

Wind Turbine Activity Worksheet

You will be engineering blades for a wind turbine to provide power to a research station on a remote island. You will then test your turbine using a multimeter to see how much power is generated. Once all groups have finished testing, teams will evaluate and modify their designs.

I. Introduction

What does wind get its energy from? _____

Wind turbines convert _____ energy into _____ energy.

List two things you notice about the design changes of wind turbines over history.

1. _____

2. _____

II. Design

Draw your blade design below (all of your blades should be identical).



Describe why you think your design will work using scientific terms.

III. Construction

1. Decide on how many blades you want in the turbine.

Name: _____ Date: _____ Class: _____

2. Trace out the shape of your turbine blades on cardboard.
3. Cut the cardboard using scissors.
4. Attach the blades to wooden dowels using masking tape.
5. Test your blades on the wind turbine.
6. Record your data and add it to the class chart.
7. Copy down other teams' results as they are added to the class chart.
8. Discuss with your group how you can improve your blade design based on how your blades worked.

Blade Design	Number of Blades	Blade Angle	Power
Group 1			
Group 2			
Group 3			
Group 4			
Group 5			
Group 6			
Group 7			
Group 8			

IV. Evaluation

How much power do the scientists need? Did your turbine produce enough power for the entire research station? If not, how many turbines would you need? Complete this section to determine how your turbine design would provide power for the scientists.

Power can be determined by multiplying **voltage** by **current**:

$$\text{Power (Watts)} = \text{Voltage (Volts)} \times \text{Current (Amps)}$$

1 Watt	=	1 Volt	x	1 Amp
1 MilliWatt	=	1 Volt	x	1 Milliamp

Practice Problems:

1. A wind turbine produces 1 volt of voltage and 15 milliamps of current. How much power did it produce? Show your work.

2. A wind turbine produces 2 volts of voltage and 10 milliamps of current. How much power did it produce? Show your work.

Different items use different amounts of power. Pick **two items** from the table below and calculate how many of your wind turbines you would need to power each item. (Remember 1 watt = 1000 milliwatts).

Item	Power
Smartphone	2 watts
Light bulb	50 watts
Laptop computer	25 watts
Stereo	5 watts

Complete each statement (round to the nearest whole turbine):

3. I would need _____ of my turbines to power a _____.

4. I would need _____ of my turbines to power a _____.

Ultimate Question Round 1

Name: _____ Date: _____ Class: _____

The scientists have 5 smartphones, 3 laptops, and 10 lightbulbs and 1 stereo that they want to use. How much power does it take to run all of them at the same time? How many of your turbines would you need to power all of them? (*Round to the nearest whole turbine*).

I would need _____ of my turbines to generate _____ power for all of the scientists' devices.

V. Redesign

Choose **one** variable to change from your original design and write it down below. This can be either the design of the blades, the number of blades, or the angle of the blades.

I am going to change the _____.

Draw your blade design below. If you are testing a different variable, draw the original design.



If you are changing your blade design, explain why you think your new design will work better than the first design using scientific terms. If not, explain why you are keeping the same design.

VI. Re-Evaluation

1. If you are changing the blade angle, decide on two other angles you want to test.

Name: _____ Date: _____ Class: _____

2. If you are changing the blade design or increasing the number of blades, follow steps 1-4 in Part III to build your new blades.
3. Test your blades on the wind turbine.
4. Record your data and add it to the class chart.

Blade Design	Number of Blades	Blade Angle	Power
Group 1			
Group 2			
Group 3			
Group 4			
Group 5			
Group 6			
Group 7			
Group 8			

Ultimate Question Round 2

Name: _____ Date: _____ Class: _____

The scientists have 5 smartphones, 3 laptops, and 10 lightbulbs and 1 stereo that they want to use. How much power does it take to run all of them at the same time? How many of your redesigned turbines would you need to power all of them? (*Round to the nearest whole turbine*).

I would need _____ of my turbines to generate _____ power for all of the scientists' devices.