

Activity: How do lungs work?

Caution: This activity involves a sharp knife! Only do this with an adult.

Materials

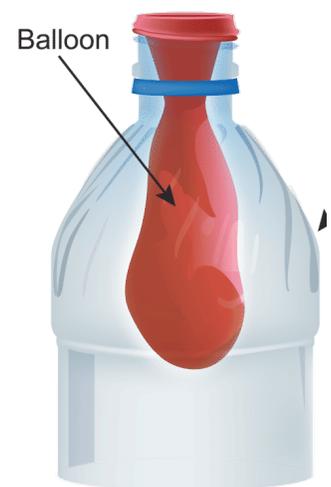
- Soda bottle made of clear hard plastic (1 liter is easiest)
- Two balloons
- Ruler
- Tape
- Rubber bands
- Utility knife
- Scissors
- Adult helper

Instructions (images courtesy of CK-12 foundation, <https://www.ck12.org>)

- (1) Cut off the bottom ~1.5 inches of the bottle so that it is totally open at the bottom.



- (2) Take one of your balloons and lower it into the bottle through the neck (top) of the bottle until only the neck (skinny part) of the balloon sticks through the bottle.



- (3) Fold the neck of the balloon over the top of the bottle. Put a rubber band around the neck of the balloon and tape it in place.



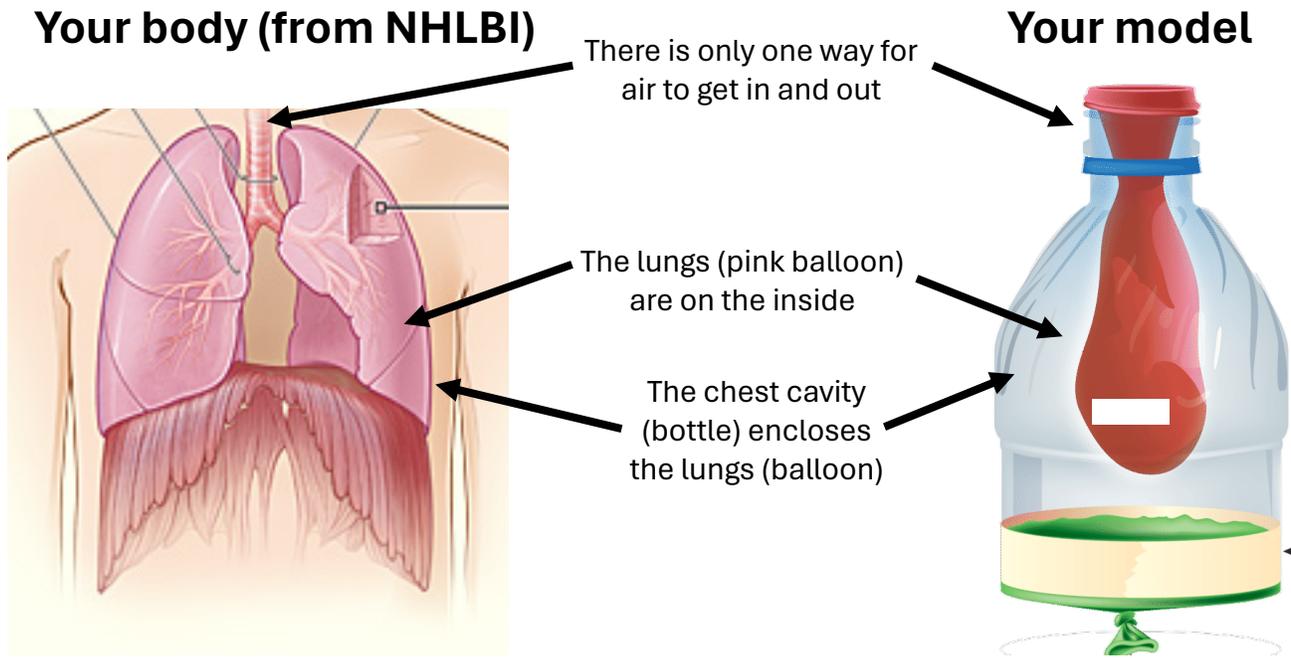
- (4) Tie a knot at the end of the second balloon and cut it in half.
- (5) Stretch the bottom (knotted) half of the second balloon over the open (cut) end of the plastic bottle. Tape it in place, making sure there are no air leaks.
- (6) Grab the knotted end of the balloon on the bottom of the bottle and pull down. Repeat it a few times. **What happened to the balloon inside the bottle?**



