



Wind Power Resources Overview

Standards Covered

Science

2010 Standards

4.4.3 Investigate how changes in speed or direction are caused by forces: the greater the force exerted on an object, the greater the change.

2016 Standards

4.PS.2 Investigate the relationship of the speed of an object to the energy of that object.

4.PS.4 Describe and investigate the different ways in which energy can be generated and/or converted from one form of energy to another form of energy.

3-5.E.2 Construct and compare multiple plausible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

Social Studies

4.1.11 Identify and describe important events and movements that changed life in Indiana in the early twentieth century.

ELA

4.RV.1 Build and use accurately general academic and content-specific words and phrases.

4.RN.1 Read and comprehend a variety of nonfiction within a range of complexity appropriate for grades 4-5. By the end of grade 4, students interact with texts proficiently and independently at the low end of the range and with scaffolding as needed at the high end.

4.RN.2.1 Refer to details and examples in a text when explaining what a text says explicitly and when drawing inferences from the text.

4.RN.2.2 Determine the main idea of a text and explain how it is supported by key details; summarize the text.

Objectives

*Students will be able to use and apply content-specific vocabulary.

*Students will be able to read an informational piece about what windmills and wind turbines have been used for and answer comprehension questions.

*Students will be able to discuss how wind turbines and windmills changed life in Indiana.

*Students will be able to discuss and demonstrate how changes in speed or direction are caused by forces: the greater the force exerted on an object, the greater the change.

*Students will be able to find the main idea of a non-fiction text.

*Students will be able to use the text to infer answers to questions as well as find explicit information in a text.

In-Class Activities

Activity #1

Wind Power Vocabulary Development

Standards

ELA

4.RV.1 Build and use accurately general academic and content-specific words and phrases

Objectives

*Students will be able to use and apply content-specific vocabulary.

Lesson Ideas

Review with students the vocabulary words related to the Early Aviation Exhibit. Students should copy down these words in their science notebooks while the teacher reviews the definitions.

Enrichment

Students should look up the words themselves to find the definitions and write them in their science notebooks.

Differentiation/Accommodation

Students could be given a copy of the Vocabulary List for Teachers to glue into their science notebooks while the teacher reviews the definitions.

Practice/Assessment

Students are given the Vocabulary Activities handout. This can be used as an assessment to gauge student understanding of the words or just as a practice to help students learn definitions.

Resources for activity #1

Vocabulary List for Teachers:

<u>Word</u>	<u>Definition</u>
Windmill	A structure with blades that turn in the wind to generate power to do work such as pumping water or grinding grain
Wind Turbine	A structure with blades that turn in the wind to generate electricity.
Revolution	A complete rotation around

Resources for activity #1

Vocabulary Activities

Match the following vocabulary words with their definition.

_____ Windmill	A.)A complete rotation around.
_____ Wind Turbine	B.)A structure with blades that turn in the wind to generate power to do work such as pumping water or grinding grain.
_____ Revolution	C.)A structure with blades that turn in the wind to generate electricity.

Activity #2

Wind Power Reading Comprehension

Standards

ELA

- 4.RN.1 Read and comprehend a variety of nonfiction within a range of complexity appropriate for grades 4-5. By the end of grade 4, students interact with texts proficiently and independently at the low end of the range and with scaffolding as needed at the high end.
- 4.RN.2.1 Refer to details and examples in a text when explaining what a text says explicitly and when drawing inferences from the text.
- 4.RN.2.2 Determine the main idea of a text and explain how it is supported by key details; summarize the text.

Social Studies

- 4.1.11 Identify and describe important events and movements that changed life in Indiana in the early twentieth century.

Objectives

- *Students will be able to read an informational piece about what windmills and wind turbines have been used for and answer comprehension questions.
- *Students will be able to find the main idea of a non-fiction text.
- *Students will be able to use the text to infer answers to questions as well as find explicit information in a text.
- *Students will be able to discuss how wind turbines and windmills changed life in Indiana.

Lesson Ideas

Have students read the Wind Power article and answer the comprehension questions about what they have read.

Enrichment

Have students research how windmills have been used to generate power.

Differentiation/Accommodation

Students can work in pairs to read the story and work together to answer the comprehension questions. They could have their Wind Power Vocabulary page with them also to help as they read through the text.

Resources for activity #2

Wind Power Student Article

A hundred years ago, many farmers used windmills to provide the power to do many different activities. Before electricity reached the farm, farmers relied on windmills to pump water and grind wheat into flour and also power saws and other farm machines. In 1866, Simeon Flint and David C. Walling founded a company in Kendallville, Indiana that produced windmills. For decades, the signature product of the Flint and Walling Company was a windmill they called Star. It was considered one of the most reliable of its time. Flint & Walling windmills could be seen across the American West and even around the world. Flint and Walling is still doing business from Kendallville. They are an international supplier of water pumps and related equipment.

Today, windmills are sometimes called wind turbines. However, wind turbines are different than windmills. Windmills are used to do work on farms, such as grinding grain. Because of the work it does, a windmill usually has more blades than a wind turbine. Wind turbines are designed to generate electricity that everyone uses. The turbines are connected to electrical generators. When turbines spin, they generate power.

