



How Do We Breathe? *(cont.)*

Take a Deep Breath

Overview: *Students will learn more about the structure of the lungs and experiment to measure the amount of air in their lungs.*

Materials

- bubble solution
- drinking straws
- rulers
- transparency of The Lungs (page 25)
- transparency of Graph of Air Exhaled from the Lungs (page 26)
- large soft sponge
- large clear container of water
- 3" x 5" (8 cm x 13 cm) lined file cards
- trays (*optional*: sheets of waxed paper)

Lesson Preparation

- For each group prepare a tray of materials: a container of bubble solution, straws, file cards for each member, and a ruler.
- This activity must be done indoors to prevent the wind from breaking the bubbles.

Activity

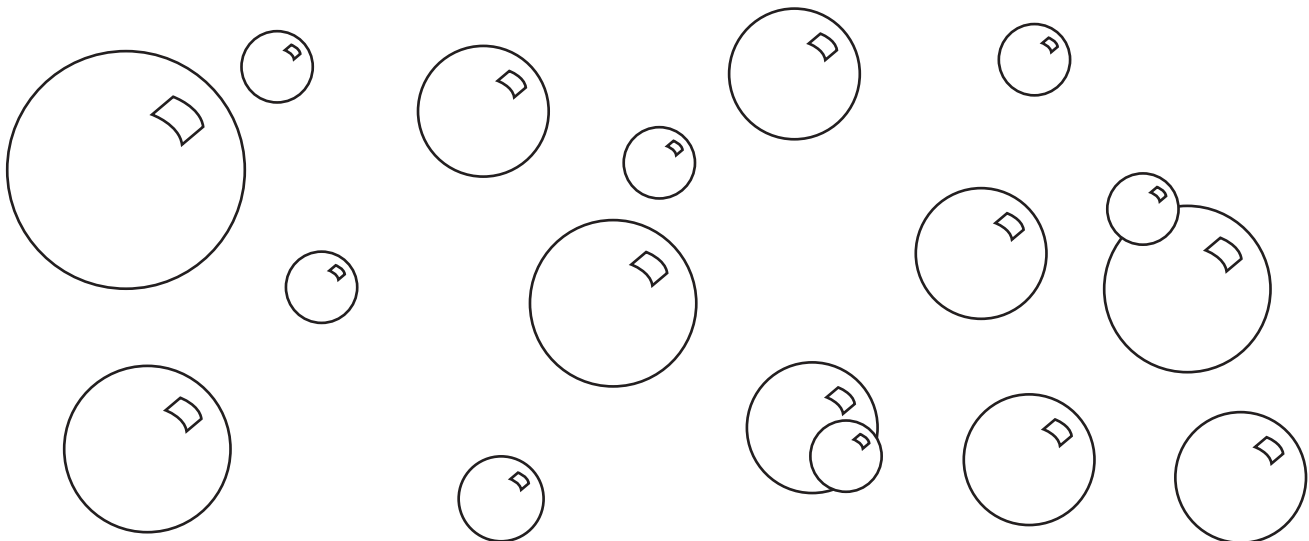
1. Have students use the lung models to tell what they have learned about lungs and how much air their lungs will hold.
2. Use the transparency The Lungs to show students what their lungs look like and learn more about their function.
3. Show students the sponge and explain that lungs look much like a sponge. Pass the sponge around so students can see how light it is. Cut it in half to show that the holes are throughout the sponge. Let students know that these are really air sacs in the sponge, not holes, and that their lungs have these as well. Place one half the sponge in the water and let them see that it floats until water enters the air sacs, forces out the air, and makes the sponge so heavy that it begins to sink.
4. Tell students that they are going to see how much air their lungs can hold. Divide students into small groups and give each group a tray of bubble materials. Let each student write his or her name on a file card and then write **1**, **2**, and **3** at the beginning of the first three lines. Have them remove all items from the tray and pour about a tablespoon (15 mL) of bubble solution on the tray. They should spread it around with their hands to make the entire surface wet with the solution.
5. Show them how to dip one end of a straw into the bubble solution and blow a bubble through it. After they have been successful, show them how to take a very deep breath and this time blow the biggest bubble they can on the surface of the tray. When the bubble pops, use a ruler to measure its diameter and write it on a file card. Do this until three trials have been completed. Tell all the group members to take turns blowing one bubble and then repeat this until three trials have been made.

How Do We Breathe? *(cont.)*

Take a Deep Breath (cont.)

Closure

- Tell the students to circle the measurement of the largest bubble they blew. Use this data to help students see how to construct a graph. Distribute a small self-adhesive note to each student and have each write his or her name and bubble size on it.
- Ask the students to tell you their bubble sizes. Find the largest and smallest bubbles. Project the transparency of the Graph of Air Exhaled from the Lungs on the board. Write the bubble sizes in order from smallest to largest on the horizontal axis.
- Have each student place his or her note on the line which represents the size of that bubble. Ask the students to help you count the notes for each measurement and then complete the vertical axis.
- Let students have the experience of analyzing this data by asking them the following:
 - ✓ What was the largest bubble size?
 - ✓ What was the smallest bubble size?
 - ✓ What was the size of the bubble most of the students blew? (Explain that this was the average-size bubble for the class.)



