

Primary science investigations

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# The leaky bottle



# The leaky bottle

## We will be:

Exploring air pressure – how does the area of an object affect the forces created on it?



# Learning objectives

## Understanding

- I understand that pressure comes from a push (force) on an area of an object.
- I understand that air is all around us and creates pressure on objects.
- I can observe that although I may not feel air pressure I can see what it does.



# Useful vocabulary

- **Air:** a mixture of gases that surround us and which we breathe. It is made up of about 78% nitrogen, 20% oxygen, and less than 2% argon, carbon dioxide, water vapour and other gases.
- **Force:** a push, pull or push and pull which occurs whenever objects come into contact with each other.
- **Pressure:** a measure of a force over a specific area. So, **air pressure** is the amount of force exerted by air on a given area.
- **Gravity:** the force which pulls all objects downwards towards the centre of the Earth.



What does it mean to be...

# UNDER PRESSURE



Pair and Share





If you sit on the bottom of a swimming pool it feels very different to sitting in class.

That's because there's a different **force**, pressing against you.

This creates **water pressure**.



# Air pressure

**Air pressure** is all around us, all of the time. We don't notice it because we're so used to it, **BUT** it's always pressing on us.



# Method

## Part One

1. Put your ruler on the table with about 10 cm hanging over the edge.
2. Scrunch a sheet of newspaper into a ball and place this on the table-end of the ruler.
3. Predict what will happen if you strike the ruler with the side of your palm!
4. Using the side of your palm, try to 'chop' the ruler. Don't use your other hand to brace the ruler!

**Was your prediction right?**





## Part Two

1. Set your ruler up just like in Part One.
2. Place a **flat** sheet of newspaper over the part of the ruler that is on the table. Use an identical sheet of paper to last time. **Smooth the paper** over the ruler so that there are **no air pockets**.
3. Again, predict what will happen when you strike the ruler with the side of your palm.
4. Using the side of your palm, try to 'chop' the ruler. Don't use your other hand to brace the ruler!

**Was your prediction right?**

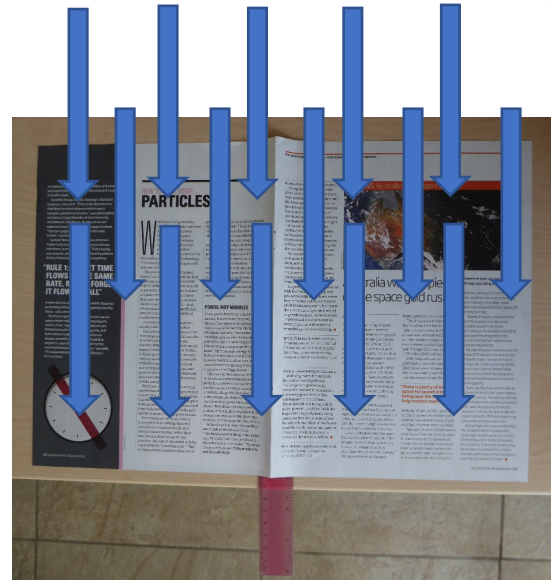


# So, what's going on?

The crumpled up paper has a small surface area, so only a narrow column of air pressure can hold it down. This is easily overcome by the force of 'chopping' the ruler!



The flat paper has a large surface area, so there's lots of space for air pressure to act on and so hold the paper down. This is enough to be greater than the force of the chop!

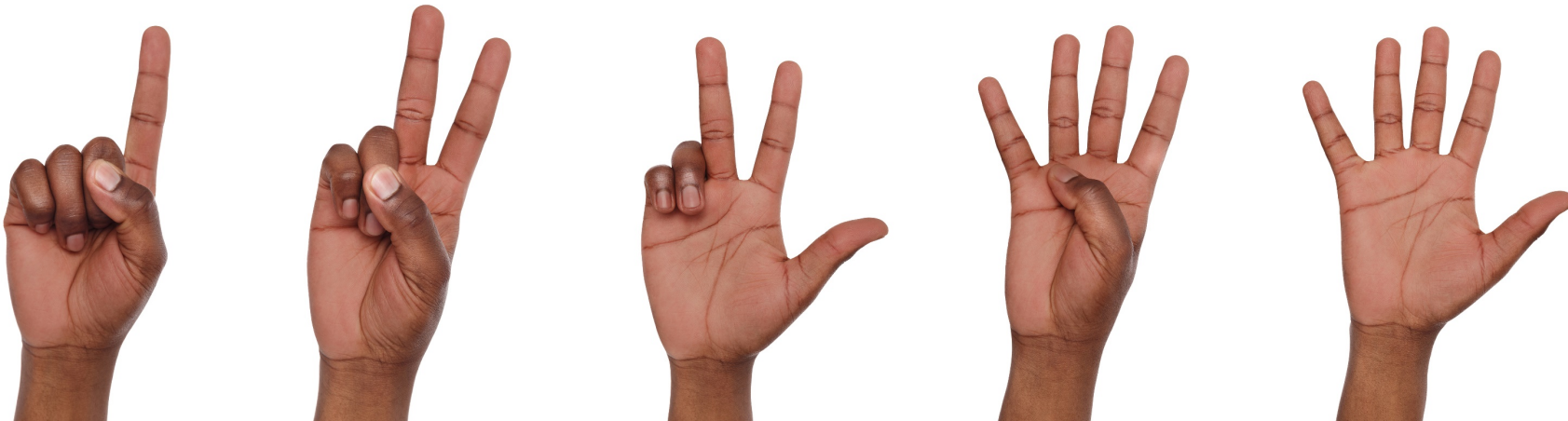


# Evaluation

How do you feel about our **learning objectives** today?

- I understand what is meant by the word 'pressure'.
- I understand that the air around us causes pressure on all of the objects it touches.
- I have observed that, although I may not feel air pressure I can see what it does.

If you feel confident, show your teacher 5 fingers, or show 1 if you feel that you need to chat through the lesson again.





# Acknowledgements

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