

RAFT IDEAS

Topics: Friction, Air Pressure, Motion

Materials List

- ✓ CD type disk
- ✓ Sports bottle cap w/ push/pull closure
- ✓ Thin cardboard, ~8 cm x 15 cm (~3" x 6") or a 120 ml (4 oz) paper cup
- ✓ Balloon
- ✓ Pushpin
- ✓ Hot glue gun (other glue or chalking could be used but would need time to dry)
- ✓ Scissors
- ✓ Smooth surface (such as a clean table or counter top)

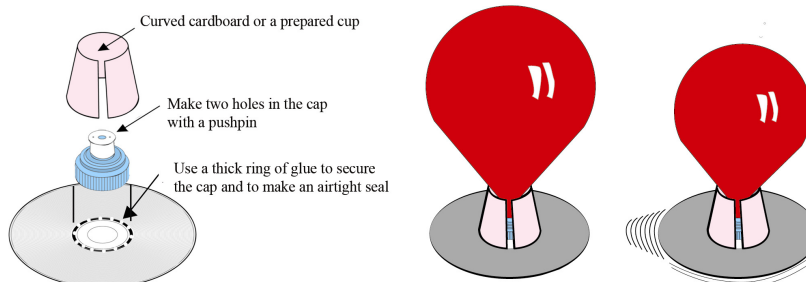
This activity can be used to teach:

CO Science Standard 1:
Physical Science

- Motion and Forces
- Grades: 2, 8, HS

Hovercraft

A toy based on air pressure that will give you a lift!



Create a simple hovercraft that will gracefully glide along on a thin cushion of air.

Assembly

1. Use a pushpin to poke 2 holes near the center of a closed sports bottle cap. The holes must go through the cap. Remove the tamper-proof ring from the cap, if present. More holes may be needed later depending on the size of the pushpin.
2. Hot glue the cap to the unprinted side of a CD by creating a ring of glue on the bottom edge of the cap **or** a matching **narrow** ring of glue on the CD centered on the hole. Giving the cap a slight twist when attaching to the CD can help ensure an airtight seal. Check the seal and add extra glue **only** if needed.
3. Make a collar by curving or folding a piece of thin cardboard ~8 x 15 cm (3"x6"), or cut the bottom out of a 120 ml (4 oz) paper cup and then cut down the side. A collar will prevent the balloon from tipping over and dragging on the table.

To Do and Notice

1. Place hovercraft on a smooth and clean counter, desk, or a whiteboard laid flat.
2. Inflate the balloon, twist the neck to seal in the air, and put the balloon opening over the push/pull cap, which should still be pushed down (closed position).
3. Place the collar around the balloon and untwist the neck of the balloon.
4. If the hovercraft does not slide or spin easily check that the CD is not warped (remake if warped) and there is no surface dirt. If the CD is okay then creating additional or larger holes in the cap will provide a greater lifting force.

The Science Behind the Activity

The air escaping from the pressurized balloon lifts the hovercraft and creates a thin cushion of air between the bottom of the CD and the smooth surface. The cushion of air reduces the friction between the table and the moving hovercraft. Reduced friction means less force is needed to move the hovercraft, and it will go farther before stopping. The CD's weight and size help keep the CD parallel to the table. The CD's base also distributes the weight of the hovercraft over a wide area. The larger "footprint" means the hovercraft needs less force per unit of area to lift it off the table. The small holes allow just enough air through to lift the hovercraft while slowing the balloons rate of deflation resulting in longer "flight" times.

Taking it Further

Students can calculate the air pressure needed to lift the hovercraft off the table as (air pressure) greater than (weight of hovercraft)/(bottom surface area of the CD)

Web Resources (Visit www.raft.net/more for how-to videos and more ideas!)

A history of hovercraft designs can be found at: <http://www.hovercraft-museum.org>.