Curiosity Guide #209
Friction

Accompanies Curious Crew, Season 2, Episode 9 (#209)

Making a CD Hovercraft

STEM Challenge

Description

What do you want your hovercraft to do? Try various designs and surfaces to make your craft go farther, higher, or hover longer!

Materials

- Old CDs
- Hot glue gun
- Plastic 2-liter soda bottles with caps
- 9-inch round balloons
- Drill
- Drill bits
- Hacksaw
- Clips

Procedure

1) Use the hacksaw to cut each 2-liter bottle below the neck. Be sure to keep the cap on to protect the threaded top.
2) Drill 1 to 3 different hole patterns and different numbers of holes in the bottle caps. Use the same size drill-bit diameter for each hole.
3) Unscrew the caps from the cut bottle necks.
4) Lay a circular bead of hot glue around the top edge of each cap. Be careful not to cover the drilled holes.

5) Press the glued cap upside down over the center of the shiny side of the CD. Check to make sure that air can escape through both the drilled holes and the hole in the CD.
6) Stretch the opening of the round balloon over the cut neck of the bottle. It should be possible to blow up the balloon by blowing into the bottle opening.
7) Blow up the balloon.
8) Twist the neck of the bottle to temporarily hold the air in place. Pinching the twisted balloon with a binder clip can help.
9) While pinching the twisted balloon, screw the lid with CD onto the top of the bottle.
10) Lay the hovercraft on the table with the CD acting as a base.
11) Unclip or untwist the balloon. Give the balloon a gentle push, and watch it hover.
12) Repeat with each of the bottles and lids you prepared. Note what happens with each one.
13) Try the investigation on various surfaces, like a table, tile floor, or carpet.
14) What hole pattern and number of holes had the best results?
15) What surface works best? Table, tile, carpet?
16) What changes could be made to the hovercraft to make it go even longer?

My Results

Explanation
As the balloon loses air from the squeezing pressure in the room, the air escapes through the drilled holes and out of the bottom of the CD. This creates a cushion of air for the CD to ride on that counteracts the force of gravity pulling the CD down.

Having fewer holes drilled into the cap makes the craft hover longer, while more holes lifts it higher with less friction. A smoother surface provides better air resistance and reduces the solid-to-solid friction, enabling the hovercraft to move more freely. The carpeted surface does not work well because much of the air can move or escape through the carpet fibers and does not push back onto the hovercraft.

Something more to explore: In 1955 an inventor in Great Britain designed a hovercraft that could travel on different surfaces, including water. For years these hovercrafts carried passengers across the English Channel from Dover, England to Calais, France. By forcing air under the craft, it would lift it off the water, while propellers on the top would push it forward. These early hovercrafts were quite a bit noisier than our hovercrafts, but what a ride!

You can find many images of hovercraft on the internet. Search "hovercraft" and click on Images. To see photos of the British inventor and his early designs, search "first hovercraft invented."

Parents and Educators: use #CuriousCrew #CuriosityGuide to share what your Curious Crew learned!

WKAR

Curious Crew is a production of Michigan State University.
Learn more at WKAR.org.