SWENext Engineering Challenge #7

Robo Wheel

Are you ready for your next summer engineering challenge?!! For this next experiment you will get to build a flying wheel. This fun new toy will give you a new way to have fun with your friends while enjoying the summer. You can play with it in your house or enjoy it outside in the park.

Once you finish making your Robo Wheel, try making different types of games – like side-by-side racer, knocking over dominoes, leaping a big gap, jumping off a ramp, and hitting a target. Step #17 in the directions shows some great ideas on how to modify your wheel ☺

What game did you come up with? How did you modify your wheel?

Send us pictures of your creation. We would love to see your Robo Wheel!!

Good luck and have fun

Source: http://ds-assets.pbskids.org/diy/robowheel-english_2.pdf

#SocialMedia

Share your pictures and videos from this activity on Facebook, Instagram or other social media with us and other SWENexters. Show us your creative games and see what kind of games other SWENexters created!

Use the hashtags:

#SWEtheFuture #SWENext #BeThatEngineer #DesignSquad #RoboWheel

To have your design featured by SWE please keep a lookout for an email on how to do this!

PBS KIDS GO!

DESIGN squad Nation

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Robo Wheel

1

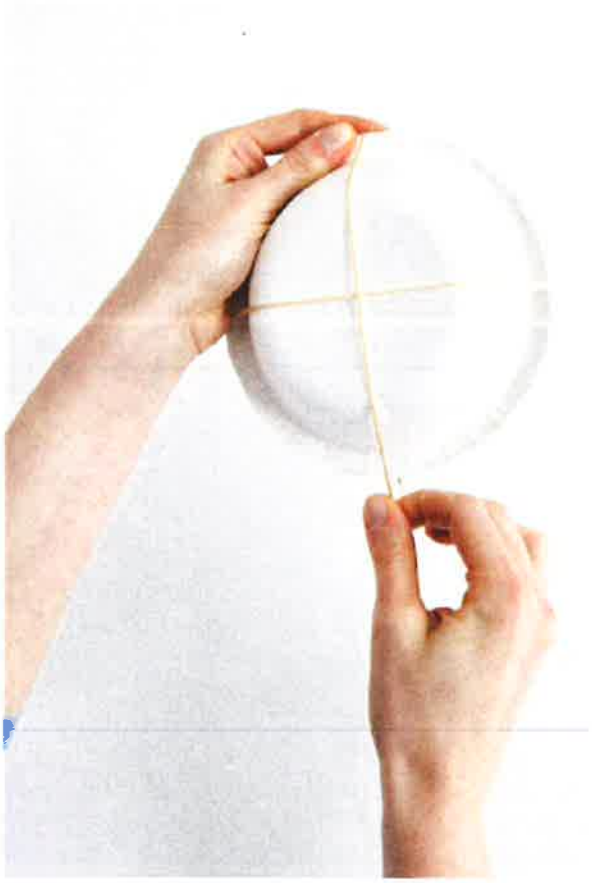
Here's what you need to make your Robo Wheel!

- 2 paper bowls
- 2 rubber bands
- 3 feet of string
- Pushpin or thumbtack
- Tape (duct or masking)
- Sharp pencil

2

Find the center

- Nest the bowls together. Wrap a rubber band around the bowls.
- Slide it right and left until it divides the bottom circle of the bowl into two equal halves.
- Make an "X" with the other rubber band. The four quarters make four "pizza slices."
- Move the rubber bands until all four "pizza slices" are of equal size.
- The center of the circle is where the rubber bands cross.



3

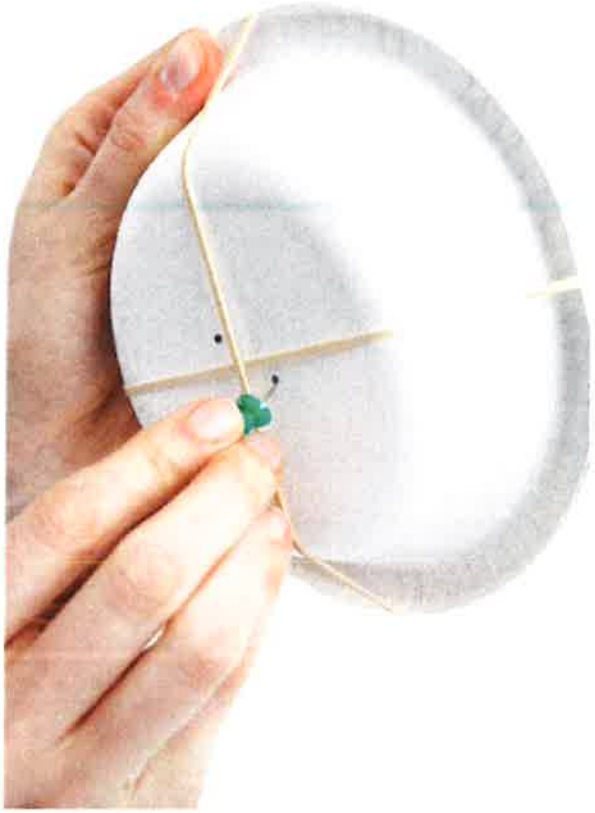
Mark the spot

Mark two dots on each side of the center. Make them equal distance from the center and about a half inch apart. (About the width of your index finger).

