

Investigation Three – Wind

Standard II Students will understand that the elements of weather can be observed, measured and record to make predictions and determine simple weather patterns.
Objective 1 Observe, measure, and record the basic elements of weather.
Intended Learning Outcomes <ol style="list-style-type: none">1. Use science process and thinking skills2. Manifest scientific attitudes and interests3. Understand science concepts and principles4. Communicate effectively using science and language and reasoning

Standard II

Objective 1

Background Information

Wind is one of the elements of weather. It is the movement of air that be felt against our face and body. We can see the effects of wind by the movement of objects. The direction, temperature, and speed of wind can help us predict changes in the weather.

Pre-Assessment/Invitation to Learn

Read this story and then ask questions afterwards.

“Bill crouched low, peering through the willows at the grazing antelope. It tugged gently on the tips of the young grass shoots, pawed loose from an earlier digging. Dad had instructed him to always stay downwind of animals when tracking and trying to get closer to them. The antelope’s head rose at the sound of a snapping twig underfoot as Bill cautiously ventured closer. He noticed tumbling dark clouds overhead. The distant thunder momentarily broke his concentration. He recalled his mother’s caution that a calm, peaceful evening could quickly change with little warning with an approaching storm.

Bill could feel the wind pick up around him. How strange it seemed to stand so close and not be seen by the antelope. The large drops of rain splattered on his coat as he tried to get closer. A sudden boom of thunder echoed in the canyon, startling the unsuspecting antelope. Bill watched as it leaped out of sight. With great excitement, Bill returned to camp having successfully tracked and gotten close to the antelope.”

- What carried the sound of a snapping twig?
- How could thunder be heard so far away?
- What brought in the storm so quickly?
- How was Bill able to get so close to the antelope?

If you said air and wind, you are correct. Earth is surrounded by a protective blanket of air that is constantly moving. Moving air is called wind. You might feel a calm, gentle breeze on your face on a lazy summer evening, or experience the ravaging fury of a thunderstorm. Wind can cool you off when you're hot, or fuel forest fires caused by summer lightning.

Instructional Procedure

Activity 1 – Make a Wind Vane

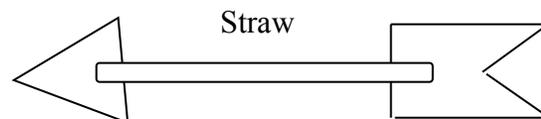
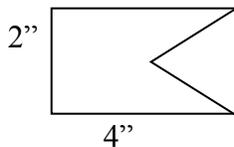
How do you observe the direction of the wind? Do you notice leaves as they are blown in the fall season? How important is knowing the wind direction when flying a kite? Wind vanes have decorated barns, houses, and other public buildings for centuries. They turn with the wind, showing the direction the wind is coming from. You may have seen windsocks at airports or used as colorful decorations on people's homes. By observing wind vanes, meteorologists know a wind's direction and can predict how this moving air will change the weather conditions in an area. Wind is what brings us storms. By knowing the direction and speed of wind, we are able to forecast the weather. Right now we are going to make a wind vane.

(This can be done individually or as groups.)

Materials

- 4 x 6 inch index card
- Ruler
- Straight pin
- Plastic drinking straw
- Unsharpened pencil
- Clay – round about the diameter of a quarter
- Marker
- Directional Compass
- Fastening device (stapler, tape, or glue)
- Paper clips

1. On the 4 x 6 index card, draw a vertical line that divides the card into a 4 x 4 inch piece and a 4 x 2 inch piece.
2. Cut the card into pieces. The smaller piece will be the front and back of the wind vane and the larger piece will be the base.
3. Make an arrow in the smaller piece as illustrated below, and then cut the arrow out. The leftover card is the back fin.



