Wind Power

Powerful Push

We usually don't notice the air around us.
But when it's moving, air can deliver a powerful push.

Wind is moving air. Its force can blow your hat off your head. It can turn your umbrella inside out. Very strong storm winds can even blow the roof off a house.

We can't control the wind. But people have learned how to use the wind's power. We can use it to sail boats. We can use it to keep kites high in the air. We can even use it to make electricity for our homes. How else can we use wind?

Make a Spin Wheel

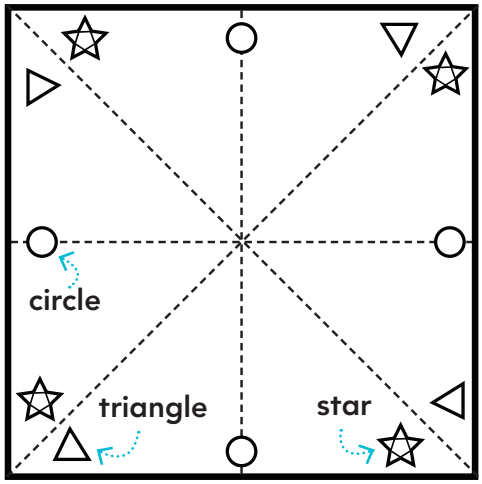
Use wind power to give this toy a push!

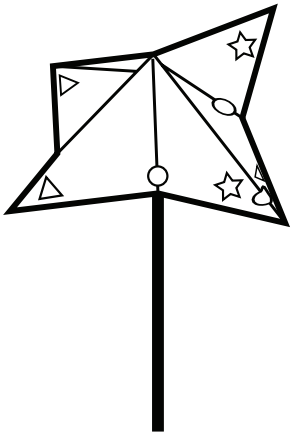
Materials

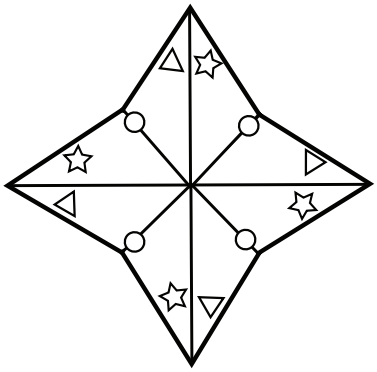
- Spin Wheel directions (from your teacher*)
- pencil
- scissors
- "Make a Spin Wheel" data sheet

1. Make a Spin Wheel. (Your teacher will give you directions.)

2. You can blow air at the Spin Wheel to give it a push. **Predict:** Which parts of the Spin Wheel could you push (or blow) to make it spin?







view from above

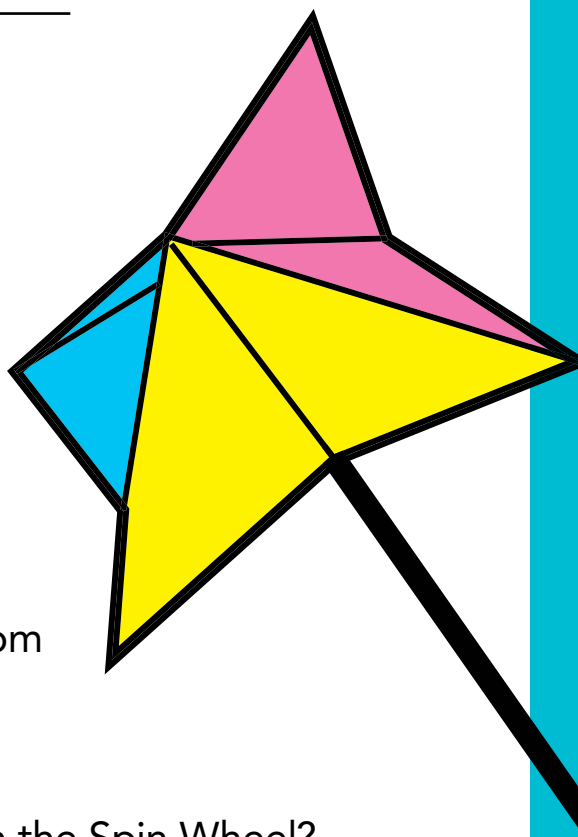
3. Test your predictions. Which worked best to turn the Spin Wheel?

