ACTIVITY 4

Wind Direction

OBJECTIVES

Students build wind vanes and use them to determine wind direction.

The students

- discuss how to determine where the wind is blowing from
- construct their own wind vanes
- discuss how wind direction can help predict the weather

SCHEDULE

About 40 minutes

VOCABULARY

wind vane

MATERIALS

For each team of two

1	Activity Sheet 4
1	bead
1	card, Wind Vane
1 piece	cardboard, corrugated, 15 cm × 15 cm
1	dowel
1	marker, felt-tip*
1 pair	scissors*
1	straw, drinking
1	T-pin

For the class

1	chart, Weather Data (from Activity 3)
2 pkgs	clay, modeling
1	compass
1	fan, electric*
1 box	paper clips
1	ruler, dual-scale*
1 pair	scissors*
2 rolls	tape, transparent

*provided by the teacher

PREPARATION

1. Make a copy of Activity Sheet 4 for each team of two students.
2. Divide the clay into sixteen equal-sized lumps.
3. Using the scissors, make a 5-cm (about 2-in.) slit at one end of each straw and make a 2.5-cm (about 1-in.) slit at the other end. Use the stripes on the straw as a guide to align the slits with each other.
4. Each team of two will need a lump of clay, a straw, a pair of scissors, a bead, a Wind Vane card, a piece of corrugated cardboard, a dowel, a T-pin, a felt-tip marker, and access to the tape.
5. Find a place in the classroom where students' wind vanes can be stored when not in use.
6. Familiarize yourself with the compass. The colored end of the needle points north, the other end points south. Practice orienting the compass. To orient the compass, lie it on a horizontal surface away from magnets and electronic devices. Tap on the face to make sure that the needle is

turning freely. Rotate the compass until the *N* on the face aligns with the colored end of the needle.

7 Select an outdoor location away from buildings, trees, and other large objects that may affect the wind where students will be able to test their wind vanes.

BACKGROUND INFORMATION

Wind is caused by air moving from areas of high pressure to areas of low pressure. The moving air brings with it changes in the weather.

In some places winds exhibit relatively stable patterns throughout the year. Such predictable winds that result from global air circulation patterns are called ***prevailing winds.*** For instance, winter storms tend to form off the southeastern coast of the United States and accompany the Gulf Stream up the coast. Regular winds also result from local geography. For instance, near oceans and other large bodies of water, summer winds tend to blow offshore in the mornings and onshore in the afternoons.

In some areas of the country, winds from a particular direction are associated with particular types of weather. For example, in southern California, winds from the north and east come down the mountains and across the desert and are generally hot and dry.

The direction of a wind is the direction from which it blows. For example, a west wind or westerly wind comes from the west.

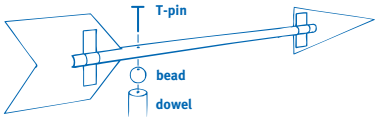
▼ **Activity Sheet 4**

Wind Direction

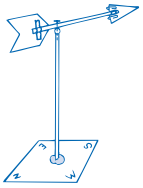
Make a wind vane.

1. Cut out the two shapes on the Wind Vane card.
2. Notice a slit cut in each end of the straw. Fit the tail into the longer slit and fit the head into the shorter slit. Fasten each piece to the straw with tape.

3. Hold the straw so that the head and tail stand vertically. Push the T-pin through the straw about 1 cm (the width of your index finger) from the tail. Feed the pin through the bead and then push it into the end of the dowel. Check that the vane rotates freely.



4. Use the scissors to poke a shallow hole in the center of the cardboard. Do not poke all the way through the cardboard. Attach the wind vane by inserting the dowel into the hole. Press the clay tightly against the cardboard around the bottom of the dowel.
5. If necessary, attach one or more paper clips to the head of the vane so that the head and the tail balance.



Guiding the Activity

Additional Information

1 Ask students, **How do we know when the wind is blowing?**

Students might suggest that the wind blows and moves leaves, trees, sailboats, windsocks, kites, long hair, or hats, and that it makes us feel cooler when the temperature is hot and colder when the temperature is cold.

Ask, **How do we know in which direction the wind is blowing?**

Objects blown by the wind are moved in the same direction that the wind moves.

Explain that weather scientists name the direction of a wind by the direction from which it comes. Tell them that a north wind comes from the north. Ask, **In which direction does a north wind travel?**

A north wind travels south.

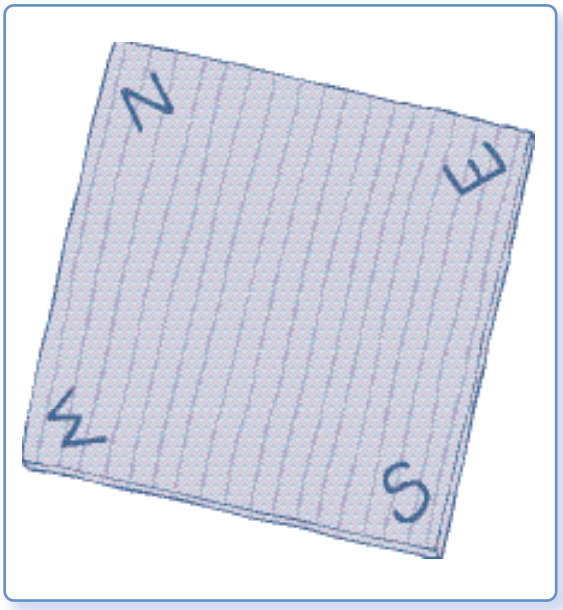
Write the term *wind vane* on the board. Ask, **Who can tell us what a wind vane is? What is a wind vane used for?**

Accept all reasonable answers. Students may know that a wind vane turns in the wind.