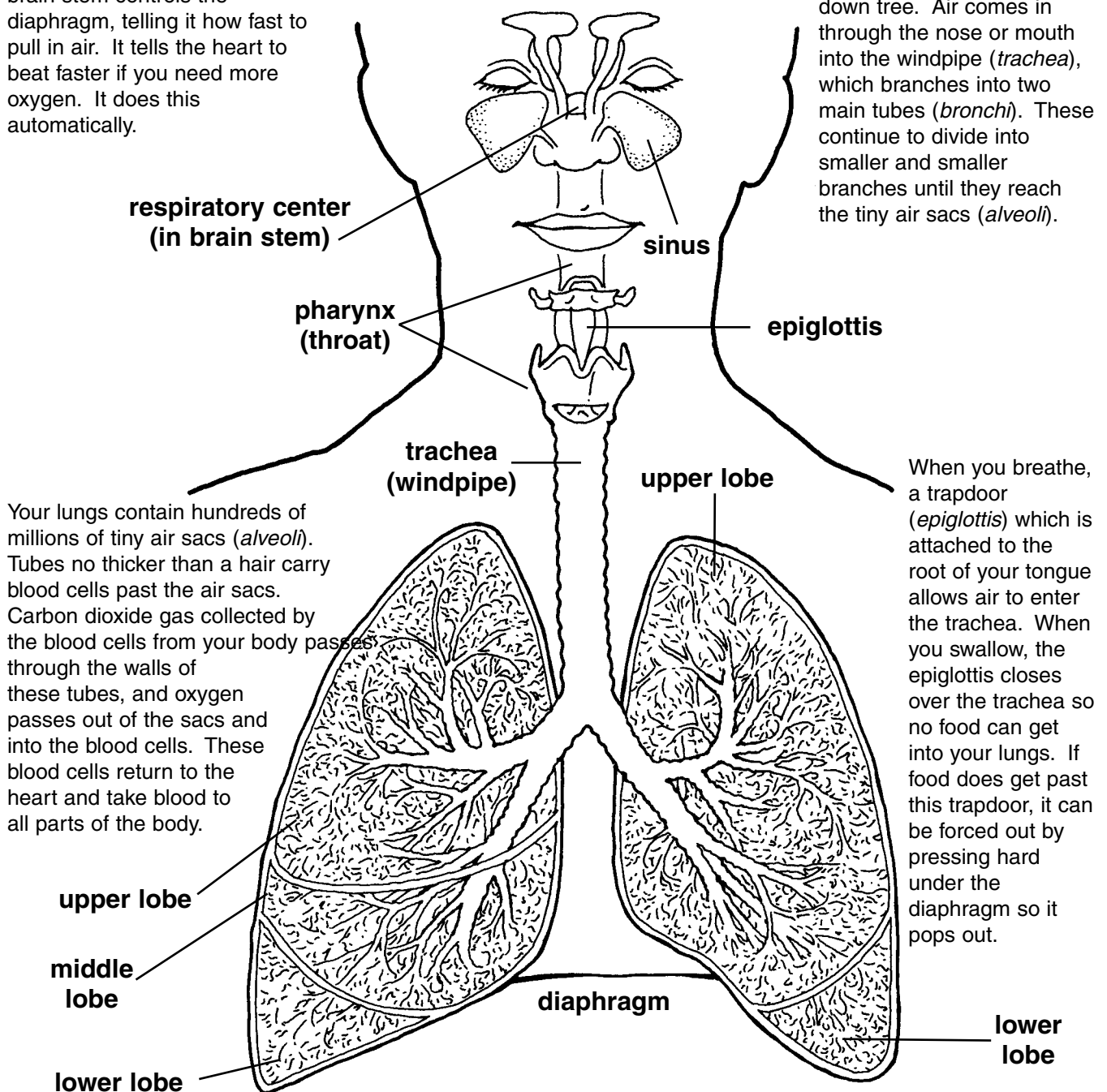
- Tell the students your largest bubble size and compare it with the size of theirs. (*The teacher's bubble should be larger.*) Find the bubble measurements for the tallest students in the class and see if they blew larger bubbles than the shortest students.
- Explain to the students that our lungs grow as we grow and the bigger we are, the larger our lungs become. Therefore, if their lungs did not hold as much air as someone else's did, they may have smaller lungs. Tell them also that we can never squeeze out all the air in our lungs.

How Do We Breathe? *(cont.)*

The Lungs

The respiratory center in the brain stem controls the diaphragm, telling it how fast to pull in air. It tells the heart to beat faster if you need more oxygen. It does this automatically.

The tubes leading into the lungs look like an upside down tree. Air comes in through the nose or mouth into the windpipe (*trachea*), which branches into two main tubes (*bronchi*). These continue to divide into smaller and smaller branches until they reach the tiny air sacs (*alveoli*).



Your lungs contain hundreds of millions of tiny air sacs (*alveoli*). Tubes no thicker than a hair carry blood cells past the air sacs. Carbon dioxide gas collected by the blood cells from your body passes through the walls of these tubes, and oxygen passes out of the sacs and into the blood cells. These blood cells return to the heart and take blood to all parts of the body.

When you breathe, a trapdoor (*epiglottis*) which is attached to the root of your tongue allows air to enter the trachea. When you swallow, the epiglottis closes over the trachea so no food can get into your lungs. If food does get past this trapdoor, it can be forced out by pressing hard under the diaphragm so it pops out.

Your heart is under and mostly centered between the two lungs. Your right lung has three lobes, each with its own section of the bronchial tree. Your left lung has only two lobes, with a notch to fit the bottom of your heart. If one lobe is damaged, the others keep functioning. Healthy people do not use their entire lung capacity, and so they have extra breathing power. You exhale only about $\frac{1}{5}$ of the air in your lungs. That means most of the air is left in your lungs.



How Do We Breathe? *(cont.)*

Graph of Air Exhaled from the Lungs