4. Try to make the Spin Wheel turn slowly. Try to make it turn quickly. Tell how you did it. Use the words *push* and *power* in your writing.

* **Teachers:** See Hands-On Hints on page 5.

Name: _____

Make a Spin Wheel



1. Do Steps 1 and 2 of the Task Card.
Predict: Which parts of the Spin Wheel could you push (blow on) to make it spin? Check any of the boxes or none.

- ☐ the stars
- ☐ the circles
- ☐ the triangles
- ☐ straight down on the top
- ☐ straight up from the bottom

2. Test your predictions. Which worked best to turn the Spin Wheel?

_____

_____

3. Do Step 4 of the Task Card. Tell how you made the Spin Wheel turn slowly and quickly. Use the words *push* and *power* in your writing.

_____

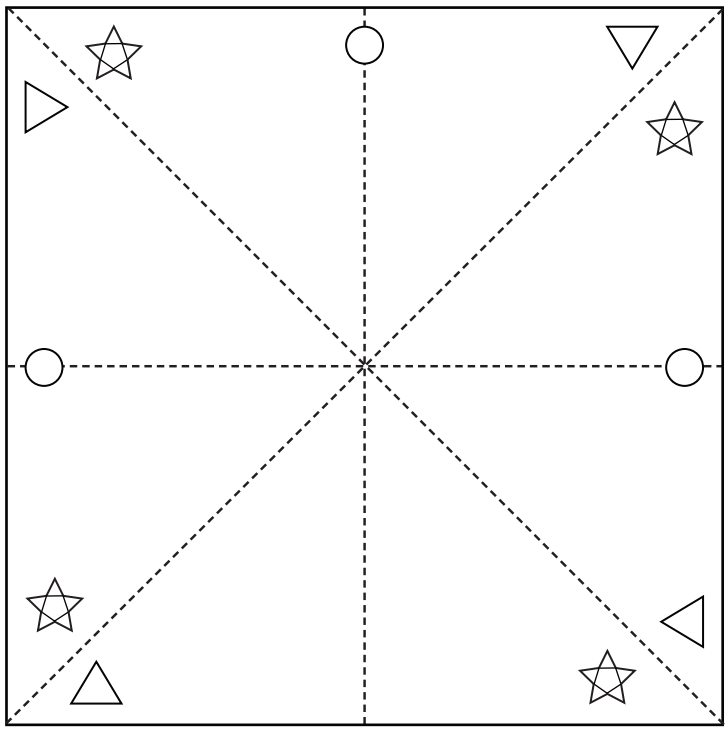
_____

_____

activity

How to Make a Spin Wheel

1. Cut out the square at the bottom of this page.
2. With the printed side up, fold it in half so the bottom edge meets the top edge. Unfold.
3. Fold it in half again so the right edge meets the left edge. Unfold.
4. Flip the paper over so the blank side is up. Fold one corner to its opposite corner. Unfold.
5. Fold so that the other two corners meet. Unfold.
6. Flip the paper over. Gently push on all four circles. The middle of the paper should poke up in a point.
7. Hold a pencil with the tip pointing up. Balance the folded paper on the tip.



Invent a Super Spinner

What would help your toy catch the wind better? Try this!

Materials

- Super Spinner Cone directions (from your teacher*)
- pencil
- scissors
- tape
- inventor's materials: extra paper, index cards, straws, pipe cleaners, egg cartons, plastic wrap, store-bought feathers, what else?
- "Invent a Super Spinner" data sheet

1. Make a Super Spinner Cone. (Your teacher will give you directions.)

2. Put your cone over a pencil point. Blow on it gently. What happens?

3. **Think:** How could you change your cone to make it spin like a Spin Wheel? (**Hint:** You can cut and fold it. You can tape new pieces on to it.) Write down three ideas that might work.

