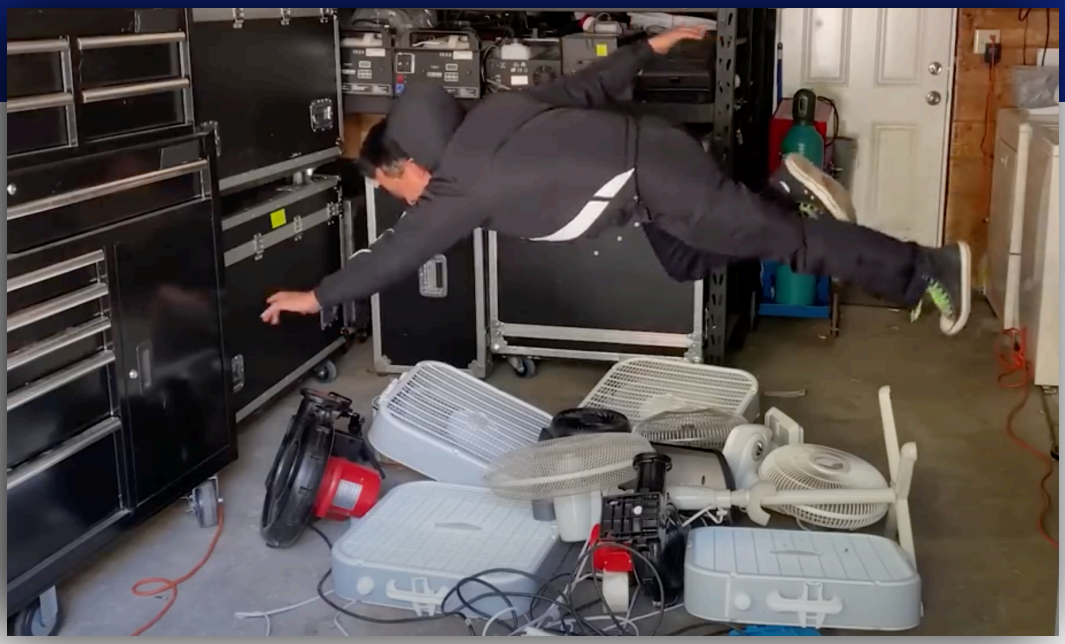
# The Coanda Effect

**Goal: Students will understand how the Coanda Effect can be used to control the movement of an object.**

**Standards: NGSS 5-Ps2 ; MS-PS2-2**



## Procedure

**Ask**: Have you ever wondered how to get an object to float in space? Or how a hovercraft might work?

**Partner** students or place in break out rooms, and have one student record and one report their responses to the following questions:

- What types of objects float?
- What types of objects float the longest?
- How lightly do you need to push on the object to move it in the flow of air, but not knock it over?
- Does changing the air speed affect how an object floats?

## Objective:

**Students will be able to demonstrate the Coanda Effect through a variety of experiments.**

## Materials:

-empty plastic bottle

-scissors

-tape

-hair dryer

-ping pong ball

-lightweight spoon

-faucet

-straw

IMPOSSIBLE SCIENCE AT HOME

**Explain**: Henri Marie Coanda, a Romanian inventor and engineer, wondered just that, and through his many inventions and experiments, discovered that much of it comes down to air pressure. He discovered that when air (or liquid) flows over a curved, convex surface, it tends to stay attached to that surface, affecting the air pressure around the surface. This effect became known as the Coanda Effect, and today you will use it to make an object float.

**Optional**: Demonstrate the ping pong ball floating in the airstream of a hair dryer, and ask students to explain/jot down a few guesses about how the ball is staying suspended.

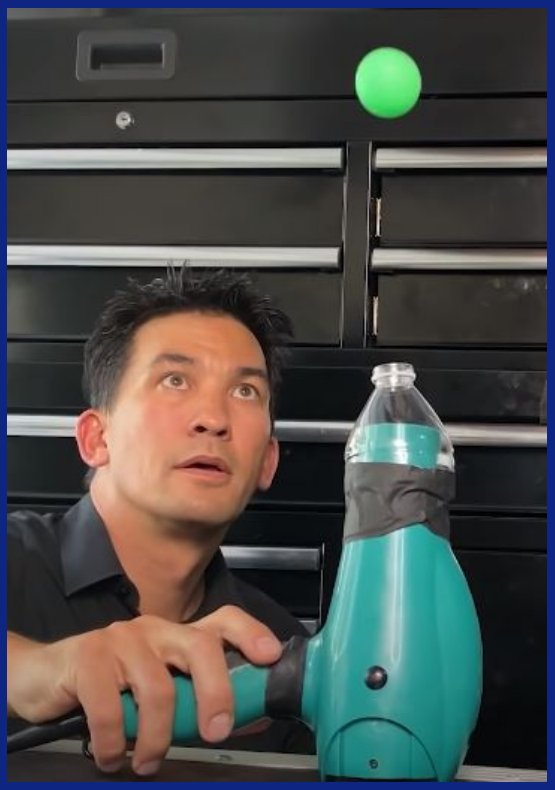
## Vocabulary

**Air pressure**: the weight of air; the amount of pressure the atmosphere is pressing on the Earth's surface. Faster moving air creates lower air pressure, and slower moving or stagnant (still) air creates higher air pressure.

**The Coanda Effect**: The tendency of a fluid to stay attached to a convex surface, rather than follow a straight line in its original direction. When airflow follows a curved surface.

**Convex**: rounded like the outside of a ball.

**Henri Marie Coandă**: A Romanian inventor and aerodynamics engineer (1886-1972) who discovered the Coanda effect.



IMPOSSIBLE SCIENCE AT HOME

**Show** students the Impossible Science Coanda Effect video through 2:50

**Pause** video and have students practice blowing on a piece of paper to see how the higher air pressure below the paper pushes the paper up into the low air pressure pocket.

**Ask** students if anyone has an idea of how this could affect the ping pong ball staying within the air stream. Share.

**Show** students the remainder of the video, pausing as needed for them to write down notes or draw a diagram of the air flow around the ball showing the Coanda effect.

**Have** students recreate the experiment with partners.

**Have** pairs write down an explanation of how the Coanda effect keeps the ball suspended.

**Challenge** each pair/small group to record an experiment responding to the question: Which objects will float most easily? Why?

**Students** will record materials and their hypothesis.

**Students** should test each object and record how well each object floats and categorize objects.

**Students** should record their conclusion.

**Exit ticket:** Write a short explanation of why the most buoyant object stayed afloat most easily.

## Extension:

1. Lightly hold the end of a plastic spoon about two inches away from a water faucet running with medium pressure.

2. Slowly move the spoon's convex side toward the water faucet.

3. Notice how the spoon gets pulled toward the water, and displaces the water sideways.

4. Try turning the faucet pressure on stronger, and observe how the spoon gets pulled.

5. Try pulling the end of the spoon away from the water, and observe how it stays attached.

6. Have students write an explanation of how this demonstrates the Coanda effect. Alternately, you can provide an explanation if needed.

7. Students can also have one partner hold the spoon vertically by the handle, and have the other partner blow vertically through a straw so that their breath passes the convex side of the spoon.

8. Students should observe how the spoon is pulled toward the fast moving air.