4

Make the holes

With your dots as a guide, use the pushpin to poke holes in the bowls.



5

Widen the holes

- Remove the rubber bands and separate the bowls.
- Poke a sharp pencil into a pushpin hole. Twist it and push gently. Stop when the hole is just a bit bigger than the string. That's usually around where the wood part of the pencil starts, just after the black lead.
- *TIP: If your two holes get larger and become one big hole… Make two new holes in the two other "pizza slices" near the center. Keep them small. Set them a finger's width apart.*

6

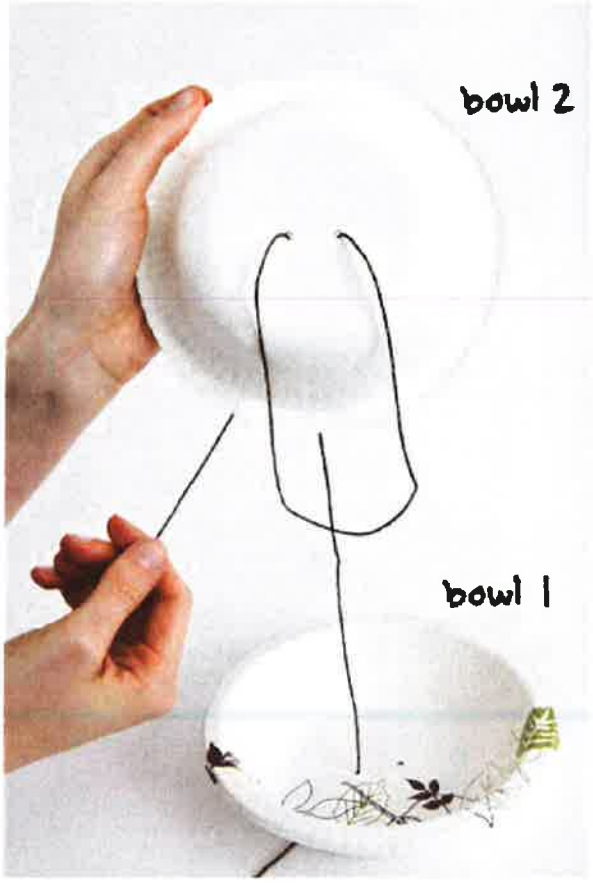
Thread the string

- Begin by threading the string through the bottom of Bowl 1, starting from the outside.
- Next, thread the string through one of Bowl 2's holes, coming from the inside.
- *TIP: If threading the string through the holes is hard to do… Try doing one of these:*
  a) Wet the end of the string.
  b) Wrap the tip in clear tape to stiffen it (like the hard tip of a shoelace).
  c) Push the string through the hole with the pencil.
  d) Re-poke a hole so its little paper rim is bent in the direction the string is going.
  e) Make the hole a little bigger.

7

Thread the string (cont'd)

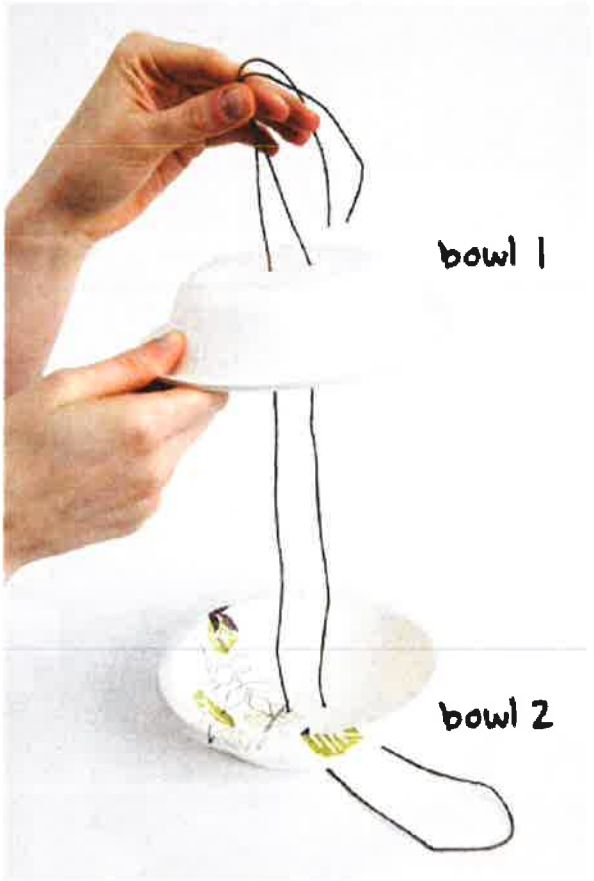
- Then thread the string through the bottom of Bowl 2, coming from the outside.
- Finally, thread the string through the open hole in Bowl 1, coming from the inside.
- Tie the ends of the string together with a knot.