4. Pick one of your ideas and test it. (**Hint:** It's important to keep your changes balanced. If you add things to only one side, the cone will fall off the pencil!) If your idea works, think of ways to make it even better. If it doesn't work, pick a different idea to test.

5. Write about your best design. Why can it spin when you blow on it? Did you run into any problems? How did you fix them?

* **Teachers:** See Hands-On Hints on page 8.

Name: _____

Invent a Super Spinner

1. Do Steps 1 and 2 of the Task Card. What happens when you blow on your Super Spinner Cone?

_____

_____

2. Think: How could you change your cone to make it spin like a Spin Wheel? Write down three ideas that might work.

Idea 1: _____

_____

Idea 2: _____

_____

Idea 3: _____

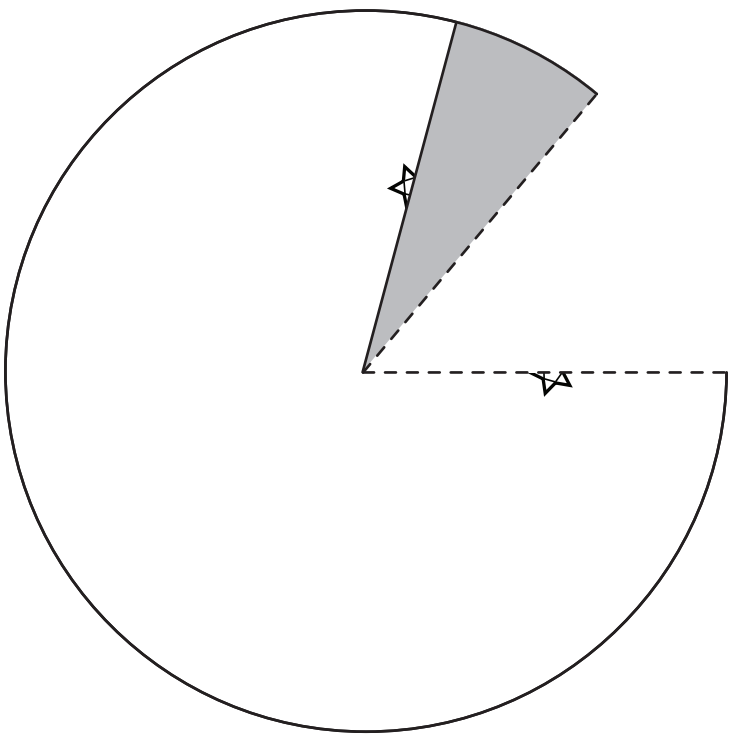
_____

3. Test your ideas. Write about your best design on the back of this sheet.

activity

How to Make a Super Spinner Cone

1. Cut out the circle below.
2. Cut along the dotted line.
3. Line up the cut edge with the solid line. The gray pattern will be covered up. The two halves of the star will line up.
4. Tape down the edge.
5. Look inside the cone for a second edge. Tape that down, too.



Next Generation Science Standards
PS2.A Forces and Motion
PS2.B Types of Interactions
ETS1 Engineering Design

Background

We harness the power of wind as a renewable energy source. Children may have seen *wind turbines*—machines that turn wind energy into electrical energy (see photo below). Wind turns a turbine's blades, which spins a generator inside the turbine to produce electricity.

Hands-On Hints

Task Card 1: Make a Spin Wheel

Print the pattern and directions for the Spin Wheel (page 5 or page 14). Blowing on the stars and triangles (at the tips of the "wings") will work best to turn the Spin Wheel. Blowing on the circles straight down may cause it to turn some. Blowing straight up will send the Spin Wheel flying off the pencil.

