

## Lesson Plan

### Ways to Improve Windmills

**Book:** *Energy Technology Inspired by Nature*

**Series:** Technology Inspired by Nature

**Level:** Navigator

### Objective

To help students explore how scientists combine ideas from many parts of nature to make energy sources more efficient, and to help students practice summarizing a text.

### Supplies

- *Energy Technology Inspired by Nature* book
- Paper and pencils

### Before the Activity

Have students read Chapter 2 (“Animal Power”) of *Energy Technology Inspired by Nature*.

### Activity

Using ideas from nature to solve human problems is called biomimicry. Scientists may look to plants, animals, or even weather for inspiration. Sometimes, scientists use ideas from several different parts of nature to help solve a single problem. For example, scientists are working to make energy technology more efficient. Being efficient means producing more power with less effort. In this activity, students will explore how scientists used several ideas from nature to make windmills more efficient.

Chapter 2 (“Animal Power”) describes three animals that scientists studied. Students should write a short paragraph about each animal. Each paragraph should answer two questions:

- What animal’s ability did scientists study?
- How did scientists use this idea to help windmills produce more energy?

Next, have students turn to page 9 and read the “Inspired by Trees” sidebar. Students should write a short paragraph that answers two similar questions about this sidebar:

- What part of a plant did scientists study?
- How did scientists use this idea to help windmills produce more energy?

**Evaluation**

Collect students' papers and use the attached answer key to give students 5 points per paragraph, for a total of 20 points.

**Standards**

This lesson may be used to address the Common Core State Standards' reading standards for informational texts, grade 4 (RI 4.2) and the National Science Education Standards' Content Standard E, grades K–4.

## ANSWER KEY

### Chapter 2

#### 1. Humpback Whales

Ridges on the front edge of a humpback's fins help the whale swim faster. The ridges make it easy for the whale to cut through the water. Scientists added similar ridges to windmill blades. The ridges helped the windmills move through the air more easily. As a result, the windmills can make more energy with less wind (pp. 12–13).

#### 2. Geese

Geese fly in groups that are shaped like a V. The goose in front pushes air up at the tips of its wings. This air helps lift the other geese. They do not need to use as much energy to fly. Using a similar pattern helps windmills use less energy, too (pp. 13–14).

#### 3. Fish

Some fish swim in schools that are shaped like diamonds. Windmills were placed in a pattern that imitated this diamond shape. The windmill in front created a flow of air. This flow of air helped the windmills in the back of the group spin more easily. As a result, those windmills could produce more power (p. 15).

#### **“Inspired by Trees” sidebar**

A tree's branches help it catch wind. Most windmills have only one generator, but scientists made a windmill that has many branches. Each branch has a small generator at the end. Having many generators helps the windmill catch more wind. More wind means the windmill can produce more power (p. 9).