



# Wind Can Do Work

## Question

What is the maximum load that can be lifted all of the way to the top of the shaft?

## Materials

- 4-Blade Windmill Template
- 1 Extra long straw
- 1 Small straw
- Masking tape
- 50 cm String or thread
- Paper clips
- Large foam cup
- 1 Straight pin
- Binder clip
- Fan
- Ruler
- Hole punch
- Marker
- Scissors

## Procedure

1. Turn the cup upside down.
2. Cut the longer straw so that you have an 8 cm length, discard the other portion, or share it with another student or group. Tape the regular straw horizontally to the bottom of the cup (which is now the top) so that there is an equal amount of straw on both ends. Set this aside.
3. Prepare the windmill blades using the 4-Blade Windmill Template.
4. Measure 1.0 cm from the end of the small straw and make a mark. Insert a pin through the small straw at this mark. This is the front of the straw.
5. Slide the straw through the windmill blades until the back of the blades rest against the pin. Gently slide each blade over the end of the straw. Secure the blades to the straw using tape.
6. Insert the small straw into the larger straw on the cup.
7. Tape the string to the end of the small straw. Tie the other end of the string to a paper clip. Make sure you have 30 cm of string from the straw to the top of the paper clip.
8. On the very end of the small straw near where the string is attached, fasten a binder clip in place for balance and to keep the string winding around the straw.
9. Place your windmill in front of the fan and observe. Record observations in your science notebooks.
10. Investigate: Keep adding paper clips one at a time to determine the maximum load that can be lifted all of the way to the top. Record your data.

## \* Conclusions

Draw a diagram of the system. Label the energy transformations that occurred in order for work to take place.

## Extension

1. How could you change the design of your windmill to produce more work from the system?
2. What variables can you change in this investigation? Create a new investigation changing one variable at a time.

