



Engineering Experiment: DIY Hovercraft

Project: Models, Small Engines

Supplies:

- Plates (plastic works best, could experiment with other materials)
- Film canister or soda bottle cap
- Ballpoint pen
- Poster putty or tacky glue
- Balloons
- Scissors (needle-nose works best)
- Paper clip or clothespin

Objective: Build a “hovercraft” to understand the concept of friction and surface-to-surface movement.

Time: 30 minutes

What to Do:

1. As a control experiment, slide the plate across the surface (or multiple surfaces) and observe
2. Use a ballpoint pen (or scissors) to poke a hole in the middle of a plate. (Adults might need to have pre-made holes, depending on age group).
3. Poke another hole in the center of the bottom of the film canister or bottle cap.
4. Place the canister/cap over the hole in the plate and use the putty or glue to stick it on. (The better the seal, the less air that will escape.)
5. Blow up a balloon and twist the opening so that air doesn't escape. Use a paper clip (carefully) or clothespin to help you keep the balloon closed.
6. Stretch the opening of the balloon over the film canister. Make sure that the opening of the balloon lines up with the hole in the film canister.
7. Put the Hovercraft on a smooth, flat surface, and let go of the balloon. Slide the plate across surface, as before, and compare the resistance between the two tests.
8. If time allows, vary the design (larger or smaller holes, different plate material, adding/subtracting weight, etc.)
 - a. Could also replace the plate with an old CD, removing the need to place a hole in the plate

Reflect:

1. **What happened when you slide the plate with the balloon/added air?**
Easier to slide, less friction, less resistance, etc.
2. **What other changes did you make to your hovercraft? Did that affect how easily it would or wouldn't slide?**
Smaller/bigger holes in plates or caps, less or more air in balloon, adding or subtracting weight to the plate

Apply:

1. **How does adding the air affect the friction and resistance? Where else do we see this same principle?**
The air flows out of the balloon and underneath the plate. This creates a “barrier” layer of air between the surface of the plate and the surface of the table, etc. This barrier keeps the two surfaces from rubbing together and creating friction. Similarly, adding oil to lubricate gears or joints that rub together creates a barrier (of slick oil) to prevent the two surfaces from coming into direct contact and causing friction.

Source: PBS ZOOM Science Activity “Hovercraft” www.pbskids.org/zoom/activities/sci Also Referenced: Phineas and Ferb Science Lab, published by Scholastic, Inc., pp. 30-31 (2011)