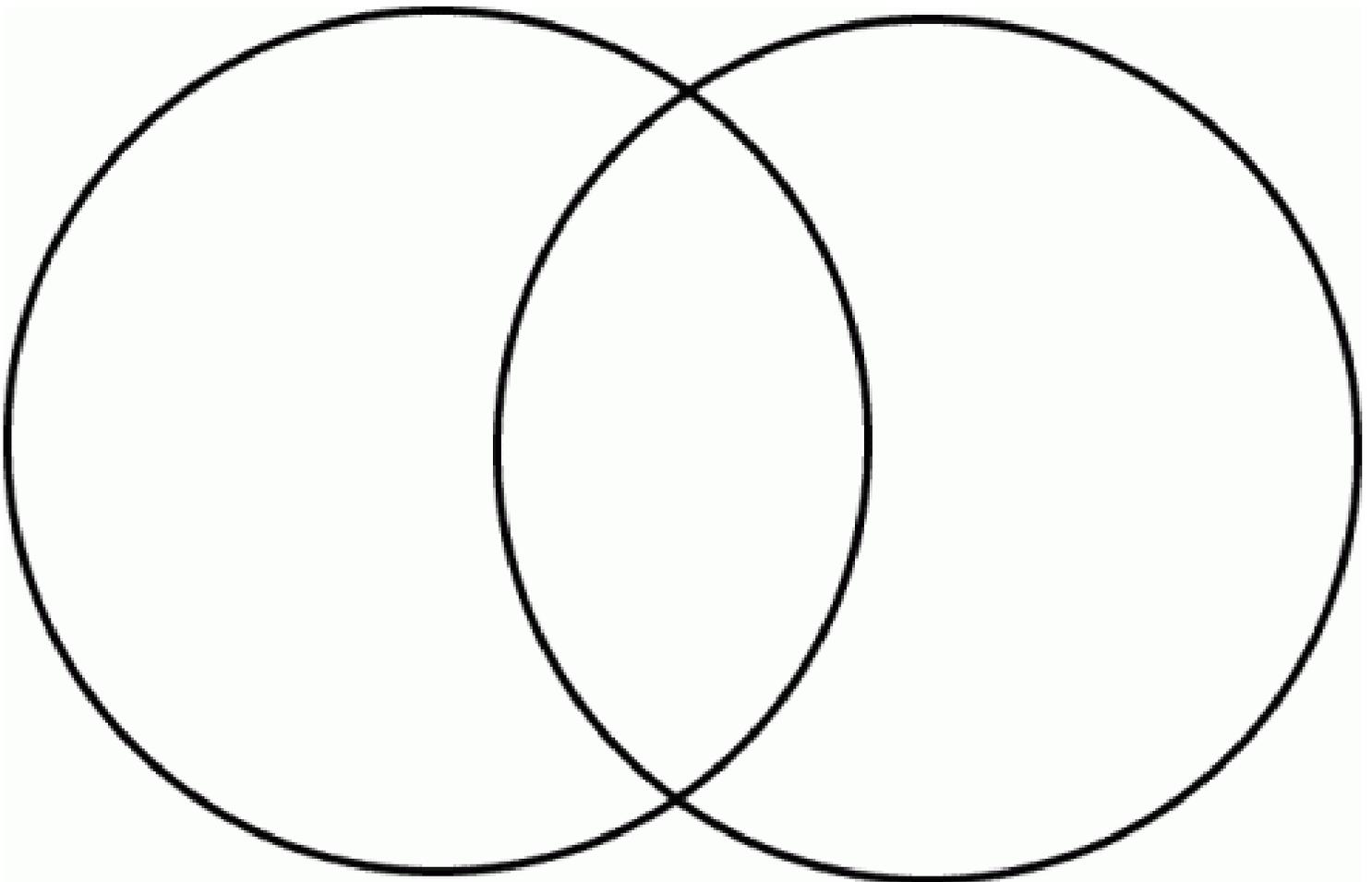
Resources for article #2

Wind Power Article Questions
Answer the following questions using the article

1.) Why did farmers put windmills on their farms?

2.) What do you think is the main idea of this article? Give 2 details from the article that support your main idea.

3.) Fill in the Venn Diagram listing some of the differences between windmills and wind turbines. On the right side of the chart list the characteristics of a windmill. On the left side of the chart list the characteristics of a wind turbine. In the middle put how wind turbines and windmills are similar.



*****Can only be completed if students visited the Wind Power Exhibit in the Create.Connect exhibit. *****

Activity #3

Wind Power Science Connection

Standards

Science

2010 Standards

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2016 Standards

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Social Studies

4.1.11 Identify and describe important events and movements that changed life in Indiana in the early twentieth century.

Objectives

*Students will be able to discuss and demonstrate how changes in speed or direction are caused by forces: the greater the force exerted on an object, the greater the change.

Lesson Ideas

Students should have previously constructed a wind turbine or windmill through the Create.Connect exhibit at Conner Prairie. Students should be able to draw what their wind turbine or windmill looked like and discuss how the construction of their turbine or windmill affected the speed and power/electricity put out by their turbine/windmill. They should also then be able to discuss how wind power changed the lives of people in Indiana.

Enrichment

Have students research the forces that act on wind turbines and have them write a short explanation.

Differentiation/Accommodation

Students could use models of windmills or wind turbines to help them explain how changes in speed or direction are caused by forces.

Resource for activity #3

Wind Power, Windmills & Wind Turbines

In the space below, draw the windmill or wind turbine that you created while in Create.Connect at Conner Prairie. Then answer the question that follows.



1.) How did the number of blades affect the performance of the windmill or wind turbine?

Additional Resources for Wind Power

<http://energy.gov/eere/wind/how-do-wind-turbines-work>

<http://www.in.gov/oed/2413.htm>

<http://learn.kidwind.org/learn>

<http://stem-works.com/subjects/2-wind-energy/activities>

<http://www.need.org/wind>

https://www.teachengineering.org/view_activity.php?url=collection/cub_/activities/cub_earth/cub_earth_lesson_04_activity2.xml