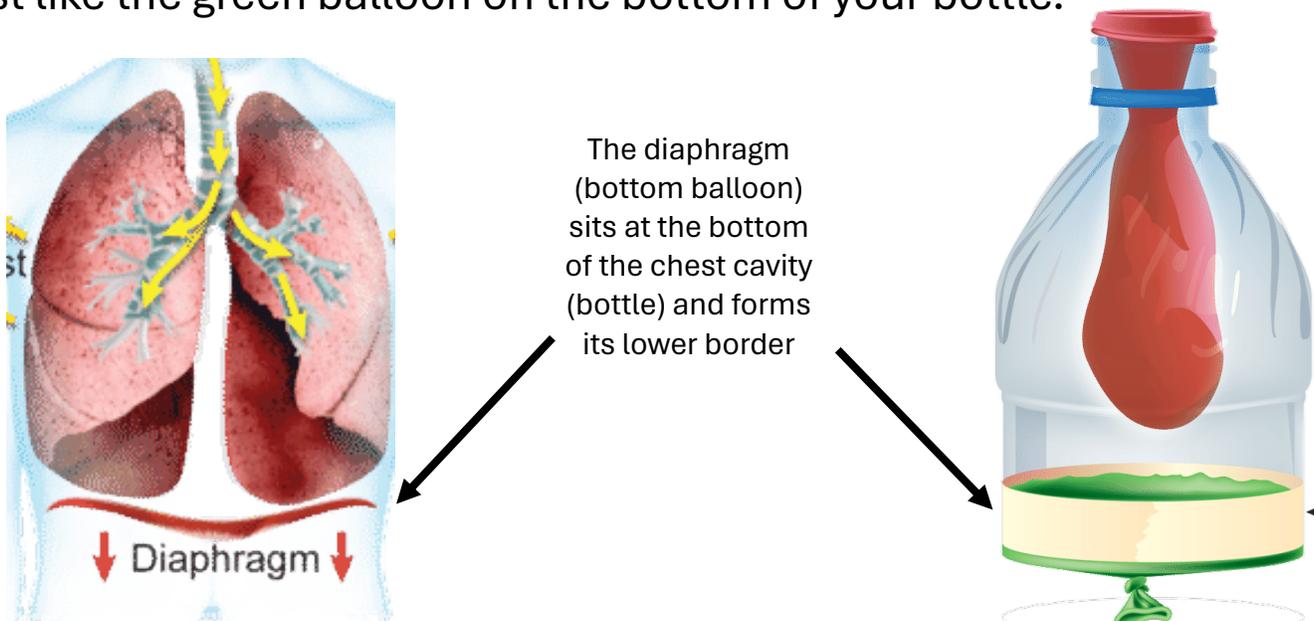
What you learned:

Explanation:

Your lungs are enclosed inside your chest cavity, just like the balloon was enclosed inside the bottle.

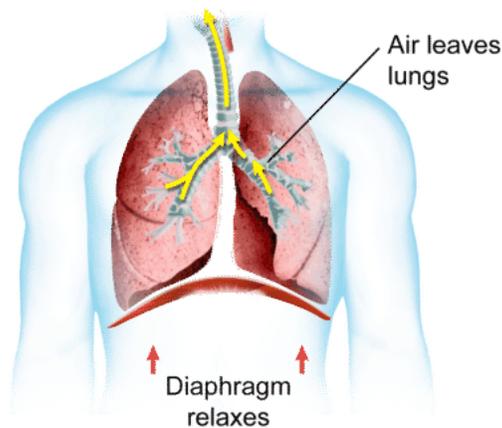
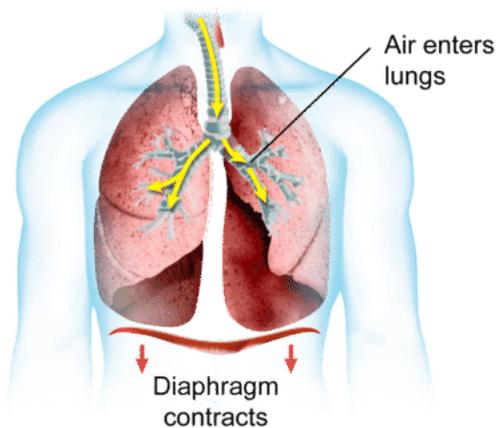


A large dome-shaped sheet of muscle called the **diaphragm** sits under your chest cavity and forms the lower border of the chest cavity, just like the green balloon on the bottom of your bottle.



Now put your hands over your stomach and take a deep breath in. Can you feel your stomach moving up and down (or out and in)? What do you think happens to your diaphragm when you breathe in?

When you take a breath in, your diaphragm contracts (squeezes). This causes it to flatten and move downwards. When your diaphragm moves, it **expands** (makes bigger) your chest cavity. This creates **negative pressure** – a vacuum that pulls open your lungs and inflates them like the balloon.



When the diaphragm pulls down, the chest cavity gets bigger. This creates negative pressure that pulls on your lungs, stretches them out, and inflates them.



You can also obtain more detailed information at:

<https://www.ck12.org/book/human-biology-breathing/section/2.1/>

<https://www.scientificamerican.com/article/how-do-we-breathe/>

<https://www.nhlbi.nih.gov/health/lungs/respiratory-system>