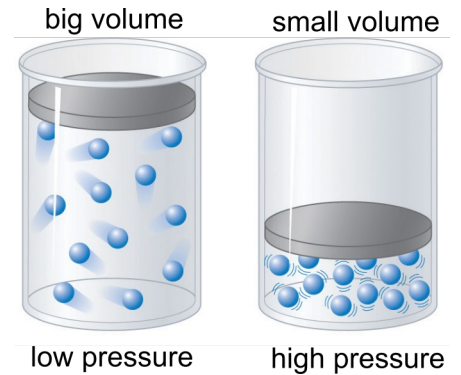


Gasses: Air Pressure and Volume

- Gasses take up space (**volume**).
- **Air pressure**: the bouncing molecules of a gas push out on everything around and within it
- If gas molecules are squeezed into a smaller volume, the pressure increases
- If they expand to fill a bigger volume, the pressure decreases
- If it can, a **fluid** (gas or liquid) will move from a high pressure zone to a low pressure zone.



Part 1: Air Takes up Space

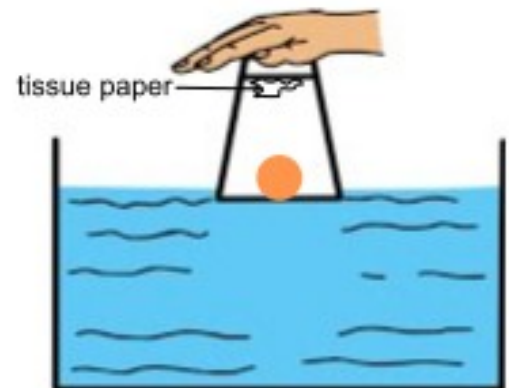
1. Float a ping-pong ball in a tall container of water.

2. Tape a piece of tissue to the inside bottom of a cup. Make sure it does not hang down far off the surface when the glass is turned upside-down.

3. Predict what will happen when you put the cup upside-down over the ping-pong ball and push down.

Will the ball:

- (a) stay at the same height? (b) move up?
(c) move down?



Will the tissue touch the ball? Yes / No

Will the ball end up immersed in water? Yes / No

4. Try the experiment! Bring the cup down directly over the ball, open end facing down.

Does the paper inside the cup get wet? Yes / No

What is inside the cup before the experiment? _____

What is inside the cup as you are pushing it down? _____

Discuss: What happens to the ping-pong ball and why?

- Air takes up space and does not allow (much) water into the cup

5. Look carefully at the water level inside the cup.

Does the volume of air in the cup change as you push it down?

Volume decreases

volume increases

volume stays same

What does this mean about the air pressure in the cup?

Pressure is higher

pressure is lower

pressure is same

Discuss: Can you feel this change in pressure? Do you feel the cup pushing back against your hand?

Part 2: Blowing up Balloons

In this part, you will try some ways to blow up a balloon without touching it.

Discuss: What happens to a balloon when you blow it up? What goes into it?

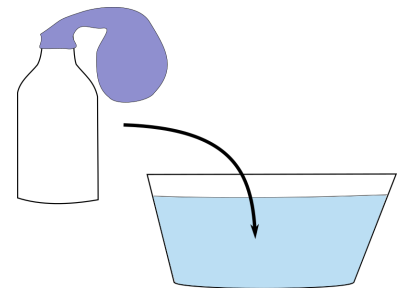
1. Attach a balloon to the neck of a bottle that has its bottom cut off

2. Make a prediction: What will happen to the balloon when you push the bottle under water, open end down?

Inflates

deflates

does nothing



3. Test your prediction. What happens to the balloon?

Inflates

deflates

does nothing

When you pushed the bottle down, where was the pressure higher?

Inside the bottle

outside the balloon

How did the air move when you pushed the bottle down?

from inside the bottle into the balloon

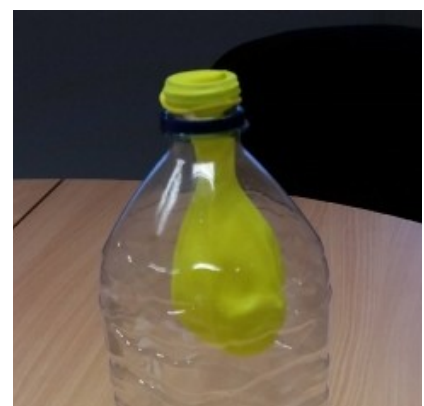
or

from the outside into the balloon

4. Place a balloon inside the plastic bottle with a small hole in its bottom. Pull the neck of the balloon over the bottle entrance from the inside.

5. Can you find a way to use the large syringe to inflate the balloon without touching it? Try it!

- When you suck out the air from the bottle, there is more space left for the remaining air - this lowers the pressure in the bottle.
- Air from outside comes into the balloon (high pressure outside to low pressure in bottle), so the balloon inflates.



Part 3: Model Lung

Activity from: <https://www.mombrite.com/balloon-lung-model/>

1. Put a balloon inside the open-bottom bottle and attach to the neck.
2. Take a 2nd balloon. Tie a knot in it. Cut off the bottom of the balloon.
3. Attach the cut balloon to the open bottom of the bottle. The knotted end should be sticking out. There should still be an inverted balloon hanging from the neck of the bottle.



4. Make a prediction:

What do you think will happen when you pull out on the knotted end of the cut balloon?

5. Try it and see if you were right!

What happens to the volume inside the bottle when you pull out on the balloon? Does it:
increase decrease remain the same

What happens to the air pressure inside the bottle when you pull out on the balloon?
Does it: increase decrease remain the same

Where does the extra air in the balloon come from? _____

Your lungs work in the same way. The diaphragm is a muscle below your lungs. When it is pulled down, the lungs increase their volume and inflate like a balloon. This makes air enter into the lungs from outside --- you breathe in!

Fun science fact:

You can't directly "pull" a fluid!
"Sucking" always involves expanding the volume of a container to lower the pressure and make fluid from outside come in.

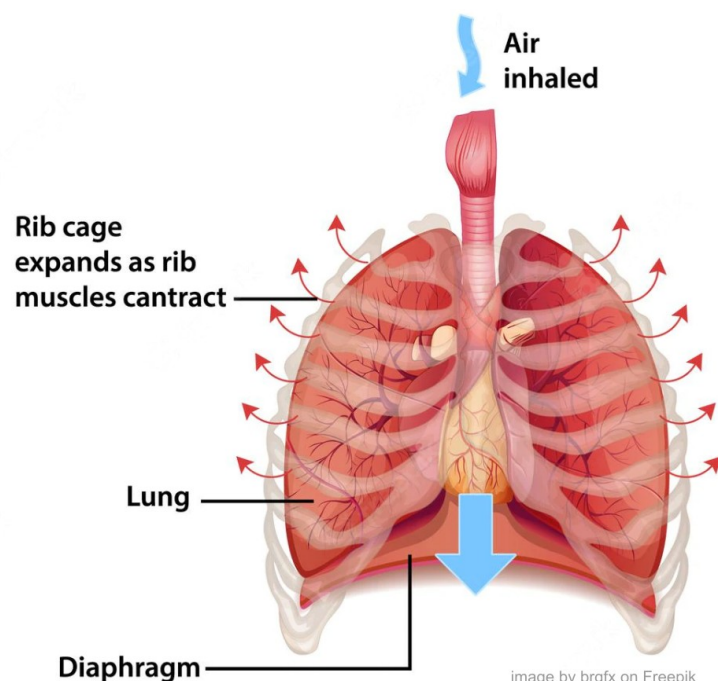


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