Streamlines

Activity Summary

This demonstration provides a strong visual representation of air streamlines and how object shape determines air resistance value. To take it further students can collect objects of varying shape and observe the change in streamlines for themselves. Be sure to only use a hairdryer with a *cool* setting if students will be handling the blow dryer.

Class time: 15 minutes as demonstration and discussion, longer if students experiment themselves with different objects.

Grade level: grades 2-5

Learning Objective

To demonstrate how air moves around objects

Materials Needed

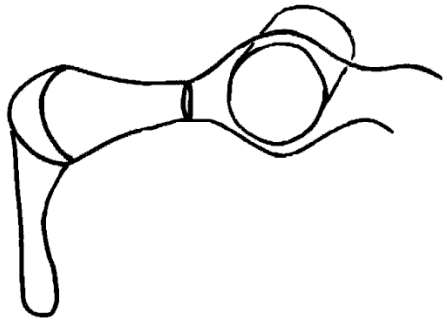
- Hair dryer with cool setting (you may be able to use a rubber band or tape to hold down the cool button)
- Streamers or ribbons under 1 inch wide
- Tape
- Metal cans or paperboard tubes of different diameters
- Boxes with sides similar in size to the diameters of the cans (tissue boxes work well)

Activity

1. Tape one streamer to the top of the hair dryer nozzle. Tape another to the bottom.

2. Turn on the hair dryer. On a high setting, the top streamer should blow out parallel to the airflow.

3. Hold a can between the two streamers so that the curved surface is facing the hair dryer nozzle (see illustration). The streamers make the airflow pattern visible: air bends and flows smoothly around the tube.



4. Now place a similarly sized box in the airflow. Air does not flow smoothly around the box; it gets bent sharply up and down. It is either completely blocked by the box or goes past the box without touching it. This shape has more air resistance or drag than the can.

5. Draw your own pictures of the streamlines around a curved surface and around a box.

When air flows smoothly around an object, we say the object is aerodynamic. Which is more aerodynamic, a boxy shape or a curved shape?

Explanation/Significance

When the objects are moving or wind is blowing over them, we call the pressure *air resistance* or *drag*. Air resistance can be helpful. Parachutes create a lot of air resistance so that falling objects slow down and land gently. Air resistance can also be unhelpful. The more drag on a car, the more gasoline it burns to keep moving. Aerodynamics is the study of how air moves and interacts with objects.