8

Thread the string (cont'd)

The two bowls should face each other, with the string looping through them.



9

Tape the bowls

- Tear off four 2-inch squares of tape. For now, stick them where they will be easy to grab.

- Line up the bowls so the holes are even with each other.

10

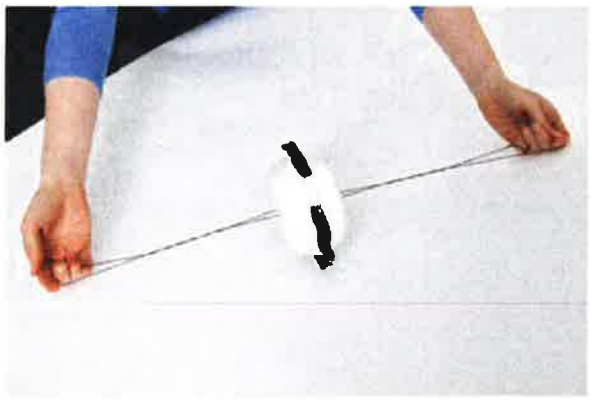
Tape the bowls (cont'd)

Stick the tape so the pieces are across from each other.

11

Wind up the string

- Slide your wheel to the middle of the string loop and hold both ends.
- To twist the string, push the wheel across the table or floor or ask a friend to help you spin the wheel to wind up the string.



12

Spin the wheel

- Pull outward on the string. The wheel will spin as the string untwists. Pull hard.
- Stop pulling just before all the twists unwind.

13

Spin the wheel (cont'd)

- Bring your hands together so the string is loose and the wheel sags down a bit. The Robo Wheel will keep spinning and will twist the string in the other direction.
- When the wheel stops spinning, pull out again, hard.
- *TIP: If you're having trouble revving up the wheel…The Pull-Relax technique takes a moment to master. Just like a yo-yo or pumping on a swing, it's about getting the timing right. Soon you'll have the wheel spinning quickly.*

14

Practice revving up

- Now that you've practiced spinning the wheel, try releasing it.
- Hold the string with your thumbs in the loop. Hold the wheel just above where you want to launch it.
- Spin the wheel forwards and backwards a few times to get it revved up.

15

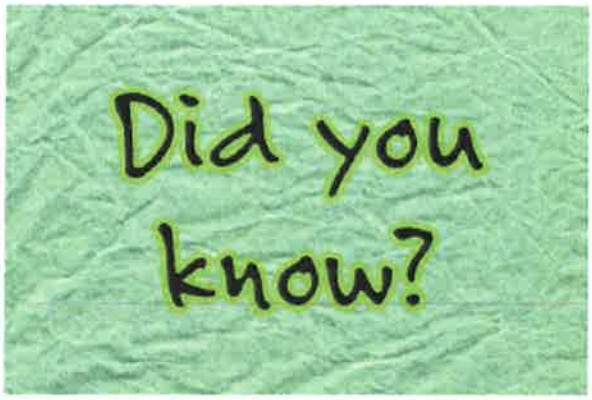
Release the wheel

- Wait until the wheel is spinning away from you to begin your release.
- Let the string unwind until it is almost completely untwisted. (At this point, there will be lots of room for your thumbs to release the string.)
- Drop the string, and watch your wheel go!

16

Did you know?

Ever spin a top? A top is a **flywheel**, a spinning disc that stores energy. Once a flywheel gets going, the stored energy keeps the spin going for a long time. The Robo Wheel is a flywheel. Like a top or a tire rolling down a hill, once it gets rolling, it keeps going until a force interferes with its spin.



17

Try this next!

- **Mini golf.** Make up stations, like side-by-side racer, knocking over dominoes, leaping a big gap, jumping off a ramp, and hitting a target.
- **Massager.** Add yarn along the edge. It will fling out. Massage your face. Or swat mosquitoes.
- **Color wheel.** Add color with markers. Watch the colors merge when the Robo Wheel spins.
- **Rain stick.** Put dried peas or a bell inside to clatter about as the Robo Wheel slows down.
- **Disco ball.** Add shiny stickers or rhinestones. Shine a focused beam of light from a flashlight and make disco-ball patterns on the wall.

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