4. Tape, staple, or glue the arrow and the fin on the ends of the straw as shown on the previous page.
5. Stick the straight pin through the straw near the back fin so the arrow is balanced.
6. Stick the same pin into the eraser head of an unsharpened pencil so the arrow will spin.
7. Paper clips may be added near the arrowhead of your vane to balance your straw.
8. With the 4 x 4 card, draw two straight lines to opposite corners. Where they meet is the center of the card.
9. Label the corners on your card – N for North, S for South, E for East, and W for West.
10. Place your clay in the center of the 4 x 4 card.
11. Place the unsharpened end of the pencil in the clay so the wind vane will stand up.
12. Find a spot outside away from any building. Hopefully the wind is blowing.
13. Place a directional compass on top of your 4 x 4 direction card. Locate magnetic north and turn your paper so the North lines on the card lines up with the compass arrow.
14. The arrow will turn toward the blowing wind telling where the wind is coming from.

Activity 2 – Make a Wind Speedometer (Anemometer)

Along with wind direction, meteorologists measure wind speed is a measure of how fast the air is moving. It is measured using an instrument called an anemometer. As the spinning cups of an anemometer turn, the speed of the wind is determined. Knowing wind speed helps meteorologists forecast the upcoming weather, or how long the same weather will remain in an area. Right now we are going to make a wind speedometer that will tell us approximately how fast the wind is blowing.

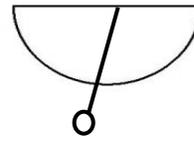
(This can be done individually or as groups)

1. Copy the paper protractor and the wind speed converter for each Student in the class and pass them out. Have the students cut them out.
2. Glue the paper protractor to a 5 x 8 piece of cardboard (Straight edge at top of card).
3. Cut a piece of string or thread ten inches long and tape one end to the ping-pong ball and the other end tape to the center of the straight edge at the top of the card.
4. Glue the wind speed converter to the back of the cardboard, making sure it is upright.
5. Go outside and determine with your wind speedometer how fast the wind is blowing.

Materials

- 5 x 8 cardboard
- Glue
- Scissors
- Light-weight string or thread
- Tape
- Ping-pong ball
- Paper protractor

- With your left (or right) shoulder to the wind, hold the wind speedometer in front of your round edge of the protractor closest to the ground.
- Check the angle of the ball and thread.



- Look at the converter chart on the back of the cardboard. Find the angle on the left side of the chart. Look at the next column to the right on the same row and record what the wind speed is.

Activity 3 – Observing and Recording Wind Data

Meteorologists are weather scientists that observe and forecast weather. Wind is one of the important weather conditions they study. Knowing wind direction and wind speed can help them predict how and when the weather will change. We will observe the wind each day with our instruments just like a meteorologist. We will record the wind direction and wind speed for a few days.

Materials

- Wind vane
- Wind speedometer
- Paper to record the wind direction

- After assembling the wind vane and wind speedometer, explain to them how they work before they go outside. Possibly you can demonstrate them with a hair blower or a fan.
- Go outside and observe the readings of the wind direction and wind speed. Discuss the observations.
- Keep a daily chart of the wind direction and speed for several days.

Curriculum Extensions

Science –

- Construct a tornado using a pool hose. Make it about four feet long, Whip it above your head like a lariat and the end of the hose will lift up light things off the floor through the hose. (ILO 1)
- Refer to the Beaufort Wind Speed Scale to measure the wind speed from visual Clues. (ILO 1)

Language Arts –

- Research and report on the effects of severe windstorms on people and property. Many incidences are found in past newspapers, magazines, and www.ksl.com. (Standard VIII, Objective 6)

