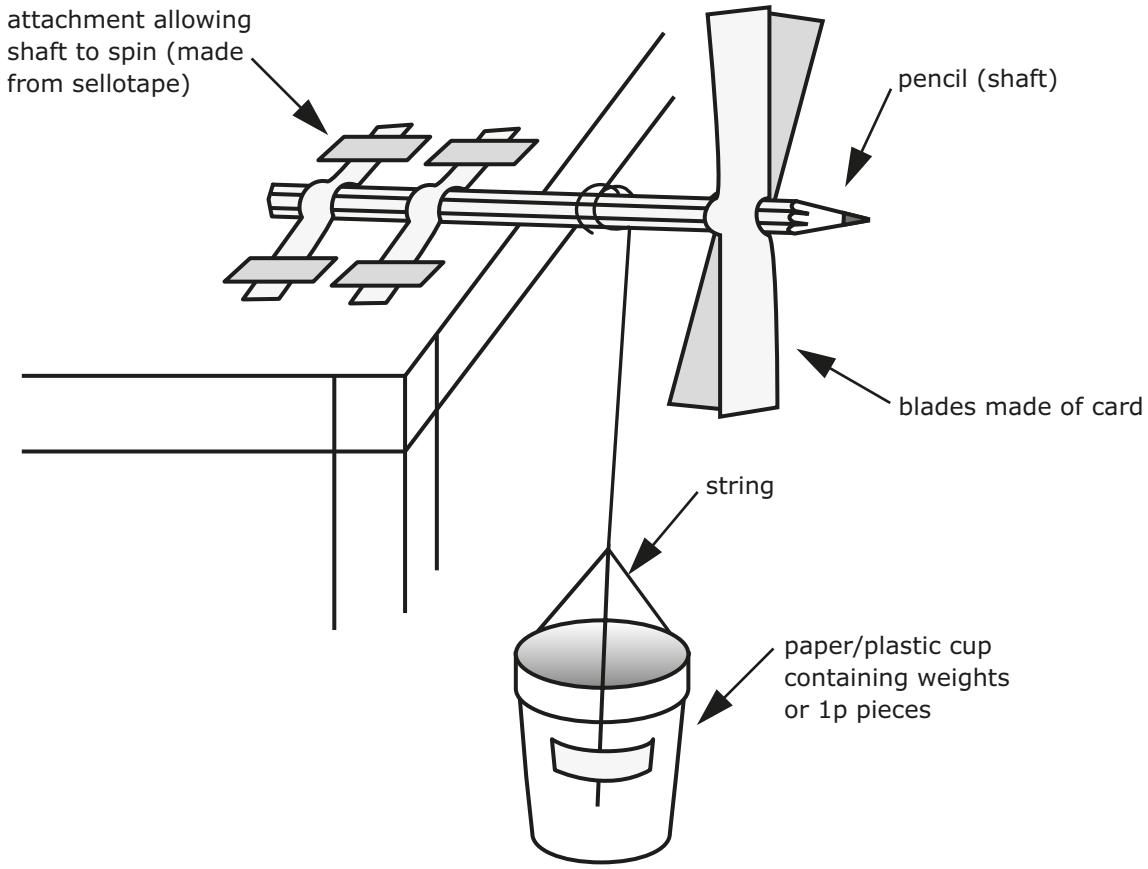
THE WIND POWER CHALLENGE

Ask students to design a simple wind turbine capable of lifting a cup off the floor up to bench height. The winning team will be the one producing a machine that lifts the most weight.

Possible design



EQUIPMENT

For each group set out a tray containing

- ✓ Scrap card
- ✓ Sellotape
- ✓ Masking tape (optional)
- ✓ Pencils
- ✓ Scissors
- ✓ String
- ✓ Paper/ plastic cup
- ✓ Weights (gram weights or pennies)

You will also need at least one hairdryer. Ensure all hairdryers are of the same power rating.

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Running the challenge

Introduce the challenge by discussing how wind power has been used throughout history to power sailboats, mill grain for flour etc. and that now it is seen as one of the solutions to the major problem facing society today – that of producing a sustainable, renewable energy source. Show Practical Action's video on wind power to illustrate how wind is being used to provide renewable energy for a community in Sri Lanka. Hand out copies of the images of different types of wind turbines, compare their design and discuss how they work. The main difference in design is that turbines producing electricity need to spin fast so have fewer (typically three), thinner blades. Those that harness wind power to drive machinery, such as water pumps and windmills, need a higher torque and to be more stable. They generally have a higher number of larger blades.

Set the challenge and discuss the variables that will be involved in making design decisions

- Shape of the blades
- Size of blades
- Thickness of blades
- Number of blades
- How the shaft is attached to the desk

Discuss how the design could be made as sustainable as possible, e.g.

- Reusing scrap material rather than new
- Reducing waste to a minimum (card, sellotape, string)
- Do they need to use a hairdryer?


You could introduce a prize for the most sustainable design as well as the one which lifts the most weight.

Ask the students to think about how they want to make it a 'fair' test. This could include

- Limiting the amount of materials (card, sellotape, string) that can be used for each group
- Ensuring all the hairdryers are of the same power rating
- Ensuring the hairdryer is a fixed distance away from the blades
- Allowing or not allowing students to touch the machine when it is operating

Discuss the design process. Students should be encouraged to research, design, build, test, evaluate then redesign.

Divide the class into groups of about 4 and give them a time limit to complete the challenge, 30 minutes should be sufficient.

When time is up ask each group to demonstrate their machine in turn and briefly describe the process they went through in reaching the final design. Students could present the process they went through to a wider audience using a method of their choice e.g. in the form of a poster or a short video.

This activity is accredited by the British Science Association as suitable to count towards a CREST Star Investigators SuperStar award. For more information about the scheme please visit their website www.britishscienceassociation.org/creststar