Hoosier Science and Engineering Fair 2026

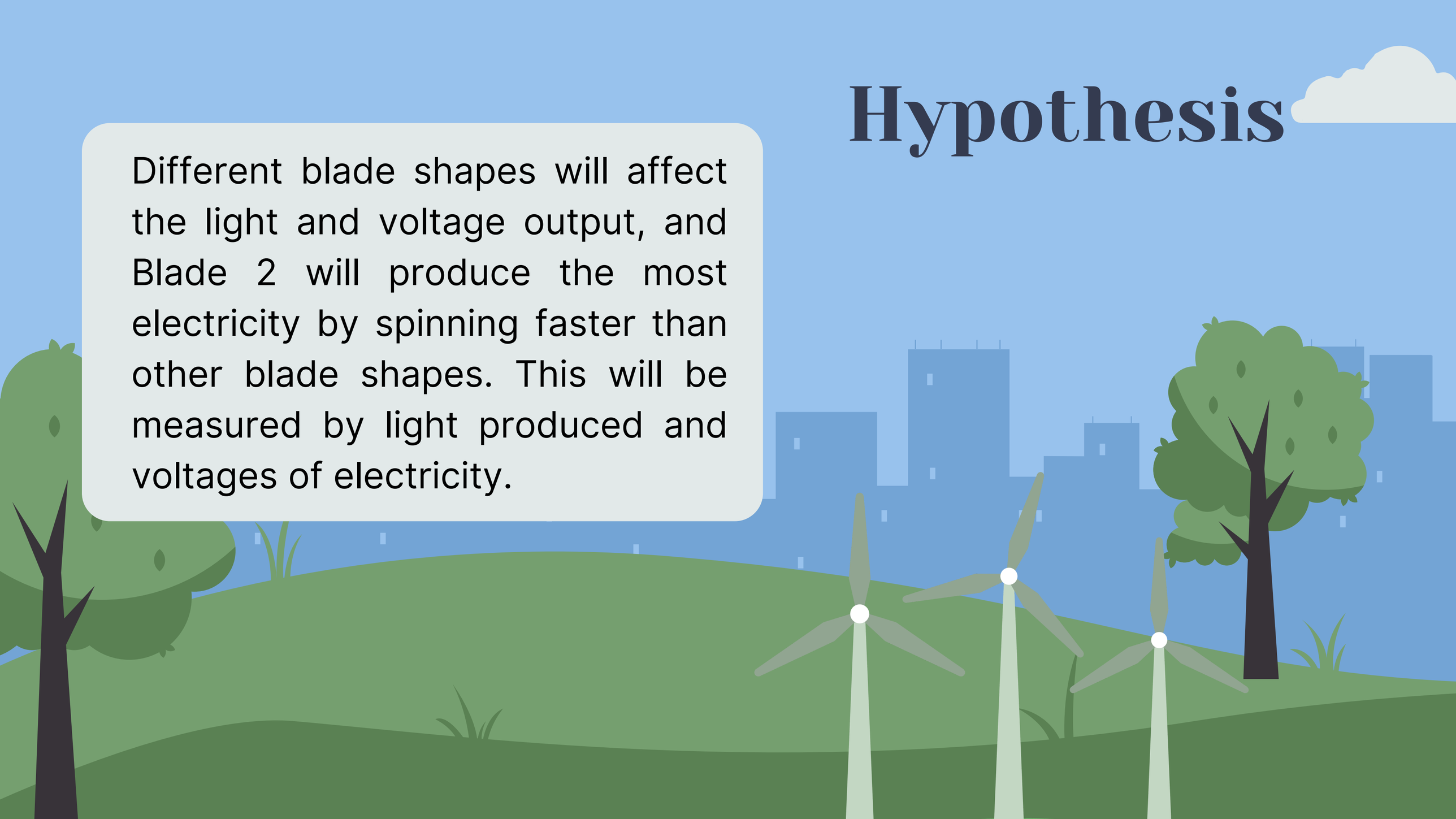
Blade Shape Showdown

By Rosalyn Wallace

What Design Generates the Most Power?