Assessment Suggestions

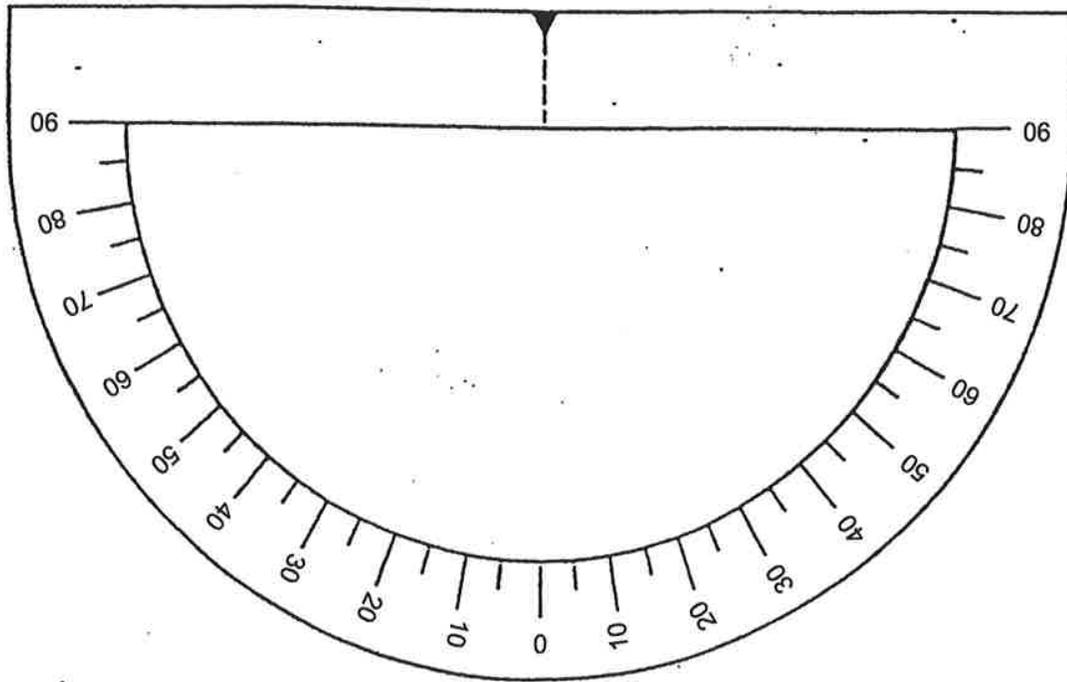
- Check the student journals for accuracy of recording information.
- Use the test item pool assessment.

Resources

- Students can bring in newspapers with daily weather maps and forecasts. They can also check weather Web sites (www.ksl.com) for current wind readings and forecasts.
- Check schools and local libraries for books on weather.
- Check district media centers for videos about weather. There are also commercial weather videos available.
- Utah's Weather Guide by Dan Pope and Clayton Brough (News4Utah), 1997.

Homework & Family Connections

- Students with Internet connections at home can be asked to visit weather Web sites.
- Students can be assigned to watch the evening weather forecast on one of the TV news channels.
- Students can demonstrate information about wind as part of a school science fair.
- Some families may want to purchase an anemometer for home use.
- If the tools and materials are available, make a real weather vane out of wood and other materials. Put it somewhere outside so it can be seen for observation.



Wind Speedometer Converter

Degrees on the Protractor	Wind Speed in Miles Per Hour
0	0
5	9
10	13
20	19
30	24
40	29
50	34
60	41
70	52

Beaufort Wind Scale

FORCE	NAME	WIND MPH	DESCRIPTION
0	Calm	Less than 1	Air is still; smoke rises straight up
1	Light Air	1-3	Smoke drifts; flags hang still
2	Light Breeze	4-7	Smoke drifts with the wind
3	Gentle Breeze	8-12	Flags and leaves move gently
4	Moderate Breeze	13-18	Loose paper blows
5	Fresh Breeze	19-24	Waves on water
6	Strong Breeze	25-31	Umbrellas blow inside out
7	Moderate Gale	32-38	Hard to walk into the wind
8	Fresh Gale	39-46	Branches ripped off trees
9	Strong Gale	47-54	Roof and chimneys damaged
10	Whole Gale	55-63	Trees snapped in half
11	Storm	64-73	Cars turned over
12	Hurricane	74 and above	Buildings destroyed