KS2 Lesson Plan

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Lesson 3	Number of Blades on a Wind Turbine		
Level	Key Stage 2	**Time required**	1 hour
National Curriculum Links Science, Maths, English, ICT (view scheme of work for full details of links)			
Aims • Students will understand how the number of turbine blades affects the wind turbine's output			
Resources required Pen, record sheet (one per group), Wind Turbine Kit, electric fan, safety goggles			
Web search keywords Wind turbine blades, number of blades on a wind turbine			

Task

The students are asked to experiment with different numbers of blades.

Ask the students to set up the Wind Turbine Kit according to the instructions and connect the voltmeter. Set up an electric fan (ideally 15" diameter) as described in the activity sheets.

Instructions are included with the Wind Turbine Kit. These can be downloaded in PDF format from: http://www.ecostyle.co.uk/products/wind_turbine_kit/wind_turbine_kit_activity_sheets_v2.15.pdf

Once the fan is in position, do not move it or the Wind Turbine Kit. Ensure the fan is always used on the highest (fastest) setting. It is important to keep all these settings constant in order to achieve meaningful results.

Explain the task to the students and show them how the rotor blades fit into the rotor hub. They can experiment with different numbers of rotor blades. The possible combinations are 2, 3 or 6 equally-spaced rotor blades. Fitting other numbers or un-equally-spaced rotor blade combinations will unbalance the wind turbine and should be avoided.

It is essential that all the blades are pitched at the same angle, say 45^0

Make sure the students have connected the turbine into the voltmeter. Explain that this simply tells us how much electricity is being generated by the turbine.

Ask the students to record their findings methodically. Test each blade combination at least twice to check and record.

The students will need to record the number of blades they use and the reading on the voltmeter.

Risk assessment

Ensure the rotor blades are pushed firmly into the rotor hub. If the rotor blade spokes become loose, squashing the spoke slightly with pliers will achieve a tighter fit. Safety goggles should be worn by students operating the equipment and by those in the surrounding area.

For your information

The voltmeter reading for 6 blades should be greater than for 3. All turbines are generally made with only three blades. The reason for this is partly economics but mainly aerodynamics. The cost of producing and moving huge blades to remote areas is expensive.

Suggestion

Ask the children to make their own record sheet. However, if you do need a record sheet you can use the one provided. You can also record this information on an Excel spreadsheet and show the children how to generate a graph of how output varies with number of blades. You could put all the results from several turbines onto one sheet.

Extension

Ask the children to represent their data by drawing a graph. Depending upon the age and ability this could be a simple histogram or a line graph.

Conclusion

- Discuss the students' results
- Which combination gives the most efficient energy production?
- Why do they think this setting gives the best performance?

Record Sheet

Number of blades	Voltmeter reading
2	
3	
6	