

Questacon at HOME

Activity sheet

Rising Water

Background

In this experiment, we are going to experiment with water levels using an upside-down drinking glass and air pressure. Air pressure is the effect of air pushing on everything it touches, even you! Air will push with more or less force if you change its temperature. When air warms up, the air particles start to move around a lot more and start to push against surfaces with more force. Here, we are going to warm up air using a small flame and see what happens to the water.

Materials

- A large drinking glass
- A small tea-candle that will comfortably fit inside the glass
- A tray, plate, or wide bowl
- Water
- A lighter or matches



Procedure

Experiment with a candle: Light the candle in a safe location. Once the candle is burning, place the glass over the top. Observe what happens!

Experiment with water: Fill the tray with water to a depth of 2-3cm and place the candle on top so it is floating in the middle of the tray. Light the candle and place the glass over the top. Observe what happens!

Safety

Fire can be dangerous – do not touch hot objects or leave fire unattended. Water can be a slipping hazard. Adult supervision is recommended for young experimenters.



Tips & tricks

- If you are having trouble seeing the water rising, try using a larger candle (stick it into a ball of playdoh or Blu Tac to hold it in place), or try creating a larger flame by letting the candle burn for longer before placing the glass over the top.
- Adding detergent to the rim of the glass can make the movement of air more obvious.

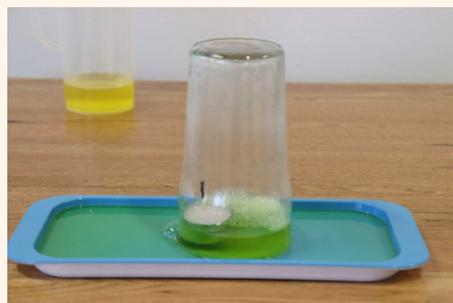
What's the Science?

Fire requires fuel, oxygen and heat to burn; if any of these three things are removed, the fire will go out. When we place the glass over the top of the candle, we are limiting the amount of oxygen available. As the fire burns, it consumes the oxygen inside the glass, and produces carbon dioxide and water vapour. Once it has used up all the oxygen within the glass, the fire goes out.

When air heats up, its particles move faster and take up more space; this means that hot air has higher pressure. When air cools down, its particles move slower and take up less space; this means that cold air has lower pressure. When the candle is burning, it heats up the air inside the glass. As the air heats up, its pressure increases, and the air tries to expand and push its way out of the glass. It does this by bubbling out of the bottom of the glass. When the candle goes out, the air cools back down and the pressure decreases. As the air pressure outside the glass is now greater than the air pressure inside the glass, the outside air tries to push its way back in, but it can't! Instead, the air pushes some of the water inside the glass in its place.

What questions could I ask?

- What do we need to make fire?
- What is inside the glass?
- What do you think will happen when we put the glass over the candle?
- Why do you think the water rises?



What's next?

Comparison challenge: Try making small changes to the equipment and comparing the results to the experiment you have just conducted. For example, what happens if you use two candles instead of one? What about changing the temperature of the water (cold vs hot)?

