



Build a Hovercraft

THE ADVENTURE:

Cub Scouts explore how moving air can power a vehicle. Cubs create a hovercraft using a CD or a paper plate or a foam board and power it by balloons. Once assembled, the youth may race the hovercraft to understand how different elements of the design can affect the speed and direction of the hovercraft.

PREPARATION:

- This activity can be done inside, outside or at camp. The hovercraft need to run on a smooth surface.
- Familiarize yourself with how a hovercraft works.
- You need a computer if you are going to show the video of the hovercraft. This can help Cubs better understand what the goal of the challenge is.
- Cubs may need more time for the design and build phases. This Adventure could be done in two meetings.

THE ACTIVITIES:

- Show the group a video of an actual hovercraft. When the video is over, ask the Cubs if they know how a hovercraft works. Take time for brainstorming, guessing and discussing. Encourage discussion by asking probing questions like those in the Plan section of the Trial Card.

BUILD A HOVERCRAFT!

- Give each group of two or three Cubs a box full of materials. There should be enough so that each Cub can try building several different types of hovercrafts.
- Give hints or guidelines if Cubs are stuck, trying not to give away the answer.
- When the group members figure out that the balloon can push the air underneath the body of the hovercraft, they will draw their design on paper.
- Explain your design and how it works to a Scouter.

- Cubs can build their hovercraft individually or in groups of two. It is best if each Cub will have a hovercraft to take home at the end of the project.
- Invite Cubs to test their designs and make changes to figure out which one works better. Ask probing questions if they seems stuck. How do the different shapes of the hovercraft influence the motion? How can we hold the balloon up?
- Cubs can cut out different shapes (such as squares and circles) from the foam board to see which one works best. They can use cardstock or straw to create a cradle for the balloon.
- After understanding the initial concept of the hovercraft and building one that works, Cubs design a hovercraft that moves in one direction. They can add a horizontal direction to the force of the air by cutting an angled hole in the foam board. The angled hole supplies lift and forward thrust.
- They can also test adding dimes on the hovercraft to see how it works if made heavier.

RACE A HOVERCRAFT!

- Once Cubs have decided on their best design, they can race the hovercraft to compare different features.
- With the Howlers, build a raceway using suspended fishing line to create a straight path for the hovercraft, like bumpers in a bowling alley. Heavy books can be used to hold strings up. Use a spring clamp to hold the balloon and maintain air pressure, and remove the clamp when ready to race.
- Release the hovercrafts. Which ones go faster? Do the hovercrafts spin around? How do you stabilize the direction of travel? Note the winners.



- Adjust the design or redo design and then run the race again.
- Extension activity: Build a hovercraft you can ride on!
- Scale up the model and Cubs can actually ride on the hovercraft. Use a sturdy piece of plywood as the body of the hovercraft, a leaf blower as the source of pressured air and something like a shower curtain to create the skirts. Check out the online resources for a video that shows you how.

REVIEW:

- This is a great opportunity to use recycled materials. Old CDs and DVDs, soap lids, and other materials can otherwise be difficult to recycle.
- Some Background Information on Hovercraft
- Hovercraft are supported off the ground by an air cushion. Vents in the hovercraft direct air downwards, creating a pocket of air currents between the craft and the ground. By shifting the direction of the vents, it is possible to steer the hovercraft. A skirt on the bottom of the hovercraft traps the air cushion underneath the hovercraft.
- By reducing friction between the bottom of the craft and the surface, the craft is able to glide freely. Think about an air hockey table, and how freely the pucks are able to move across the rink.

ONLINE RESOURCES:

- **A detailed description of another similar activity**
<http://www.instructables.com/id/BuildActivity-Build-a-Hovercraft/>
- **How a hovercraft works**
http://www.sciencebuddies.org/science-fair-projects/project_ideas/Aero_p033.shtml#background

SUGGESTED TIMING:

- Introduce the problem: 15 minutes
- Designing and building: 45 minutes
- Race and redesign: 45 minutes
- Review: 15 minutes