Hypothesis

Different blade shapes will affect the light and voltage output, and Blade 2 will produce the most electricity by spinning faster than other blade shapes. This will be measured by light produced and voltages of electricity.



Research

History

About 1,100 years ago, windmills were invented in Nashtifan using wood, straw, and clay. They were used to grind grain, though wind energy had been used in Persia for over 5,000 years. Early windmills spun on a vertical axis, while modern ones spin on a horizontal axis.

How It Works

Wind turbines make electricity by using spinning blades. Wind moves over and under the blades, creating pressure that makes them turn. As the blades spin, they turn a shaft connected to a generator, which produces electricity. The electricity then travels through power lines to homes. Wind speed and blade shape affect how much electricity is made.

Procedures

Step 1: Assemble a small wind turbine generator and connect it to a
lightbulb.

Step 2: Connect blade 1 and blow a hair dryer on max speed. Observe how
much light shines.

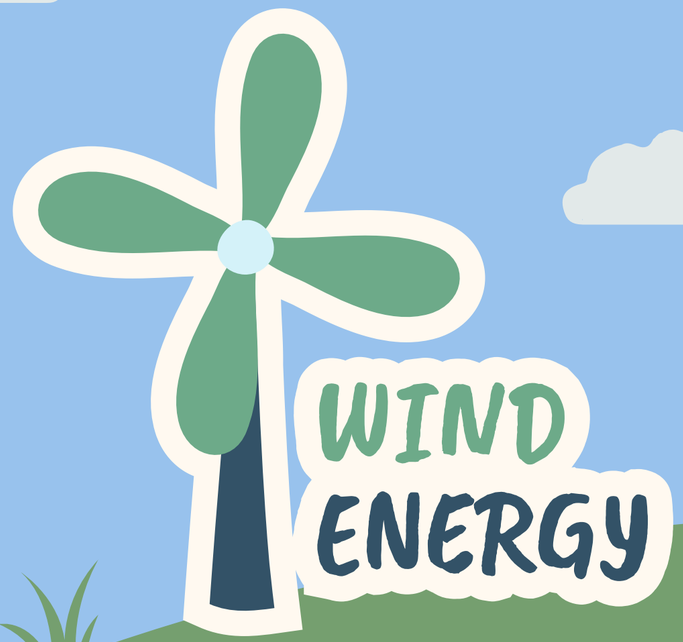
Step 3: Attach voltage reader to rotor plugs and repeat hair dryer blow.

Step 4: Record observations.

Step 5: Repeat steps 2, 3 and 4 for blade 2, blade 3, and blade 4

Step 6: Record conclusion of observations.

Materials



Things I Had to Buy:

- Rotor and generator kit
- Blade designs
- Light bulb
- Wood

Things I Already Had:

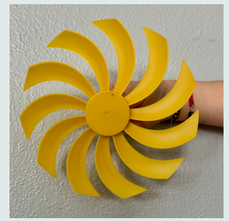
- Glue gun
- Glue sticks
- Hook
- Tape
- Multimeter
- Cardboard

