

## HOW DO WE BREATHE?

**A. Question:** *What happens when we breathe?*

**B. Materials Needed:**

- A large bottle or jar with a rather narrow neck
- A one-hole stopper (able to fit snugly in the bottle neck)
- A y-glass tube (or straight tube)
- Two small balloons & two rubber bands
- One large balloon (or beach ball balloon)

**C: Procedure:**

1. Cut the bottom of a large bottle out. If the bottle/jar is glass, this can be done by covering it with a cm thick layer of hot oil, and touching the outside of the jar with an ice cube exactly at the surface of the oil (the jar will crack and the bottom will drop out). Smooth the edge by filing or firing. An adult should assist with this part of the experiment.
2. Tie the two small balloons to the two ends of the Y-tube using the rubber bands. Hold the long end of the Y-tube through the bottle neck and insert the one-hole stopper over the Y-tube and in the bottle neck. Refer to diagram.
3. Cut the large balloon/ beach ball in half, stretch it over the open end of the bottle and tie or tape it around airtight (it represents a diaphragm).
4. Pull the center of the diaphragm up and down and observe the balloons expand and collapse.

**D: Anticipated Results:**

As you pull the beach ball down you should see the balloons inside the bottle expand.

**E: Thought Questions for Class Discussion:**

1. What does the Y-tube represent in this demonstration?
2. What do the small balloons and the stretched rubber sheet represent?
3. What made the small balloons expand?
4. What stage of the breathing could the expanded state of the balloons be compared with?
5. How different would it be to compare the glass jar with our chest cavity? How are they the same?

**F: Explanation:**

The Y-tube in our demonstration represents the bronchial tube; the small balloons represent the lungs; the rubber sheet represents the diaphragm; and the jar represents the chest cavity. The chest cavity can be expanded or contracted due to flexible rib joints. This is not the case with the glass jar. This is one difference between our model and the actual human physiology. By pulling the rubber sheet down, the pressure inside the jar decreases, and therefore the air is sucked from the outside into the small balloons. This mimics the process of inhaling.