



Pinwheels and Wind Energy

Round and round it goes! Explore properties of wind and create your own fast-spinning pinwheel. Learn how we harness the power of wind to create renewable energy!

TEKS:

SCI 1.8D: The student is expected to demonstrate that air is all around us and observe that wind is moving air.

SCI 6.7: Matter and energy. The student knows that some of Earth's energy resources are available on a nearly perpetual basis, while others can be renewed over a relatively short period of time. Some energy resources, once depleted, are essentially nonrenewable.

SCI 6.7 A: The student is expected to research and discuss the advantages and disadvantages of using coal, oil, natural gas, nuclear power, biomass, wind, hydropower, geothermal, and solar resources.

SCI 8.10 A: The student is expected to recognize that the Sun provides the energy that drives convection within the atmosphere and oceans, producing winds.

Materials:

- Paper
- Pencil with eraser
- Scissors
- Tape
- Thumbtack or T-pin

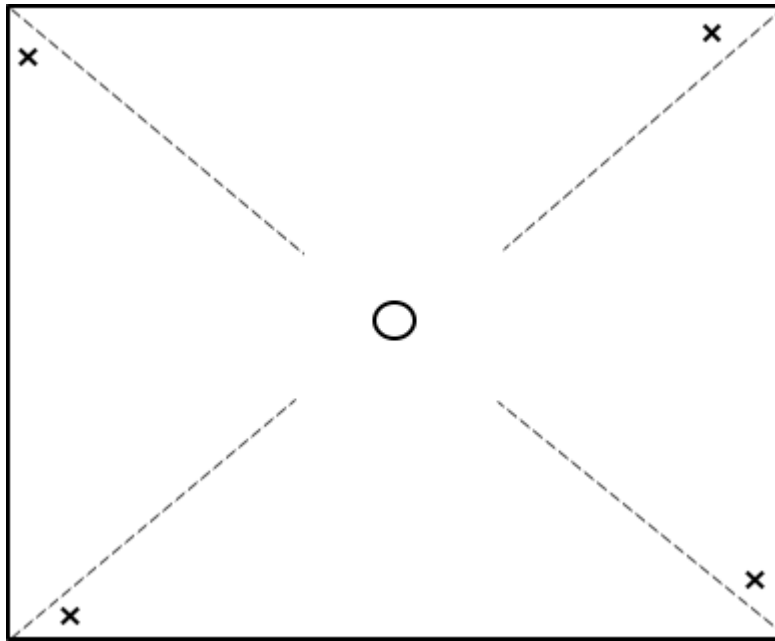
How To:

1. Cut your piece of paper so that it is a square (it can be any size!)
2. Place a rolled-up piece of tape in the center of the paper square, where the circle is in the photo below.
3. Using the photo below as a guide, cut the square from each corner approximately $\frac{3}{4}$ of the way toward the center (along the dotted lines in the photo).
4. Fold the corners marked with x's toward the center and align them over the tape. Press firmly to make sure all four corners attach to the center.

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5. Take a thumbtack or T-pin and push it through the center of the pinwheel. **Safety: an adult should help when using a thumbtack or T-pin.**
6. Poke the thumbtack or T-pin through the side of the eraser that's on the end of your pencil. **Safety: an adult should help when using a thumbtack or T-pin.**
7. Now, blow on your pinwheel, hold it under an AC vent in your house, or take it outside on a windy day and watch it spin!



STEM Explanation:

Wind is air in motion. As the sun warms the Earth's surface, the atmosphere warms too. Some parts of the Earth receive direct rays from the sun all year and are always warm. Other places receive indirect rays, so the climate is colder. Warm air, which is less dense than cold air, rises. Then, cool air moves in and replaces the rising warm air. This movement of air is what makes the wind blow. The power of wind can be harnessed to create energy! Wind power, as an alternative to fossil fuels, is plentiful, renewable, widely distributed, clean, produces no greenhouse gas emissions during operation, and uses little land. Most wind power is collected at wind farms: groups of wind turbines in the same location used for the production of electricity.

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The pinwheel that you created represents a wind turbine! Wind turbines in real life can be over 400 feet tall. As the kinetic energy of moving wind rotates the blades of a wind turbine, a generator inside the turbine is also rotated. This causes a coiled wire to rotate around a magnet and creates an electrical current. The more wind there is, the faster the blades turn, and the more electrical energy will be created by the turbine. Experiment with different types of paper, pinwheel sizes, or holding your pinwheel in different positions. What makes the pinwheel spin fastest?

Did you know that the state of Texas produces more wind power than any other state in the US? In 2019, 22% of the state's electrical power came from wind, compared to 21% from coal. In fact, if Texas were a country, it would be the fifth-largest wind producer in the world!

Career Connection:

Wind energy engineers design wind farm collector systems and analyze the operations of wind farms. They create models to determine layouts of wind farm roads, structures, and equipment. Wind energy engineers ensure that wind farms are constructed properly and have little impact on the environment.

Resources:

<http://www.vies.vi/docs/default-source/resources/pinwheel.pdf?sfvrsn=2>

https://www.ducksters.com/science/environment/wind_power.php#:~:text=Wind%20power%20is%20energy%2C%20such,also%20does%20not%20cause%20pollution

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