Variables

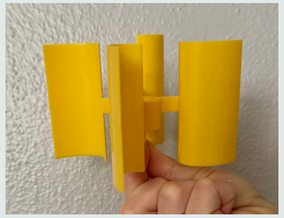
Dependent Variables

Blade 1

Blade 3



Blade 2



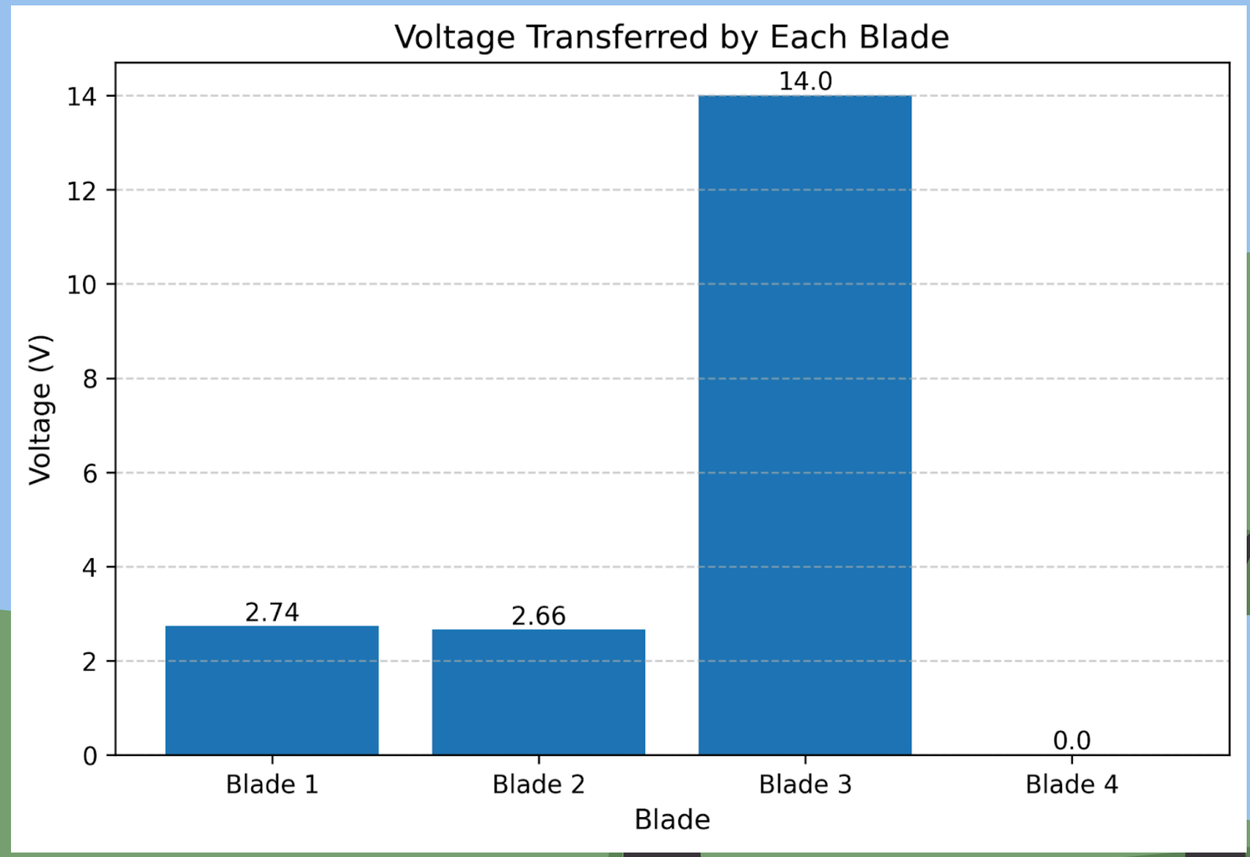
Blade 4

Independent Variables

Voltage
Electricity Output

Observations and Results

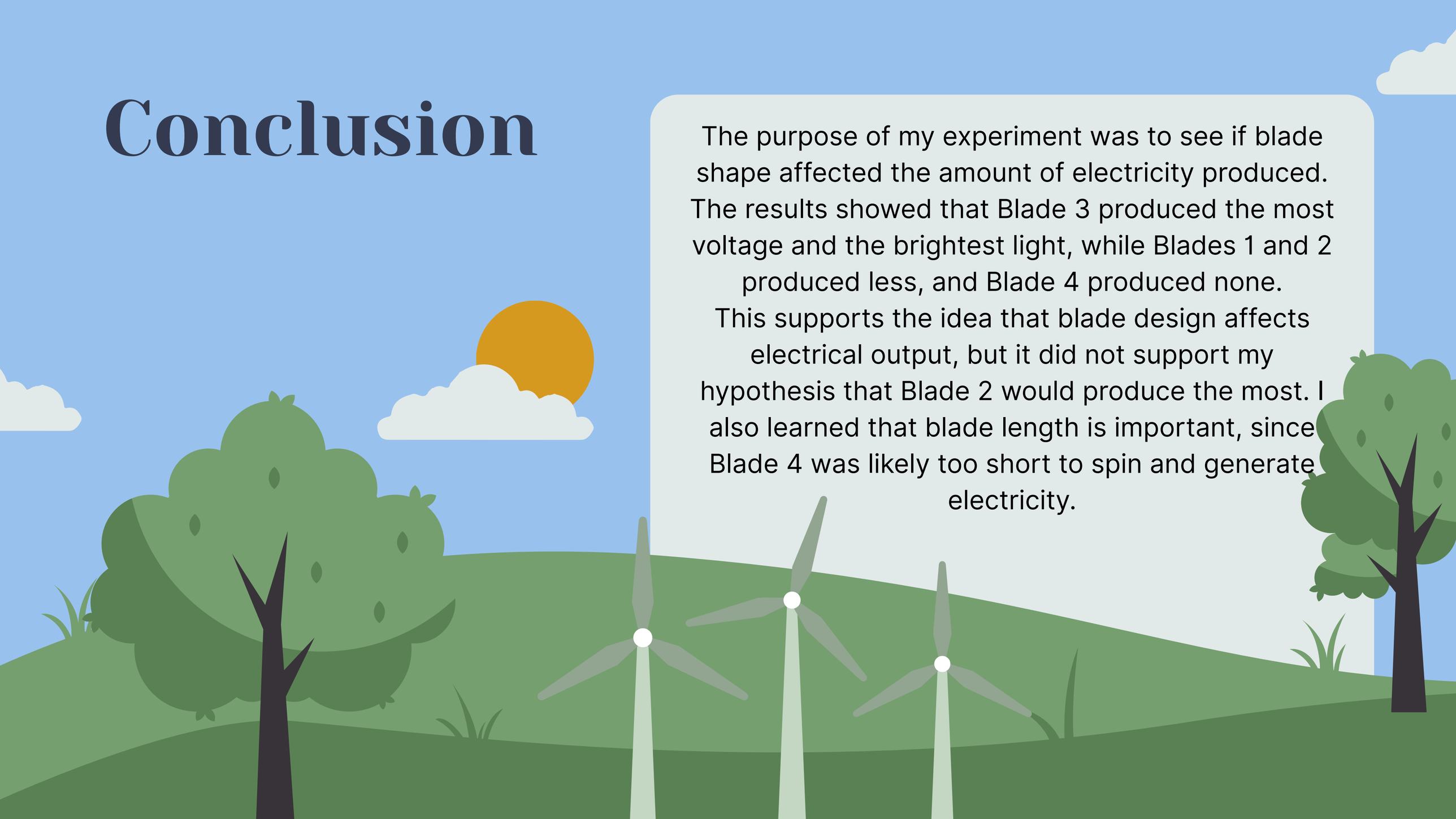
In my experiment, Blade 1 produced a bright light (≈2.74 V) and Blade 2 was slightly dimmer (≈2.66 V). Blade 3 produced the brightest light (over 14 V), while Blade 4 produced no light. The blades on Blade 4 did not spin well, likely because they were too short.



Conclusion

The purpose of my experiment was to see if blade shape affected the amount of electricity produced. The results showed that Blade 3 produced the most voltage and the brightest light, while Blades 1 and 2 produced less, and Blade 4 produced none.

This supports the idea that blade design affects electrical output, but it did not support my hypothesis that Blade 2 would produce the most. I also learned that blade length is important, since Blade 4 was likely too short to spin and generate electricity.



Thank You