

CURIOSITY AT HOME

MAKING A MODEL LUNG



Have you ever wondered what is going on inside our bodies when we breathe? Try taking a deep breath in and out. When we breathe in deep, our chest and stomach expand. That's because our lungs are filling up with air. Our lungs are a very important part of our respiratory system, which is a group of tissues and organs that allow us to breathe. Lungs are the organs that provide oxygen to our blood when we breathe in, and remove carbon dioxide when we breathe out. But what does it look like when our lungs bring air in and out of our body? Let's find out in this model lung activity!

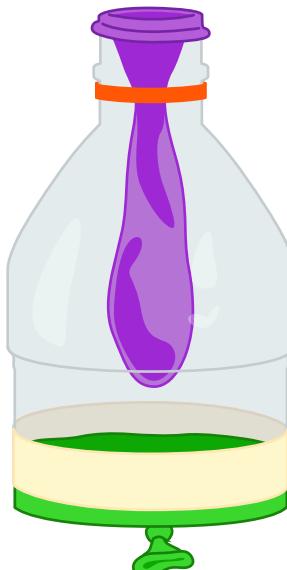
MATERIALS

- 1 Clear Plastic Soda Bottle (1 or 2 liter) with labels removed
- 2 Large Rubber Balloons
- Scissors
- Tape or rubber bands
- Science notebook or paper
- Something to write with



PROCEDURE

- Use the scissors to cut off the bottom few inches of the plastic bottle. The plastic bottle will represent the human chest cavity.
- Place one balloon inside the mouth of the bottle so that the opening is on the outside. Then stretch the opening of the balloon around the mouth of the bottle and tape firmly into place. This balloon represents the human lungs.
- Tie a knot at the end of the second balloon and cut off the top half of the balloon.
- Stretch the remaining bottom balloon half with the tied knot over the bottom of the bottle. Secure the balloon with tape.
- Grab the stretched balloon from the tied knot and gently pull down. The balloon inside the bottle should fill with air.



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EXPLORE MORE

Try pushing the stretched balloon up into the bottle, and watch what happens to the balloon inside. What do you notice? Why do you think that happens?

WHAT'S HAPPENING?

The balloon inside the bottle represents our two lungs, and the balloon stretched across the bottom represents the **diaphragm**. The diaphragm is a strong set of muscles below your lungs. When you breathe in, your diaphragm muscles pull downwards and your rib muscles pull up, bringing air into your lungs. This movement makes more space in your chest for air and also decreases the pressure on your lungs. When you breathe out, your diaphragm relaxes and the ribs and lungs push in, causing the air to be pushed out.

DID YOU KNOW?

- Our two lungs are not the same size! In order to make room for our heart, the left lung is a little bit smaller than the right lung.
- The average person breathes in approximately 11,000 liters of air a day. The soda bottle you used for this activity is 1 liter. So, we breathe in 11,000 soda bottles of air a day!
- Our rib cage, which are the bones that surround and protect our lungs, moves about 5 million times each year when we breathe in!



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K–2 GRADE EXPLORATION

- Think of a situation when you would breathe faster or slower? Can you make the model lung breathe faster, or slower? Make a prediction of how to do so, then test it out on your model. What do you notice?
- Do you think your lungs are bigger or smaller than an adult's lungs? Why?
- What would a hiccup look like? Make a prediction in your science notebook and then test it out on your model lung!



Show us how you're being curious! Share your results with us.

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3–5 GRADE EXPLORATION

Explore the following questions and write your observations in your science notebook.

- Think of a situation where you need to breathe faster or slower. Can you make the lung breathe faster, or slower? Make a prediction of how to do so, then test it out on your model. What do you notice?
- All mammals have lungs. Lungs vary in shape and size from a bat to a whale, and everything in between. The lungs of these different animals are designed specifically to help them live in their environment. How would the lungs of a dolphin be different from ours? What about elephant's lungs? Or a bat's lungs? In your science notebook, make a list of your predictions about the similarities and differences between these animal lungs and our own.
- Inside our bodies, we have two lungs. What do you think would happen if we had two balloons inside the bottle to represent our two lungs? Would they inflate the same? Write down your prediction in your science notebook.

- To test it out you will need:
 - ◊ Two straws
 - ◊ Two balloons
 - ◊ Tape or rubber bands
- Procedure:
 - ◊ Place one balloon on the end of each straw and secure it with tape or rubber band.
 - ◊ Part of the straw should be inside the opening of the balloon. The straws represent the bronchi tubes, which help to get the air we breathe in from our nose or mouths down into our lungs.
 - ◊ Stick the balloon ends of the straws through the bottle opening.
 - ◊ Secure the straws to the mouth of the bottle with tape.
 - ◊ Pull down on the “diaphragm” (bottom balloon) like you did in the first activity. What do you notice? Write your observations in your science notebook.
- What do you think a hiccup would look like? Write down your prediction in your science notebook and test it out!



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6–8 GRADE EXPLORATION

Explore the following questions and write your observations in your science notebook.

- Inside our bodies, we have two lungs. What do you think would happen if we had two balloons inside the bottle to represent our two lungs? Would they inflate the same? Write down your prediction in your science notebook.
 - To test it out you will need:
 - ◊ Two straws
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 - Procedure:
 - ◊ Place one balloon on the end of each straw and secure it with tape or rubber band.
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 - ◊ Stick the balloon ends of the straws through the bottle opening.
 - ◊ Secure the straws to the mouth of the bottle with tape.
 - ◊ Pull down on the “diaphragm” (bottom balloon) like you did in the first activity. What do you notice? Write your observations in your science notebook.

- Some diseases and medical conditions can affect the respiratory system. One example is asthma. During an asthma attack, the tissues making up the airways in the lungs become swollen or inflamed. This makes it harder to move air in and out of the lungs. Let's change our model lung to see what happens to someone during an asthma attack:
 - Take a piece of tape and cover the mouth of the soda bottle, completely covering the balloon hole. If you are using the straws, cover the opening of both straws fully.
 - Take a toothpick, pushpin, or end of a paper clip to poke a small hole in the tape. The much smaller hole represents the way asthma narrows the airways.
 - Pull down on the diaphragm (bottom balloon). What do you notice happens to the two “lungs”?
 - What do you think asthma medication does to help treat the condition? Do this to your model.
- Can you think of some other diseases that could affect the lungs?

