



3.2 WIND

OBJECTIVES

The students

- Invent wind direction and speed indicators.
- Use a compass and the sun to determine the direction, north.
- Measure and record wind speed and direction.
- Determine the prevailing local wind direction at different times of the year.
- Record wind speed using the Beaufort Wind Scale.

CLIMATE EDUCATION FRAMEWORK

- 3-5Weather.A.1 By measuring weather conditions (temperature, amount and kind of precipitation, amount and kinds of clouds, wind direction and wind speed), scientists learn how the weather changes from day to day, month to month, and during the year.

BACKGROUND

Students invent and construct wind detectors to find wind speed. This activity provides an opportunity to introduce the Inventors Box. See Appendix A, *DASH Components*. They most often use the angle of a wind detector similar to a flag, windsock, or other detector to estimate relative wind speeds—no wind, light wind, moderate wind, and high or strong wind. In this activity an abbreviated Beaufort wind speed scale is introduced that will help the students quantify wind speed observations. The Beaufort scale allows the students to look at things that are moved by wind to get an approximation of the wind's speed. Then they are asked to invent a wind speed detector that can be standardized using the Beaufort wind speed scale.

Next they invent a wind vane to find wind direction. They learn how to use the body as a compass with the rhyme and song below.

Body Compass Rhyme	Body Compass Song Sung to the tune of <i>When Johnnie Comes Marching Home</i>
Right, rising east. Left, leaving west. Nose north. Seat south.	The sun is rising in the east, the east, the east. The sun is setting in the west, the west, the west. My nose is north, my seat is south, And earth rotates itself about. The sun is rising in the east and setting in the west.

Then the students use a magnetic compass to verify direction and locate north when the sun is not shining. They make their own magnetic compass using a magnetized paperclip in a piece of Styrofoam that floats in a plastic dish of water.

STUDENT ROLES

Inventor
Meteorologist

MATERIALS

cardboard
wire
nails
wood blocks
wood dowels, chopsticks, or skewers
yarn or light weight string
hammer
plastic pen tops
waterproof or duct tape
cork or Styrofoam
plastic dish
paperclips
magnet
pliers
scissors
magnetic compass
plastic wrap
Working Dictionary
Weather Data Book or Chart
Student Page 3.2A BEAUFORT SCALE
 3.2B WIND DIRECTION
 3.2C DAILY WIND DATA

PRODUCTS

Wind speed detectors
Wind vanes
Daily data on wind speed and direction
Working definitions for wind, wind direction, and wind speed

PROCEDURES

1. **On a windy day very early in the year introduce the activity.**

Ask such questions as:

- How do you know when it is windy? What do you see? What do you feel?
- Does the wind always feel the same? How is it different?
✓Get at the idea that the wind can be gentle, strong, etc.
- What do you see when there is a strong wind? Gentle wind?
✓Have them identify things in the environment that move with the wind like flags, trees, etc. Contrast how they look or move with different kinds of winds.
✓Introduce the term, *wind speed*, as the way scientists describe different wind strengths—how fast the wind is blowing.

2. **Introduce the Inventor’s Box and have the students individually or in small groups design and construct wind detectors, tools to measure how hard or fast the wind is blowing. Have them test their inventions in various wind conditions. Have them share how their wind detectors react in different wind speeds.**

3. **Introduce the Beaufort Scale to the class using Student Page 3.2A BEAUFORT WIND SCALE.**

Working outside, have the students

- Agree on the speed of different wind gusts.
- Agree on the average wind speed—the speed most of the time.

4. **Have the students try to use their devices to measure wind speed and standardize them using the Beaufort scale. Encourage them to modify their devices as needed.**

5. **Discuss the measurement and recording of wind speed. Select or build a class wind detector. Begin to collect and record wind speed data.**

Ask such questions as

Where should your wind detector be placed to measure wind speed?

When should wind speed be observed?

Where should this wind speed data be recorded?

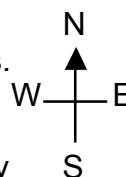
- Add this data to the daily weather data record. Use SP 3.2C Daily Wind Data if desired.
- Add this job to the Responsibility Chart.
- Have the students design logos for the different wind speeds.
- Post a copy of SP 3.2B Beaufort Scale with logos in the Weather Data Center.