Task Card 2: Invent a Super Spinner

Print the pattern and directions for the Super Spinner Cone (page 8 or page 17).

For a Super Spinner to stay on the pencil, its weight must be evenly balanced. Though it is mentioned in the instructions, you may want to talk about balance with children ahead of time. Simply put, *balance* is when something stays in a stable position. It is related to *center of gravity*—the point about which all of an object's weight is evenly distributed. The spinner will stay balanced when its center of gravity is at the same point as its point of support (the tip of the pencil). The easiest way to keep a spinner balanced is to make sure each side of the spinner carries about the same weight. So if children add a feather on one side, for example, they should add another feather or some other object that weighs about the same on the opposite side.

Provide a wide variety of lightweight materials, such as pipe cleaners, straws, and feathers, which are available at craft stores. (Don't use feathers found outside.) Encourage children to think about how to design their Super Spinner to "catch the wind." To allow children to test more ideas, provide additional copies of the Super Spinner. If you print the Super Spinners on card stock, children can use heavier materials.

For optimal results, we suggest following these steps:

1. Introduce the topic by reading aloud the nonfiction acticle. The article helps build background knowledge and provides context for the hands-on activities. You can project it onto your interactive white-board as you read it aloud. There is also a printable version that you can distribute to students so they can read along.

2. Divide the class into small groups. Hand each group a Task Card, and give each student a Data Sheet. (We recommend starting with Task Card 1.) Together with the class, read aloud the steps of the activity to ensure everyone understands what to do. You may also want to have each group conduct an inventory of their materials to make sure they have everything they need.

3. Have students do the activity and record on their Data Sheets.

4. Make sure to leave enough time before the end of the period so you can have a class discussion about the activity. Invite groups to share their findings and results, including any challenges they may have faced.

5. Gather students' data sheets to assess for understanding.

If you plan to continue the unit in your next lesson with the second Task Card, you might want to review the article with the class. In some cases, Task Card 2 builds upon Task Card 1, so you may want to quickly go over the first activity as well.

At the end of a unit, consider asking students to evaluate the topic and activities. This can be as simple as a thumbs-up or thumbs-down. Engage them in a discussion about what they liked or did not like and why. You might find this feedback useful for future lessons.

The two Task Cards feature hands-on activities that incorporate the following eight science and engineering practices—identified by the NGSS as essential for all students to learn:

1. Asking questions and defining problems
2. Developing and using models
3. Planning and carrying out investigations
4. Analyzing and interpreting data
5. Using mathematics and computational thinking
6. Constructing explanations and designing solutions
7. Engaging in argument from evidence
8. Obtaining, evaluating, and communicating information

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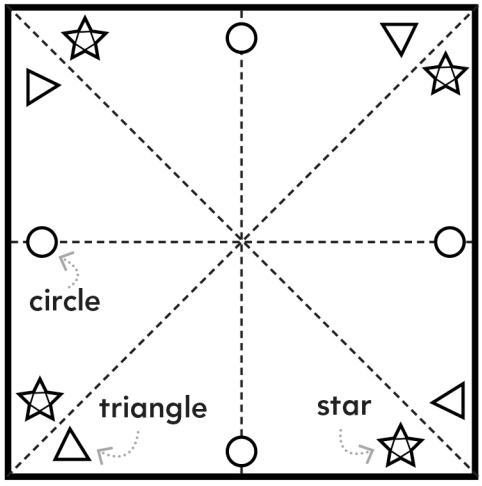

