Drexel-SDP GK-12 ACTIVITY

Science

Weather and Aeronautics

All About Air: Properties of Air

Grade Level 5

Lesson # 1 of 1

Lesson Dependency

Time Required 1 Day

Summary

- When you push on your desk, you can feel the pressure exerted from your hand and from the desk. When you fill a bottle of water, the water expands, in other words, it fills the bottle as completely as it can. If the bottle were wider, the liquid would fill it, too. This is because the water is pushing on the sides of the bottle, or exerting pressure, just like your hand on the desk.

  Air has pressure, too. You see this every day as well, but may not notice it as readily as you would with the examples above because you cannot see air. Take a water bottle and pretend to drink it, but use air to keep the water in the bottle. Here, you are using air to push against the water, just like you used your hand to push against the desk. The water stays in the bottle because the air is holding it there. Release the air, and the water flows through the bottle.

Keywords

Air Pressure, Weather, Aeronautics, Properties of Air, Bernoulli's Principle

Educational Standards: 3.5.7, 3.6.7

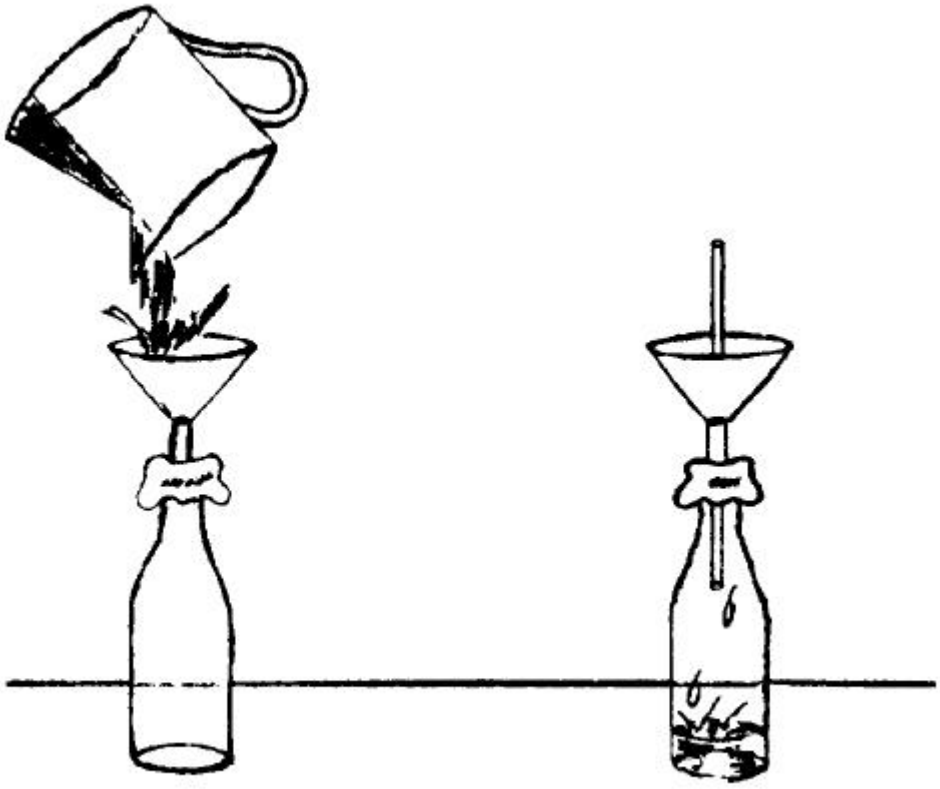
Introduction / Motivation

- In this lesson, we demonstrate the basic principle that air has properties like any matter. It exerts pressure, takes up space, and has mass. Air in a bottle is no different than liquid in a

bottle, although students will want to predict otherwise. We demonstrate these properties in this lesson.

Lesson Background & Concepts for Teachers

- Put the funnel into a bottle that is otherwise sealed with clay, trapping air inside the bottle. This is shown in the picture below:



- Suck air from the bottle; what happens?

  We demonstrate this principle by trapping air in a bottle with clay, and then sucking the air from the bottle through a straw. We say that the bottle is "empty," when it is really full of air! When we take air out of the bottle, room is made for the water to flow into the bottle through a funnel.

  When we took air out of the bottle, the air density inside the bottle decreased. What does this mean? Basically, there are less air molecules (because we took some out!) inside the bottle, which means that they can spread out more. As a result, they won't push as hard on the sides of the bottle, meaning that the pressure inside the bottle has decreased as well.

  This is why the water rushed into the bottle -- the pressure was lower inside the bottle, and things move from areas of high pressure to lower pressure. In other words, the water wants to take up the extra space left over from when we took out

some of the air. How much water will go in? Take a look at the funnel to see. The water goes into the bottle until the pressure goes back to what it was before.

As we will see in the next experiments, we can take advantage of pressure to make things move for us. Does this give you any clues about what makes things fly? We will explore this in the Bernoulli Experiments to come!

References

The AIAA: http://www.aiaa.org/kidsplace/kidsplacepdfs/sciact.pdf

Author

William Mongan

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