# Home experiment: Liquid flow.

One of the most important properties of a liquid is its ability to flow, but different liquids behave in different ways.

**Viscosity races**

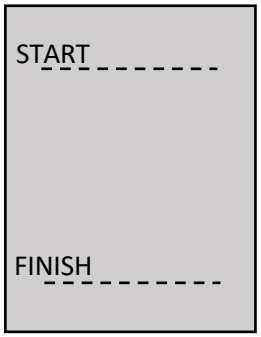
Some liquids flow easily (for example water) but some flow more slowly (for example ketchup or honey). Those that flow more slowly are described as more 'viscous'. We are going to compare the **viscosity** of several different liquids by racing them against one another.

**You will need:**

- A selection of different liquids (just a few $cm^3$) of each. (You could try: water, milk, honey, shampoo, bath gel, different types of oil, ketchup etc…)
- A tray to carry out your experiments in.
- Paper towels for cleaning up!
- A smooth flat sheet of splastic, metal or non-absorbent card.
- A timer (e.g. use a mobile phone)

**What to do**

- Mark two lines 15cm apart on the sheet, mark one START and the other FINISH
- Place the sheet horizontally in the tray.
- Put a small amount of one of the liquids just behind the START LINE.
- Start the timer and at the same time tilt the sheet so that it is at 90 degrees to the tray and the liquid can flow toward the finish line. Stop the clock when it gets there.
- Record the time. Do this three times for each liquid.




The longer the time the greater the viscosity.

| Liquid | Time/s (1st trial) | Time/s (2nd trial) | Time/s (3rd trial) | Average time / s |
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Which liquid has the highest viscosity?

Which liquid has the lowest viscosity?

**Further investigations:** How does the viscosity of a liquid change if it is heated? (Think about honey).

The Science: Viscosity is resistance to flow. Liquids that consist of large or long chain molecules have larger viscosity because it is difficult for the molecules to get past one another.

The study of how things flow is called Rheology.

# Strange behaviour – a non-Newtonian liquid

**WARNING** – this can be messy. Wear old clothes and do the experiments carefully! When you have finished your experiments make sure you dilute the liquid with lots of water before pouring it down the sink otherwise you might cause a blockage!

**What you will need**

- A large mixing bowl
- Corn starch or custard powder (the more the better!)
- A large spoon to stir with
- A small hammer
- Rubber gloves

Mix 2 parts of custard powder or corn starch with 1 part water (e.g. ten spoons of powder to five of water) in a large bowl, stirring slowly until all the lumps have gone and it looks like a liquid.

**Experiments**

- Try moving the spoon slowly through the liquid.
- Now try to move it quickly.
- Put on your gloves and try to make a ball from the liquid – do this fast and then slow.

What do you notice?

How can you describe this in terms of the viscosity of the liquid?

- Try hitting the surface of the liquid with a small hammer (DON'T DO THIS IF IT IS IN A BREAKABLE BOWL!!!).
- Try punching it (put a glove on first).

What do you notice?

Can you explain this from what you learnt in the first experiment?

**Waking on custard…..**

The clip below is from the show Brainiac.

https://youtu.be/BN2D5y-AxIY

Did you know that you can walk on custard? But if you stand still you sink and the harder you try to pull yourself out the more it grips you!

Quicksand works a lot like this.

The liquid you made is an example of a Non-Newtonian fluid. Its viscosity increases as you try to make it flow faster.