ACTIVITY 5: DESIGN A WORKING WINDMILL

Image Credit: Gary Abud, Jr.

The purpose of this activity is for students to design a working windmill that can lift a weighted object.

This type of windmill can be likened to a wind turbine in its design more so than a traditional windmill. However, instead of an electricity generator, it will have a spool of string attached to a weight that coils up as the windmill turns to lift the weight. *Note: you should build a prototype yourself before doing this project to test out the procedure.*

Materials Needed:

- wooden dowels, shish kebob skewers, or chopsticks
- straws (paper or milkshake straws are strongest and better than plastic for this)
- tape
- scissors
- cardboard
- pencils
- toothpicks
- styrofoam cups (8oz or 16oz)
- string
- 1 quart milk cartons
- beans, candies, or other weighted objects
- box fan

First, inform students that they will be working with a group to construct a windmill that can lift weight. Provide them time to research the available materials, plan, and sketch out their windmill designs.*

Then, make materials available to groups and give them work time to build, test, and refine their windmill designs.

Next, provide students an opportunity to test their windmills using the fan. Encourage them to adjust the angle of the blades on their windmill and retest until they achieve an optimal spin angle.

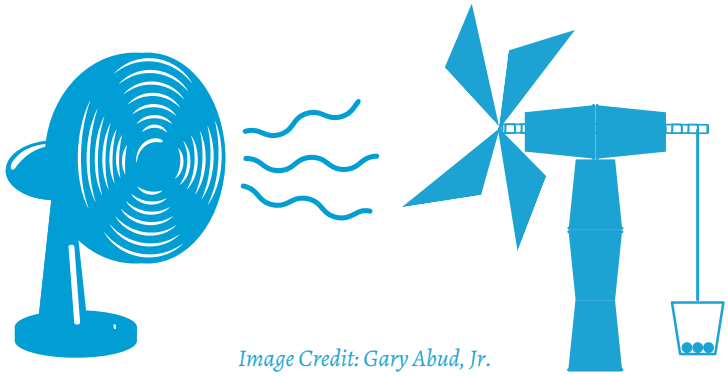
Last, once windmills are complete, and students' designs have been thoroughly tested, it is time to test** their ability to lift weight. Students can fill their "payload" cups with the weighted objects and test out their windmill's ability to lift the weight all the way to the top without breaking or failing.

Students should use a balance/scale to record the mass/weight of the payload that their windmill was able to lift.

For an added challenge, groups can try a heavier load and see if their windmill can lift it when the fan is blowing on it. You can allow groups to retest their windmills until they max out their weight or fail.

**Designs do not have to all look the same way, nor be made of the same materials, but should all be required to satisfy some minimum criteria in terms of size and amount of weight to lift.*

***Teachers can evaluate these sail cart projects and their functionality according to a criteria that best suits the format of their learning setting.*



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