

Bernoulli Strips

Activity Summary

Students first participate in a simple activity that demonstrates the Bernoulli principle on a strip of paper. After an explanation is provided the students are challenged to apply the knowledge by making a prediction in a different scenario in which the Bernoulli principle is at work.

Class Time: 15 minutes for activities I and II. One hour if extensions are included.

Grade Level: 1st -5th

Learning Objectives

- Air exerts pressure
- The amount of pressure exerted by air changes under certain circumstances

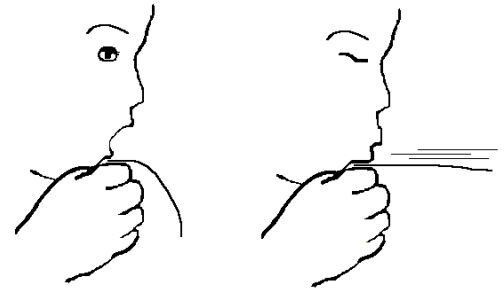
Materials Needed

- Strip of paper – cut or tear a 4 inch strip from a sheet.
- Sheet of Paper
- Drinking Straw
- Large paper grocery bag (extension activity)
- Markers (extension activity)
- Scissors (extension activity)
- Metric ruler (extension activity)

Activities

I. Lifting a strip of paper

1. Instruct the participants to hold a strip of paper with short edge below his/her bottom lip.
2. Instruct them to blow across the paper.
3. Participants can share observations and experiment with different variables such as how hard they blew or how long their paper was.

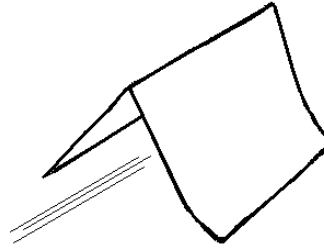


4. Explain that moving air creates a low pressure region on top of the paper. The

still air below the paper has higher pressure and so pushes the strip of paper up. This is called lift.

II. Blowing down a paper tent

1. Fold paper in half lengthwise and stand paper up as a tent.
2. Explain that the next step is to blow air under the tent. Ask the students to predict what they think will happen to the paper when they blow air under the tent.
3. Now Instruct them to blow under the tent. It might be easier to aim the air under the tent by blowing through a drinking straw.
4. Ask students to share their observations and propose an explanation.
5. Follow up their explanations with the following if the students were unable to articulate it: When air moves it creates a region of low pressure under the tent. The still air above the tent has higher pressure and so pushes the tent down.



Extensions

Have students sketch their experiment. Include direction of airflow; label high and low pressure areas; use arrows to show the direction paper moves.

Create a mask that depends on the Bernoulli effect to move the tongue up and down. The activity can be found here:

http://www.nasa.gov/pdf/205708main_Paper_Bag_Mask.pdf

Explanation/Significance

In 1738, Swiss physicist Daniel Bernoulli discovered that as the speed of a fluid increases its pressure decreases. What does that mean? When air is still it pushes equally in all directions. For example, air pressure pushes down on a table, but also up on the underside. But when air moves along the surface of an object the pressure is reduced. A fan blowing across the surface of the table reduces the downward pressure of air. A light wind has little effect on a heavy object like a table, but a slip of paper illustrates the principle well as in these simple activities.