

# MAKEngineering Kit

## Windy Day

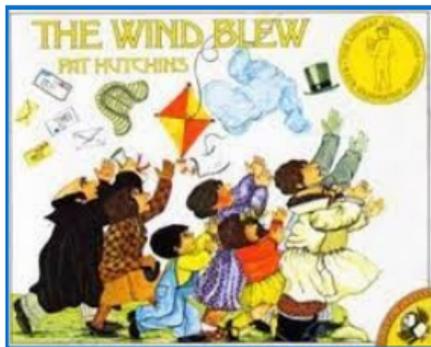
Inspired by *The Wind Blew* by Pat Hutchins



This engineering kit would not have been possible without funding and support from the National Science Foundation.



# ENGINEERING TASK



Read the story about the power of the wind. The wind was so **strong**, it took everything with it – an umbrella, a balloon, scarves, a newspaper, even a wig! What happened when the wind reached the sea?

Do you think there is a way to keep the wind from blowing items away or to generate electricity? Your engineering task is to control and use the power of the wind.

## DID YOU KNOW...?

Wind is a renewable source of energy that means that it can be used over and over again. Wind is created by the sun heating the Earth's surface unevenly. For example, as the heated air above the land rises, the cool air from the water surfaces rushes in to take its place, creating a sea breeze.



For more about where the wind comes from check out this video.

<https://youtu.be/0yXC45dgmSs>

## MATERIALS IN KIT

- ◆ 2 Plates
- ◆ 6 Paper cups
- ◆ 6 Straws
- ◆ 10 Popsicle sticks
- ◆ 6 Wooden dowels
- ◆ 5-6 Push pins
- ◆ 10 Rubber bands
- ◆ Hole puncher
- ◆ Play dough
- ◆ 6 Straws
- ◆ 8 Paper squares
- ◆ ~1 yard of Yarn
- ◆ 1 Plastic Bag

You will also need the following tools—pencils, scissors, fan or blow dryer.

# STEP 1—RESEARCH

There are two popular ways to harness wind power.

1. **Windmills** are a wind-powered device that converts the energy of wind into mechanical energy.
2. **Wind turbines** are a wind-powered device that converts the energy of wind to generate electricity.

To learn more check out the following online sites:  
Britannica Kids, Easy Science for Kids, or Kids Discover

# STEP 1—SUPPORT

Go outside. Use your senses to “see, feel, smell, taste, hear” the wind.

Optional questions to ask:

- ◆ Tell me what you hear and what you feel when the wind blows.
- ◆ What direction is the wind blowing? How do you know?
- ◆ Why do you think is more windy here than there?
- ◆ How strong do you think the wind gets?
- ◆ I wonder when people started harnessing wind to do something for them. What do you think?

## DID YOU KNOW...?

There are instruments to that will show the direction of the wind and measure wind speed.

A wind vane is an instrument used to show the direction of the wind. Where might we have seen a wind vane?

An anemometer is a device used to measure wind speed. The highest recorded wind speed in the U.S. is 231 mph. This was recorded on April 12, 1934 at Mount Washington, New Hampshire.



## STEP 2—PLAN

Design/sketch 2-3 wind-powered projects and make a list of materials for each design. Here are some ideas to get you started (from easy to more challenging).

- ◆ **Pinwheel** (<http://stem-works.com/external/activity/562>)
- ◆ **Windsock** (<https://www.wikihow.com/Make-a-Windsock-for-Children>)
- ◆ **Anemometer** ([https://youtu.be/UFGkVSMLH\\_E](https://youtu.be/UFGkVSMLH_E))
- ◆ **Paper cup Windmill** (<https://youtu.be/AWaOM3uDP80>)
- ◆ **Wind Turbine** (<https://youtu.be/vmM5kO2PjCo>)
- ◆ **Wind-powered Car** (<https://www.stirthewonder.com/diy-wind-car-science-lesson-fine-motor-fun/>)

## STEP 2—SUPPORT

Optional questions to ask during the planning process:

- ◆ What makes each of your designs unique?
- ◆ What do you want to use the wind power for (e.g., keep wigs from blowing off people's head)?
- ◆ What parts will move? What parts will not move?
- ◆ What materials will you need?
- ◆ How might we use \_\_\_\_\_ (e.g., rubber bands)?
- ◆ What were you thinking when designing/sketching the wind-powered project?

# MATERIALS IN HOME—BINGO STYLE

In addition to using materials from the kits, let's find other materials around your home to make your wind-powered project. As a family, work together to find items to complete the bingo card on the next page. As you search for objects, think what kind of parts do \_\_\_\_ (e.g., windmills) have?



Paper-based item	Something that is round or a cylinder but as many of this item as you want.	Something that is flat and sturdy
Random items from a “junk” drawer or recycle bin	FREE SPACE (anything that will help you innovate)	Food container of any kind
Something that will help keep things together	Something that clips	Something that will show your style

## STEP 3—CREATE

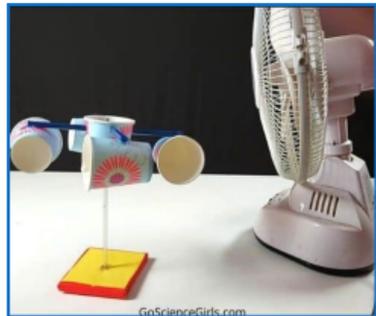
Pick one of your designs from Step 2 and make your wind-powered project.



## STEP 4—TEST

Use a fan or hairdryer to see if your design works.

Place your project in front of a fan or hair dryer. Turn the fan or hair dryer on the lowest speed. What did the wind do to your project? Can you blow stronger wind? Draw or write down what happened.



## STEP 5—IMPROVE

“Changes call for innovation,  
and innovation leads to  
progress.” ~Li Keqiang

As a family of engineers,  
discuss the following:

What are two ways you can  
improve upon your prototype?  
How are these based on the  
results from your testing step?



## DID YOU KNOW...?

There is an entire field of environmental engineering dedicated to figuring out ways to use renewable energy and make our homes and buildings better for the environment. Due to climate change, sustainable engineers are becoming more and more important in protecting our environment for generations to come. Environmental engineers are starting to use wind energy to power homes! As you drive around, be on the lookout for wind-powered structures.

# SHARE THE FUN AND PASS IT ON!

Thank you for participating.

When you are done with this project, gift the book and the directions to your friend to make the idea of engineering keep blowing.

