

Placing a Turbine Near Your Home

Introduction:

This experiment provides students with the opportunity to identify and apply wind speed and wind altitude. Students will collect their own wind data to determine where around their home they would place a wind turbine based on available wind speeds at different directions and heights.

Objectives:

- Develop a strategic approach to gathering data
- Understand the relationship between wind speed and wind direction
- Understand the relationship between wind speed and wind altitude
- Analyze data from around your home

Before the Lesson:

Ask students to hypothesize which side of their house would be best to place a wind turbine. In addition, ask them to guess if it will be windiest at ground level or at roof level.

Materials: (Use the pinwheel lesson to create a pinwheel)

Pencil with eraser

Pinwheel template

Thumb tack

Compass

Stop watch or wrist watch

For the Teacher:

Wind Speed:

Wind speed is affected by a number of factors and situations. Ultimately, variations in wind speed are caused by changes in atmospheric pressure. Jet streams and weather conditions are key contributors to these changes in pressure.

Wind Direction:

Wind direction is the direction in which wind originates. A wind vane is the most commonly used instrument that measures wind direction. Students will be able to see which direction (during the week of their experiment) produces the most wind for their wind turbine. Due to changes in the weather and atmosphere, these answers will vary.

Wind Altitude:

Wind speed typically increases with increasing heights. Wind flow near the surface is often reduced due to obstacles that serve as wind blocks. Natural landscape features and man-made obstructions are examples of obstacles that reduce wind speeds near the ground. Therefore, students should find that higher altitudes have higher wind speeds.

Energy Education for Students

Placing a Turbine Near Your Home

Lesson:

1. Using the pinwheel lesson, construct a pinwheel.
2. Color one blade of your pinwheel in a bold color (black or red).
3. Draw a diagram of your house. Be sure to include the items around your home that may block wind such as trees, shrubs, fences, etc.
4. Using a compass, label the north, south, east, and west sides of your home.
5. Select one site from each direction where you will be conducting your experiment and mark this location on your map.
6. Stand in place in the location that you have selected on your map with your wind measuring device.
7. Place your device in the air (facing the designated direction N,S,E,W) and note the amount of times the pinwheel spins by counting the bold turbine blade. Using your stopwatch, record for 1 minute. Repeat this portion 3 times a day (try to test once in the morning, afternoon, and evening) for one week and record results.
8. Use your device at ground and a higher level three times a day for 7 days (try to record in the morning, afternoon, and evening).

* NOTE: If weather does not permit outdoor data collection add this to your data sheet (i.e. rain)

Assessment:

1. What time of the day was windiest? What do you think is the reason for this?
2. Which direction (N,S,E,W) would you place a wind turbine at your home and why?
3. Is there only one good location or are there several locations that would work? Explain.
4. Was it windiest near the ground or at higher altitudes? Why do you think that this is?

Hometown WindPower Education for Students

Placing a Wind Turbine Near Your Home

Wind Direction

North Side of Home

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Morning							
Afternoon							
Evening							

East Side of Home

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Morning							
Afternoon							
Evening							

South Side of Home

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Morning							
Afternoon							
Evening							

West Side of Home

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Morning							
Afternoon							
Evening							

Wind Altitude

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Ground							
Morning							
Afternoon							
Evening							
Roof/High							
Morning							
Afternoon							
Evening							