

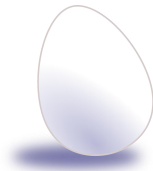
# How it works - Egg in a bottle

*Best done as a teacher demonstration at the front of the class for younger students due to use of matches*

## Before the experiment:

*Get each group to take turns measuring:*

The height of the bottle  
 The width of the bottle  
 The size of the bottle opening  
 The length of the egg  
 The width of the egg  
 The circumference of the egg



## Investigate:

### What measurements did the class get?

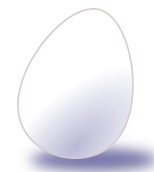
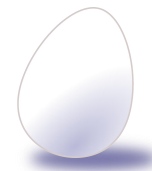
In small groups students investigate what measurement the class got by going and asking each group and recording the data in their *Egg in Bottle Measurement Charts*

## Analyze the Investigation Data:

Once they have filled in *Egg in Bottle Measurement Charts* then give them time to answer the questions below the chart, then go over each one in a class discussion

## QUESTIONS:

- ✧ **The height of the bottle**
  - What was the largest height recorded?
  - What was the smallest height recorded?
  - What was the average height recorded?
- ✧ **The width of the bottle**
  - What was the largest width recorded?
  - What was the smallest width recorded?
  - What was the average width recorded?
- ✧ **The size of the bottle opening**
  - What was the largest opening recorded?
  - What was the smallest opening recorded?
  - What was the average opening recorded?
- ✧ **The length of the egg**
  - What was the largest length recorded?
  - What was the smallest length recorded?
  - What was the average length recorded?
- ✧ **The width of the egg**
  - What was the largest width recorded?
  - What was the smallest width recorded?
  - What was the average width recorded?
- ✧ **The circumference of the egg**
  - What was the largest circumference recorded?
  - What was the smallest circumference recorded?
  - What was the average circumference recorded?



*In this experiment we see a demonstration of the power of pressure*

*It may look like it is suction at first glance - but it is not.*

**It is high pressure winning over low pressure.**

**Observation Questions to ask:**

Can you see the egg is bigger than the opening of the bottle?

What is the air pressure inside and outside the bottle before the experiment, is it the same?

Did you see the flame which causes heat?

*As the paper burns inside the bottle the pressure goes up*

Did you see the egg being placed on top of the bottle?

*The egg on top seals up the bottle for a bit*

Did you see the egg jiggle on the top of the opening?

*This is because the egg still allows high pressure to force the air out of the bottle*

Did you see the flame go out?

*When all the air is forced out of the bottle, the burning paper runs out of oxygen and can't burn any more.*

*When the flame goes out, the bottle cooled and the air temperature goes down, so does the pressure.*

Did you see the egg go into the bottle?

*The pressure on the outside of the bottle is higher than the pressure on the inside of the bottle.*

*The high pressure wins over low pressure and air pushed pushes the egg in the bottle.*

**Things to remember:**

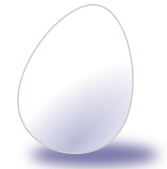
This experiment demonstrates the power of pressure.

In the experiment you see high pressure winning over low pressure.

When temperature goes up, pressure goes up, too in a fixed environment

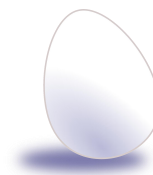
**According to the ideal gas law**, the pressure will rise as the temperature increases so long as the volume remains fixed

$$PV = nRT$$



**The ideal gas law is often written in an empirical form:**

where P, V, T and are the pressure, volume and temperature and n is the amount of substance; and R is the ideal gas constant.



**It is the same for all gases.**

