

# Puff Bottles

*Science begins with questions, and the direction science will take in the future will depend very much on the kinds of questions you're going to ask. Try this activity to get your friends puzzling away!*

## Safety

Remember to be healthy by **not sharing your balloon** with others - they can use their own balloon or build their own bottle! Also, make sure you **get a grown up to drill the hole** in the bottom of the bottle that you'll need.

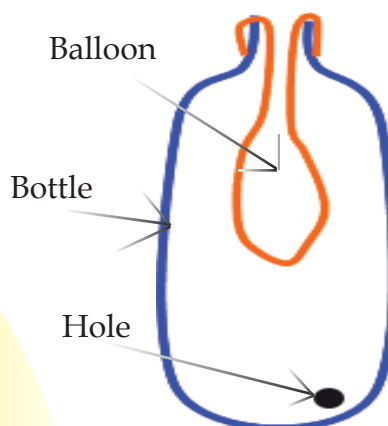
## Materials:

- Empty soft drink bottles (lids are not required). Small tops and wide sides, are preferred, with labels removed. Strong, plastic bottles are best - larger ones tend to crumple.
- You'll need a grown up to drill a small hole in the bottom of the bottle - as large as possible, but still small enough to cover with your finger (3-4mm is usually best).
- A balloon large enough to cover the opening of the bottle. (Water balloons won't do - unless you have a *very* small bottle!)



## Building Puff Bottles:

- Gather the materials.



- It is helpful if you stretch your balloons out several times first. This makes it easier to blow them up.
- Push the balloon into the bottle and pull the end back over the lid (see the picture). Be sure the balloon seals around the entire top so that no air can escape around the edge.

## Using the Puff Bottles:

A little bit of magic science can go a long way! Blow up the balloon. Then, while you click or tap with one hand you also hold the hole closed with your other hands' finger - and the balloon stays up! Wait as long as you like and when you're ready, click again and remove your finger - the balloon will 'magically' deflate! Can your friends and family work out how you do it?

*Remember - finger off to inflate, finger on to keep the balloon inflated... with the magic of science!*



### Why it Works

There are many very good explanations of why this works - here's mine: all air everywhere is pushing all the time - we call it air pressure and it happens because there is a lot of air between you and outer space. It's pushing down and around you. (And it's not pushing lightly - it's pushing very hard!)

### Explain More!

When you blow up the balloon you push the air out of the lower part of the bottle. But then you cover the hole with your finger preventing any air from pushing its way back into the bottle *except* through the balloon which is still open to the outside air - and it pushes the balloon in as far as it can go until it balances the air pressure inside the bottle. Release the hole, and the air can push into the bottle from both sides of the balloon. As the air pressure evens out the balloon (which was pulled tight like an elastic band) returns to its preferred shape - an uninflated balloon!

*To help us understand this better, we'll need to explore an idea called pressure, which is a foundational concept we'll come back to in other topics like, space, weather, etc!*



*Asking questions is the **FIRST STEP** in science!*