6. Ask the students how they can find the directions north, south, east, and west.

- Work to the idea of using a magnetic compass.
 - ✓If no compass is available, have students construct a compass using a magnet, straightened (2-inch) piece of a paperclip, and a small piece of Styrofoam. Remember to rub the magnet along the length of the paper in only one direction, NOT back and forth. When it can pick up a small paperclip, it is sufficiently magnetized. Insert into the Styrofoam and float in a plastic bowl of water.
- Ask the students how else they can find directions.
 - ✓Work toward using the sun's position in the sky.
- Teach the Body Compass Rhyme and Song.

7. Help the students explore wind direction.

- What does it mean when someone says there is a north wind? A west wind?
 - ✓Work to the idea that the wind is coming *from* that direction.
- Have students work in groups of four to simulate wind directions.
 - Have each group make a simple compass rose labeling the directions north, south, east, and west on a sheet of paper.
 - Have each student or student group make a wind detector by tying a 4-8 inch piece of yarn or string to a pencil, skewer, or chopstick.
 - Place the compass rose on the floor.
 - Assign each group member a wind direction.
 - Have them arrange themselves around the compass rose so they face each other.
 - Have the “North Wind” blow on a wind detector.
 - Ask the students to observe and report on the direction of the string.
 - ✓It will flow toward the south (in the opposite direction).
 - Repeat for the other three cardinal (S,E,W) directions.
 - Combine 2 groups to form groups of eight.
 - Add and label the ordinal (NE, NW, SE, SW) directions to the compass rose.
 - Assign each of the 8 group members a cardinal or ordinal direction.
 - Have them arrange themselves around the compass rose so they face each other.
 - Have the “Southwest Wind” blow on a wind detector.
 - Ask the students to observe and report on the direction of the string.
 - ✓It will flow toward the northeast (in the opposite direction).
 - Repeat for the other seven directions.
- Ask if anyone has ever seen a wind vane? What does it tell you?



8. **Show the students an example of a wind vane and have them work alone or in groups to design wind direction finders. Use the Inventors Box or have them collect the materials from home.**
Have them consider that
 - The vane should move freely through 360 degrees.
 - The free movement can be produced by a nail turning in a solid sleeve. (Pen top, test tube, etc.)
 - The base needs a compass rose similar to the one on the Student Page 3.2B WIND DIRECTION.
 - They can cut out and attach a compass rose or label the base of their wind vane with a waterproof marker.
 - They need to take into account that wind direction will have to be taken on rainy as well as dry days.
✓Work to the idea of covering paper or cardboard parts with plastic.
 9. **Have the students make and test their wind vanes.**
Have them
 - Orient their wind vanes first using their body compass and then with a magnetic compass.
 - Observe that the wind vanes act differently when they are placed next to buildings than when they are in the open.
 - Agree upon a common location where the wind direction (and speed) will be taken each day.
 10. **Have the students plan and begin to record the daily wind direction in the Wind Center in the class weather book or chart. Use SP 3.2C Daily Wind Data as desired.**
 11. **Have the students write a working definitions for wind, wind direction, and wind speed. Put these in the Working Dictionary.**
 12. **At the end of each month review the wind speed and wind direction data with the students. See Activity 3.6 Monthly Weather Summary.**
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EXTENSION

- Have the students investigate ways that wind speed is measured by meteorologists.



**BEAUFORT
WIND SCALE
SP 3.2A**

Name: _____

Date: _____

SCALE	MPH	INDICATORS	KIND	LOGO
0	0-1	Smoke goes straight up.	Calm	
1	1-8	Smoke drifts sideways. Leaves move gently.	Slight Breeze	
2	8-13	Leaves and twigs move.	Gentle Breeze	
3	13-19	Small branches move. Dust and paper flies.	Moderate Breeze	
4	19-24	Water ripples. Small trees sway.	Strong Breeze	
5	25-38	Large branches move. Tree trunks bend. Walking is difficult.	Strong Wind	
6	39-75	Twigs break off. Shingles get torn off. Trees uprooted. Widespread damage.	Wind Storm	
7	Over 75	General disaster.	Hurricane Tornado	



**WIND
DIRECTION
SP 3.2B**

Name: _____

Date: _____

