1.1. BOYLE'S GAS LAW

Marshmallow Under Pressure

Boyle's Law states that when temperature is held constant, the *volume*—the amount of space occupied by matter—of a gas is inversely proportional to its *pressure*, the force per unit area. This simply means that if the pressure increases and temperature remains the same, the volume decreases. The opposite is also true (if the pressure decreases and the temperature remains the same, the volume increases). This activity will demonstrate Boyle's Law using a marshmallow and a syringe.

Materials

Large plastic syringe (without a needle); Large marshmallow; Felt-tip pen

Activity

1. Draw a face on one side of the marshmallow and place it in the plastic syringe so the face can be seen from the side.
2. Place your thumb over the end of the syringe where the needle is usually located. Holding your thumb in place, push in the plunger. Observe what happens to the marshmallow as you do so.

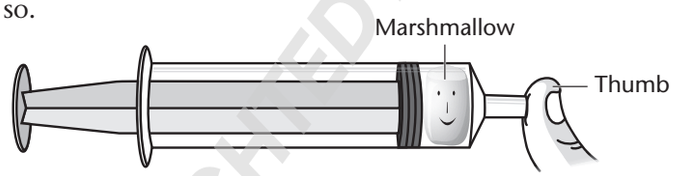

FIGURE 1.1. Boyle's Gas Law: Plunger In

3. With your thumb still in place, pull the plunger out and observe what happens.

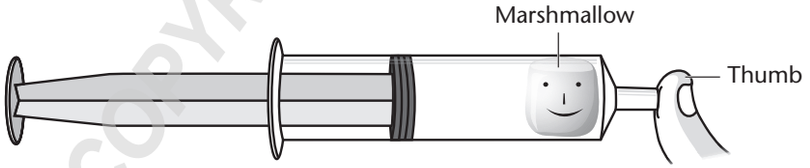

FIGURE 1.2. Boyle's Gas Law: Plunger Out

Follow-Up Questions

1. Marshmallows have bubbles of air trapped inside. What happened to the marshmallow when you pushed in the plunger? What happened when the plunger was pulled out?
2. Relate this demonstration to the definition of Boyle's Law. How did this demonstration verify the accuracy of that law?

Extension: Try to think of a real-life example of Boyle's Law in action.