INSTRUCTOR INFORMATION

Spin the simpleGEN with Wind

Students will use the wind from a fan to spin a home-made generator and generate electricity. After creating a simple wind turbine to spin the generator shaft, students will change one variable to explore that variable's effect on voltage generated by the turbine and generator.

ESTIMATED TIME

We estimate that this activity will take about one class period, including blade construction and testing with fans. It will go faster if the blades are pre-constructed and if there are more fans and multimeters set up and available

NEXT GENERATION SCIENCE STANDARDS

Disciplinary Core Ideas	Crosscutting Concepts	Science and Engineering Practices
Middle School PS2.B Types of Interactions (MS-PS2) ETS1.B Developing Possible Solutions **High School** PS2.B Types of Interactions (HS-PS2) PS3.A Definitions of Energy (HS-PS3) PS3.C Relationship Between Energy and Forces (HS-PS3)	Patterns Cause and effect Structure and function	Analyzing and interpreting data Constructing Explanations and Designing Solutions

EQUIPMENT TIPS

1. A video showing construction of the simpleGEN is available at www.vernier.com/kw-sgen

2. This activity was designed using a digital multimeter, such as that included in the simpleGEN kit. It is possible to measure the voltage generated in this activity with a Vernier Differential Voltage Probe or a Vernier Energy Sensor with a data-collection interface and software.

3. It is helpful to have already built the generators ahead of time, as it can take a full class period alone to do so. This can be accomplished by completing the experiment "Generate Power" before doing this experiment.

4. It can be helpful to have a set of pre-glued turbine blades, eliminating student use of hot glue.

5. Turbine blades that start near the hub of the wind turbine work well. For best results, the radius of the wind turbine should not exceed the radius of the fan.

6. If available fans have only two speeds, students can omit filling out the "Fan on medium speed" columns of the tables.

DATA COLLECTION AND ANALYSIS TIPS

1. If students do not get a reading from the digital multimeter, they may need to re-sand the ends of the wire so that there is no enamel on the last 2 cm of each wire end.

2. The digital multimeter must be set to measure alternating voltage, as shown in Figure 2.

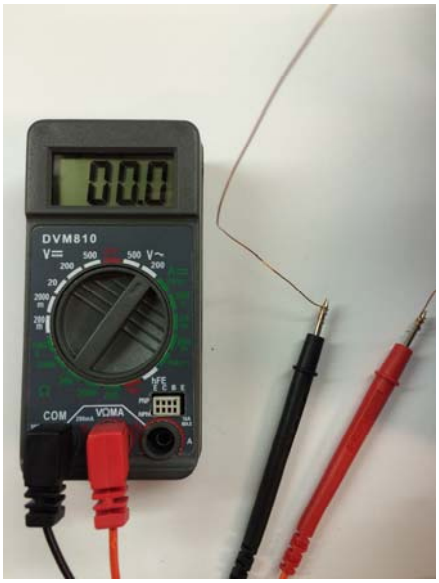

Figure 2

3. If the voltage reading fluctuates, students should watch the values for at least 30 seconds and record the highest value that is repeatedly shown on the multimeter display.

SAMPLE DATA

Total number of turns of wire: 150 Number of magnets in holder: 4

Number of blades: 3 Angle of blades: 20°

Length of blades: 18 cm

Table 1			
	Fan on low speed	Fan on medium speed	Fan on high speed
Voltage reading (V)	0.2	0.3	0.4

Total number of turns of wire: 150 Number of magnets in holder: 4

Number of blades: 3 Angle of blades: 15°

Length of blades: 18 cm

Table 2			
	Fan on low speed	Fan on medium speed	Fan on high speed
Voltage reading (V)	0.6	0.8	1.0

ANSWERS TO ANALYSIS QUESTIONS

1. The higher the fan setting, the more voltage is generated.
2. Answers will vary.
3. Answers will vary.