Lesson Plan #1—Science

Title: Bernoulli Principle

Introduction:

How does a curveball curve?

How does a vacuum cleaner work?

How does a 747 fly?

These and other common phenomena can be explained by Bernoulli's principle. In 1738, a Swiss mathematician named Daniel Bernoulli studied the relationship between the pressure and velocity of a fluid. The Bernoulli Principle states that the pressure of a liquid (in this case, air) decreases as its velocity increases.

Objectives:
In this lesson, students will:

- Gain awareness of the Bernoulli Principle.
- Apply the Bernoulli Principle.
- Utilize various critical thinking skills related to learning about science.

Session time: 30 minutes

Materials:

- 24 drinking straws
- 2 empty soft drink cans
- A flat, smooth table top

Methods: Guided discussion, cooperative learning, interactive participation

Procedure:

1. Place 23 straws on the table parallel to each other, about 1 cm apart.

2. Place the cans upright on the rank of straws approximately 5 cm apart. The cans will be able to roll freely, back and forth like a conveyor belt.

3. Using the remaining straw, blow between the cans.

Discussion/Wrap-Up

The Bernoulli Principle applies to the two cans. As the velocity of the air between the two cans increases (being blown away), the pressure the air it applies to the inner sides of the cans decreases. That allows the air on the opposing sides of the cans to push the

cans towards to the area of lower pressure. The air pressure on the outer sides did not increase; rather it was the decrease in pressure between the cans that allowed the cans to roll towards each other. The cans were not “sucked” together. They were pushed together.

Instructor Notes:

Although this activity is fairly simple, it affords several opportunities to model prediction and analytical thinking. First demonstrate how easy it is for the cans to roll back and forth on the straws. Ask your students to predict what is going to happen. Many will suggest that the cans will roll apart due to the additional air you are forcing between the cans. Then ask “Besides the straws, what is touching the cans?” *(ANSWER: air)* Is blowing between the cans going to increase the air pressure momentarily by adding more local air, or decrease the pressure momentarily by “knocking” some of the local air out of the way?

If students suggest that the cans will roll towards each other, ask them to explain their prediction. What are their prior experiences that would allow them to make such a prediction? *(ANSWER; wind blowing over a sheet of paper and “lifting” it or something getting “pulled” into a current.)*

After completing the activity, have the students draw a top-view drawing of the two cans and use arrows to indicate the forces of air pressure. **Remember:** The cans were pushed together, not “sucked” together.

Note: This lesson is included in the workshop, ***Weird Science***, available as a Horizon Wimba online professional development workshop. To view a complete list of online offerings go to **www.siue.edu/SIPDC.**