Elicit from students or state that a **wind vane** tells us from which direction the wind is coming. Explain that when the wind comes it brings new weather with it. Knowing what direction the wind is coming from can enable us to predict what weather it will bring.

2 Tell students that they will construct their own wind vanes. Divide the class into teams of two. Distribute to each team a pair of scissors, a lump of clay, a drinking straw slit at both ends, a dowel, a T-pin, a bead, a piece of corrugated cardboard, a felt-tip marker, and a Wind Vane card.

Draw on the board a large square and mark the four compass points in the corners (see Figure 4-1). Instruct each team to mark the four compass points in the same corners as shown on the board on one side of their piece of corrugated cardboard. Instruct them to write their names on the same side.



▲ ***Figure 4-1.*** *Compass directions marked on the corrugated cardboard square.*

Guiding the Activity

	Additional Information
3 Distribute to each team of two a copy of **Activity Sheet 4.** Review each step, making sure that each team understands what the tasks are.	
Have student teams construct their wind vanes. Explain that the corrugated cardboard square will serve as a stand for the vane.	*Point out that the side with the compass points should face up.*
4 If weather permits, take the students outdoors with their wind vanes. Bring the compass with you.	*If the weather is too foul or if there is no detectable wind, use the electric fan to simulate windy conditions.*
Orient the compass by laying it on a horizontal surface and slowly turning it until the colored end of the needle aligns with the *N* on the face. Instruct students to align their wind vanes as the compass indicates.	*Circulate among the groups and help students to position their wind vanes correctly.*
5 Explain that the arrow points in the direction from which the wind is coming. For instance, if the head is pointing east, the wind is from the east. Have each team try to determine the wind direction using its wind vane. Ask, **From which direction is the wind blowing today?**	*Answers will vary, depending on actual conditions.*
Ask, **If you knew what the weather conditions in that direction were, what could you predict about the weather?**	*In the next few days, the weather here will be like the weather there today.*
6 Collect the compass and have the students bring their wind vanes back to the classroom. Have the class come to a consensus on the direction of the wind. Invite one student to record the wind direction on the class Weather Data chart (see Figure 4-2).	
Tell students that, beginning with Activity 6, they will be recording wind direction data every day along with their other weather data.	

Guiding the Activity

Additional information

Weather D

Date	Observation	Air Temperature (°C)	Weather Conditions	Air Pressure (millibars)	Wind Direction
Sept. 4	morning	24			
	afternoon	35			
Sept. 5	morning	19	fair	1,010	
	afternoon	25	fair	1,042	
Sept. 6	morning	18	fair	1,031	E
	afternoon	21	cloudy	1,008	NE
	morning				
	afternoon				
	morning				

▲ ***Figure 4-2.*** *Class Weather Data chart with wind direction data.*

Reinforcement

Tell students to look at the trees surrounding them and try to determine from which direction the wind is blowing. One student can hold up a tissue and see if it blows in the same direction as the trees and the wind vanes.

Cleanup

Store the wind vanes in a prearranged place. Return the compass, tape, and paper clips to the kit.

Connections

Science Challenge

Almost 150 years ago, a Dutch scientist named Buys Ballot discovered that there is a direct relationship between a wind's direction and the location of the high-pressure and low-pressure air masses that are causing the wind. This relationship, known as Ballot's Law, is as follows: In the Northern Hemisphere, when you stand with your back to the wind, the low pressure mass is to your left and the high pressure mass is to your right. In the Southern Hemisphere, the locations are reversed.

Take the class outdoors on several days with a noticeable wind so they can try this method of identifying the location of "highs" and "lows." Help them determine the compass direction of each air mass relative to your location. Suggest that they check a television or newspaper weather report each day to see whether the locations they identified are consistent with those given in the report.

Science Extension

Explain that a change in wind direction often is associated with a change in weather conditions. In the Northern Hemisphere, wind from the south or west generally brings warm or mild wet weather, whereas wind from the north or east generally brings colder, drier weather, particularly in winter. After students have recorded wind and weather information on the class chart for a period of time, have them check each wind direction against the general weather conditions on the day or two following it to see whether these patterns are evident.

Tell students that the direction in which a wind is blowing can be changed by cliffs and mountains in its path. Let teams investigate this effect as follows, or do the activity yourself as a demonstration: Build a "mountain" by stacking books in a pile roughly the shape of a pyramid with a flattened top. Position an electric fan about 1 meter from the "mountain" so it blows a strong breeze at and over it. Hold one end of a long strip of tissue paper in front of the fan so the strip streams over the "mountain." Students will see that the strip moves upward on the fan side of the "mountain" and then suddenly moves downward on the opposite side. Explain that these winds, called *updrafts* and *downdrafts*, can be very strong. In mountainous areas, airplane pilots must be careful to avoid these winds.

Science and Language Arts

Students might enjoy reading old myths that attempt to explain winds or other weather conditions in terms of gods and goddesses or other supernatural beings. For example, the ancient Greeks believed that different winds were caused by different gods—Boreas, Zephyrus, and others—controlled by the god Aeolus. In ancient China, dragons were believed to cause rain. The ancient Japanese thought that a god named Fu Jin kept wind in a huge bag and released it in lesser or greater amounts to create winds ranging from soft breezes to fierce gales.

Science and Social Studies

Tell students that many areas of the world have a particular type of wind that affects the region's weather. Encourage students to research the names of such winds and the region in which each is found. Help students find those regions on a world map or globe. Examples include the Santa Ana in southern California, the chinook in the Rocky Mountains, the buran in Russia and Central Asia, the haboob in the Sudan, the harmattan in northwest Africa, the mistral in southern France, and the sirocco in the northern Mediterranean.