

Measuring the Wind Lesson Plan

Consumers Energy's *Measuring the Wind* Lesson Supports the Michigan Grade Level Content Expectations and Common Core State Standards

<i>Kindergarten</i>
SCIENCE
Inquiry Analysis and Communication <ul style="list-style-type: none">○ S.IA.00.12 Share ideas about science through purposeful conversation○ S.IA.00.13 Communicate and present findings of observations
Inquiry Process <ul style="list-style-type: none">○ S.IP.00.11 Make purposeful observation of the natural world using the appropriate senses○ S.IP.00.12 Generate questions based on observations
SOCIAL STUDIES
Geography Environment and Society <ul style="list-style-type: none">○ K-G5.0.1—Describe ways people use the environment to meet human needs and wants
ENGLISH LANGUAGE ARTS
Writing Standards (W) Research to Build and Present Knowledge <ul style="list-style-type: none">○ W.K.8—With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question
Speaking and Listening Standards (SL) Comprehension and Collaboration <ul style="list-style-type: none">○ SL.K.2—Confirm understanding of a text read aloud or information presented orally or through other media by asking and answering questions about key details and requesting clarification if something is not understood○ SL.K.3—Ask and answer questions in order to seek help, get information, or clarify something that is not understood○ SL.K.6—Speak audibly and express thoughts, feelings, and ideas clearly
Language (L) Conventions of Standard English <ul style="list-style-type: none">○ L.K.1 – Demonstrate command of the conventions of standard English grammar and usage when writing or speaking

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First Grade

SCIENCE

Inquiry Analysis and Communication

- S.IA.01.12 Share ideas about science through purposeful conversation
- S.IA.01.13 Communicate and present findings of observations

Inquiry Process

- S.IP.01.11 Make purposeful observation of the natural world using the appropriate senses
- S.IP.01.12 Generate questions based on observations

SOCIAL STUDIES

Public Discourse, Decision Making, and Citizens Involvement

P4.2 Citizen Involvement

- 2 – P4.2.2 Participate in projects to help or inform others

ENGLISH LANGUAGE ARTS

Writing Standards (W)

Research to Build and Present Knowledge

- W.1.8—With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question

Speaking and Listening Standards (SL)

Comprehension and Collaboration

- SL.1.3—Ask and answer questions about what a speaker says in order to gather additional information or clarify something that is not understood

Language (L)

Conventions of Standard English

- L.1.1 – Demonstrate command of the conventions of standard English grammar and usage when writing or speaking

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Second Grade

SCIENCE

Inquiry Analysis and Communication

- S.IA.02.12 Share ideas about science through purposeful conversation
- S.IA.02.13 Communicate and present findings of observations

Inquiry Process

- S.IP.02.11 Make purposeful observation of the natural world using the appropriate senses
- S.IP.02.12 Generate questions based on observations

SOCIAL STUDIES

Public Discourse, Decision Making, and Citizens Involvement

P4.2 Citizen Involvement

- 2 - P4.2.2 Participate in projects to help or inform others

ENGLISH LANGUAGE ARTS

Writing Standards (W)

Research to Build and Present Knowledge

- W.2.8—Recall information from experiences or gather information from provided sources to answer a question

Speaking and Listening Standards (SL)

Comprehension and Collaboration

- SL.2.3—Ask and answer questions about what a speaker says in order to clarify comprehension, gather additional information, or deepen understanding of a topic or issue

Language (L)

Conventions of Standard English

- L.2.1 - Demonstrate command of the conventions of standard English grammar and usage when writing or speaking

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Lesson Outcome

Students will identify how wind speed is important for wind energy. They will use a simple visual to help them understand how the wind is collected and analyzed in order to find a site to host wind turbines. They will discuss how wind energy is growing in Michigan and how it can be used to help our environment and the state's need for energy.

Rationale / Purpose for Lesson

This lesson will provide students an opportunity to take a look at how wind turbines are sited using a simple homemade anemometer to measure the winds speed. Students will learn that electricity can be dangerous and hurt them if they don't use it the right way. They will also learn that if they see something dangerous they should tell an adult. Finally, this experiment will reinforce how energy is made using the wind and how much wind speed is needed to produce electricity from the wind.

