

## Chapter 19

Use with Section 1

## ENRICHMENT

## ● The Respiratory System

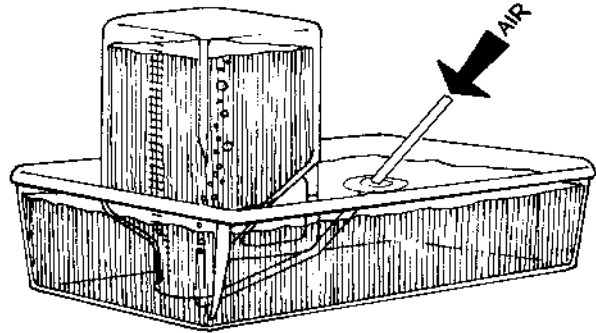
## Exhaling

How much air do you exhale in one breath? One way to find out might be to blow up a balloon and see how big it gets. A better way to measure how much air you exhale in a single breath is to see how much water is displaced by the air you exhale. Try the following activity.

## Materials



3.79-liter plastic milk jug  
0.5-liter measuring cup  
marking pen  
flexible plastic tubing, about 60 cm  
sink with stopper



## Procedure

1. Use the measuring cup and water to fill the milk jug. After adding each 0.5 liter of water, mark the volume on the side of the jug.
2. Fill the jug with water to overflowing. Push the stopper in the sink and fill it with 10 cm of water.
3. Cover the opening of the jug with your hand and turn the filled jug upside-down over the sink. Put the jug in the sink with the opening under water. Have someone hold the jug for you.
4. Push one end of the plastic tubing through the opening of the jug, take a deep breath and blow into the other end of the tube.
5. Use the markings on the side of the jug to estimate the volume of water remaining in the jug.

## Observations

What happened to the water in the jug? \_\_\_\_\_

*Compare how much air you typically exhale in one breath to that of others. Include people of different ages, sizes, sexes, and activity levels. Use a different piece of clean tubing for each person. Develop a questionnaire for your test subjects. It should include some of the following questions:*

1. Are they in good health? Any chronic bronchitis, asthma, emphysema, or other lung ailments?
2. Have they ever smoked? Does anyone smoke at home?
3. Do they live in a rural or urban setting?
4. Do they exercise on a regular basis?

*Use the answers to the questions to write a conclusion.*

## Conclusion

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