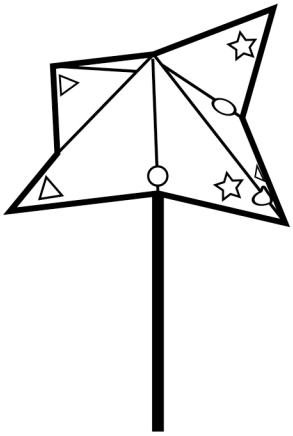

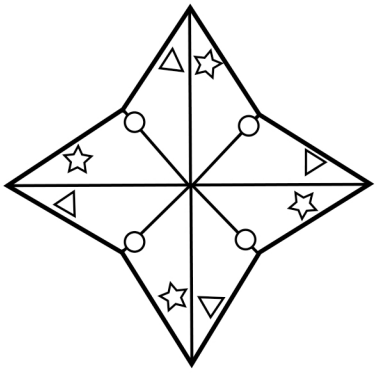

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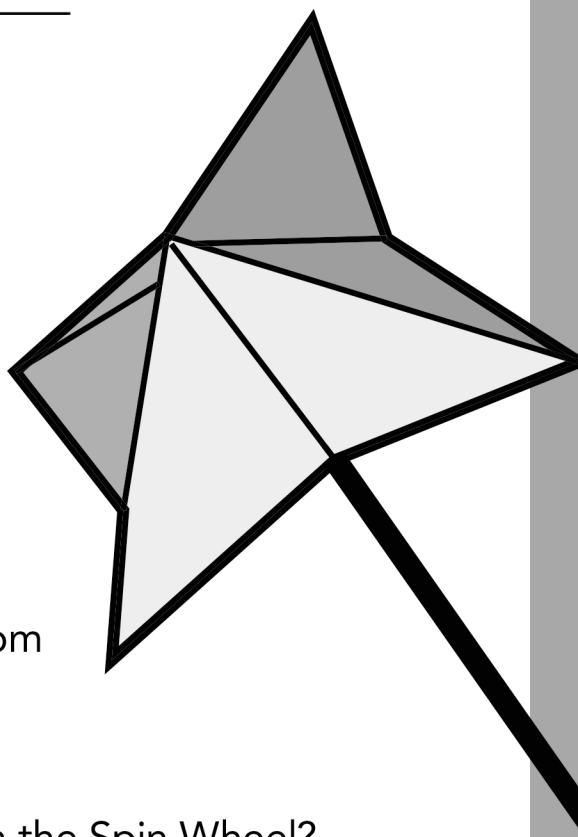

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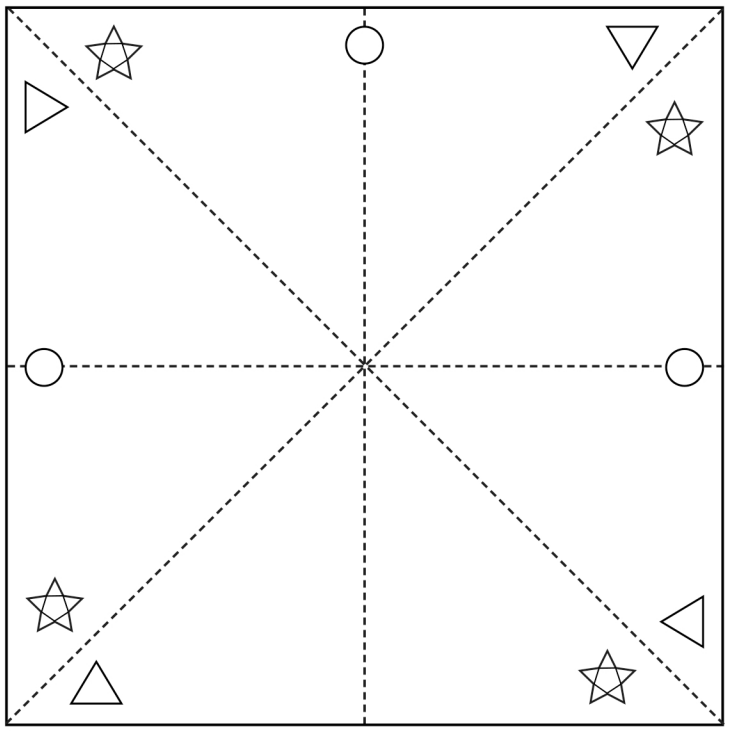

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