (L's) air pushes down on the ground with less force than it does in areas of high pressure. You might relate this to something they are familiar with, such as bicycle tires or automobile tires that are soft have low air pressure in them. Tires with high air pressure are hard. The same is true for balloons or inflatable water toys.

1. Hand out copies of the Station Plot and Fronts map for students to observe.
2. Ask students if they can see any patterns of how the wind blows around Highs and Lows.

3. Have students draw arrows on the wind barbs using the method shown below. This was also done in the activity, “Which way does the wind blow?”
4. Have them do this for the station models around a well-developed low pressure\ and a high pressure area. The arrows can be longer than the wind shaft. It is important that students understand the wind is entering that weather station the from the direction of the arrow. (In the drawing, the arrow represents a northeast wind.)



5. If enough arrows are drawn into the station circles, students should see some kind of pattern of wind flow around Highs and Lows.
6. The arrows around the Lows should indicate a counterclockwise wind direction. Around Highs the general direction of the wind flow is clockwise.
7. You may have to explain clockwise and counterclockwise to the class

Extend:

1. Display the US Satellite Fronts/Lows image.
2. Ask students to observe the locations of clouds.
3. Ask what relationship they see between Lows, Highs, Fronts and cloud cover.
4. Have them locate their state, and ask whether they think they are closer to a High or Low pressure center. How does the current weather outside seem related to the locations of US Clouds, fronts, and pressure centers?

Evaluate:

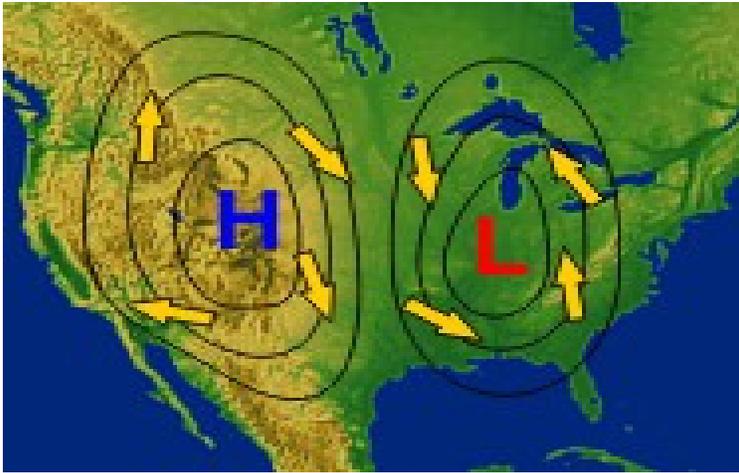
1. Have students access weather maps showing H’s and L’s from the activity website for several days in a row. Each day record the positions on the attached USA map. After several days, ask students to describe the motion of the systems across the USA.
2. Collect student maps and monitor discussions.

For Further Inquiry:

Ask students how they think Highs and Lows move across the country. Have students design an investigation to answer this or any other question they might have about high and low-pressure systems.

Science Background:

You have probably seen a newspaper surface map marked with H's and L's which indicate high and low pressure centers. Surrounding these "high" and "low" are lines called isobars. "Iso" means "equal", and a "bar" is a unit of pressure so an isobar means equal pressure. We connect these areas of equal pressure with a line. Everywhere along each line is constant pressure. The closer the isobars are packed together the stronger the pressure gradient is.



Pressure gradient is the *difference* in pressure between high and low pressure areas. Wind speed is *directly proportional* to the pressure gradient. This means the strongest winds are in the areas where the pressure gradient is the greatest.

Also, notice that the wind direction (arrows) is clockwise around the high-pressure system and counter-clockwise around the low-pressure system. In addition, the direction of the wind is across the isobars slightly, away from the center of the high-pressure system and toward the center of the low-pressure system.