Resources / Materials Required

- Print off one experimental worksheet below per group of three students
- Compile the supplies in the *What You'll Need* section of the experiment for each group

Anticipatory Set

The main activity of this lesson can be completed either in class or at home depending on time constraints. The lesson works best if students are able to take readings on multiple days because such a simple anemometer will not give much of a reading in low wind conditions. In either case, background information about wind energy should be introduced prior to any measurements being taken. Links to resources from Consumers Energy are below and can help provide background information.

Continue the lesson by discussing how wind speed is important for wind energy. Wind turbines need a constant, average speed of 14 miles an hour for optimal generation. Wind farms are located in windy spots, such as Mason County along Lake Michigan and Tuscola County in the thumb.

Making an anemometer will help students understand that wind speeds can vary from location to location. With this information, students will learn how to harness wind power for

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generating electricity. An anemometer is a device that tells you how fast the wind is blowing. The simple anemometer used in this lesson will allow students to compare relative wind speeds at different locations.

For more information on wind energy see:

The Boy Who Harnessed the Wind: Picture Book Edition

By: William Kamkwamba

ISBN: 0803735111

Procedures

If lesson is being completed at home:

1. Provide students with attached handout.
2. Instruct students to complete this task at least four times in the next seven days. This allows for days when wind speeds are minimal.
3. Once a week has passed, allow students to share their findings with each other.

If lesson is being completed in class:

1. Provide students with attached handout and materials to make the simple anemometer.
2. Time permitting, give students class time on multiple days in order to take readings of wind speed.
3. On the first day, establish partners for recording.
4. If short on time, students can be provided a map of the school with possible sites for wind turbines already determined, citing that those sites are the only allowable ones for safety reasons.

Alternative Options:

- a. Allow students to create their own maps of the school.
- b. Allow students to determine which sites they would like to test with partners.
- c. Work together as a class to determine which sites should be tested.

Once measurements have been taken, allow students to share their findings.

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Closure

Have the students report out on their findings:

1. At what height was the wind the strongest?
2. Were the measurements the same at different times of the day and in different weather conditions?
3. Where would be the best place to put a wind turbine around your house that would produce the most energy and why?
4. Where would be the worst place to put a wind turbine around your house and why?

Additional Resources can be found at www.crosswindsenergypark.com and www.lakewindsenergypark.com, including a short 2 minute 38 second YouTube video clip and photos of turbine construction.

Wind Experiment Around Your Home or School

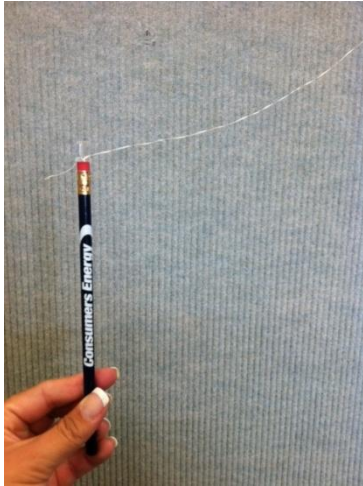
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Question to consider:

1. On which side of the house or school would you put a wind turbine and why?

Materials needed:



- Pencil with eraser
- Thumbtack
- Thread - 25 cm in length
- Paper to record findings
- Protractor
- Compass

Steps:

1. Draw a diagram/map of your house or school. Be sure to draw anything around like bushes, trees, and other items that may block the wind.
2. Label the north, south, west and east sides and mark the sites that represent the areas where you will be testing for wind.
3. Make a device to measure wind strength by pushing a thumbtack into the eraser of a pencil. Tie a piece of thread around the thumbtack.
4. Measure the power of the wind by holding your device in the air and observing the wind blowing the thread. Record the angle of the thread using your protractor. (The larger the angle, the higher the wind energy at that location)

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5. Repeat step 4 several times in a few different locations, at different times of the day, and in different weather conditions.
6. Make a chart to record the time of day, weather conditions, location where you measured the wind, and the angle of the thread at each site.

Conclusion:

- At what height was the wind the strongest?
- Was this the same at different times of the day? In different weather conditions?
- Where would be the best place to put a wind turbine around your house/school that would produce the most energy and why?
- Where would be the worst place to put a wind turbine around your house or school and why?

Adapted from <http://www.need.org/needpdf/IntWindAroundYourHome.pdf>

Date	Time of Day	Weather Conditions	Location	Thread Angle
Ex. 3/31/2011	3:00 PM	Sunny	By the Monkey Bars	Pointing at the Ground