

CD Hovercraft

AT A GLANCE:

Kids can build a working hovercraft with household materials.

STUDENTS WILL BE ABLE TO:

Demonstrate the process of science inquiry by posing questions and investigating phenomena through language, methods and instruments of science.

BACKGROUND INFORMATION:

A hovercraft illustrates Newton's Three Laws of Motion.

PRINCIPALS:

Newton's First Law states that an object in motion will stay in motion unless acted upon by an outside force.

Newton's Second Law tells us that $\text{Force} = \text{Mass} * \text{Acceleration}$. In other words, an object's mass, multiplied by its amount of change in position gives us the amount of force that it can expend on another object.

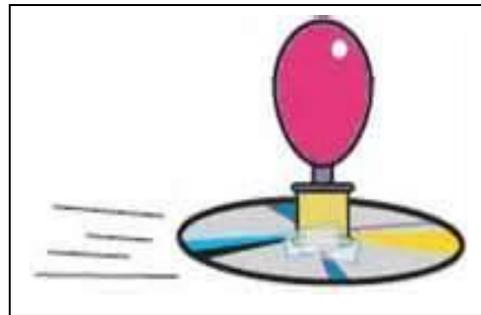
Newton's Third Law states that for every action there is an equal and opposite reaction.

DETAILED EXPLANATION:

Hovercrafts work by using air to lift a vehicle off of the ground. The CD Hovercraft is no exception. As the balloon deflates, it is releasing air through the sports bottle cap and beneath the CD (Newton's Third Law). Because of the shape, smoothness, and weight distribution of the CD, the releasing air creates a cushion of air between the CD and the surface (Newton's second Law). This cushion of air reduces the friction between the CD and surface and allows your hovercraft to move more freely. *If it were possible to reduce friction altogether, the hovercraft would travel in one direction, uninterrupted, FOREVER. Kinda like objects orbiting in space!*

MATERIALS:

- Compact disc (CD)
- Sports bottle cap (push/pull closure)
- Card stock or thin cardboard
- Balloon
- Pushpin or thumbtack
- Hot glue gun
- Scissors
- Smooth surface



PROCEDURE:

1. Using a pushpin, poke 2 to 4 holes near the center of a closed sports bottle cap. Make sure that the tamper-proof ring is removed from the cap and that the holes go all the way through the plastic of the cap.
2. Use the hot glue gun to glue the bottom of the cap to the top of the compact disc. Use as little hot glue as possible, but be sure that there is a perfect airtight seal between the cap and CD. Giving the cap a slight twist when you glue it to the CD can help.
3. Create a collar with a 2"x6" piece of card stock. Cut two slits, one on each end of the card stock that are 1" from the end. Cut the slits on opposite sides of the collar (think of it as the top and bottom of the collar). Join the slits together to create the collar.
4. Find a clean, smooth surface to place the hovercraft on.
5. Inflate the balloon and twist the opening shut.
6. Pull the open end of the balloon through the collar.
7. Stretch the balloon's opening over the sports bottle cap.
8. Now impress your friends with your new found physics abilities!

Try this:

- Try using different materials to build hovercrafts. Compare lighter vs. heavier materials.
- Try different sizes of balloons. Does one size work best?
- Can your craft hover over a pan of water?

Why is it so important to conduct this experiment on a smooth surface? *Hint- Think of Newton's First Law!*

What do you notice or observe?

What conclusions can you make?

What can you do differently next time?