

# **Air Powered Vehicles**

Best for Ages 7+ Workspace

Smooth or textured surface Indoors or outdoors Is electricity required?

Yes

## Description

Air Powered Vehicles is an excellent activity that uses everyday materials to create vehicles that move with the power of wind!

#### Materials

- Main body: cardboard tubes, plastic/paper cups, o pool noodles
- Axles: pencils, skewers, straws, or chopsticks
- Wheels: wiffle balls, bottle caps, or spools
- Sail: Paper, craft foam, cardstock, or thin cardboard
- Attachers: tape, rubber bands, binder clips, paper clips
- Scissors/Awl/Knife: Needed to make holes
- Air Source: fan, hair dryer
- Test Surfaces: tabletop or floor, smooth or textured

#### **Concepts Explored**

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- Friction
- Traction
- Lift



- 1. Choose your surface and plug in your air source.
- 2. Assemble your vehicle.
  - a. Using your scissors/awl/knife, poke holes in the main body where you want your axles to go.
  - b. Slide axles into the holes in the main body.
  - c. If the material you chose for your wheels doesn't already have holes, use your scissors/awl/knife to poke holes in them.
  - d. Slide wheels onto the axles.
    - i. **Note:** Either your wheels or axles must be loose enough to spin.
  - e. Attach your sail using either tape, rubber bands, or clips.
- 3. Test out your vehicle by placing it in front of your fan or pointing your hairdryer towards it. Does it move the way you wanted it to?
- 4. Modify your air powered vehicle and test it again.
- 5. Test your vehicle on a different surface. Does it move differently on a textured surface than on a smooth surface?









# **Air Powered Vehicles**

### **Troubleshooting Tips**

- Do your wheels keep falling off? Try placing a rubber band or clip on the end of your axles to keep them in place.
- If your vehicle keeps tilting forward (with the back portion in the air), your sail is getting too much lift. Move the sail farther back on your vehicle. Or try to counterbalance the vehicle with some weight.



What happens when you change the wheels to a different material? Does a light or heavy vehicle work better for your surface? How does your vehicle move on a different texture of surface?

## What is Happening?

- **Friction** is the force resisting the relative motion of two objects. In order for your vehicle to move forward, it must overcome the friction of the surface it is on.
- **Traction** is the force that is used to generate motion between an object and a surface. Traction needs friction in order to work. Think about how wheels on a car "grip" the road below it to move forward.
- Sails work by catching the wind. When air is pushed into a sail, it deflects the air back, creating lift.
  Lift is the sum of forces on an object that make it move perpendicular (or in opposition) to the direction of airflow.

### **Taking it Forward**

- Add a Storyline!
  - How would you build your vehicle to take you and your family on an adventure through the desert, grassland, or tundra? Create surfaces that represent that landscape then design a vehicle to take your family adventure.
- If you like this activity, you'll also like...
  - o <u>Build a Boat</u>
  - Bernoulli Obstacle Course



