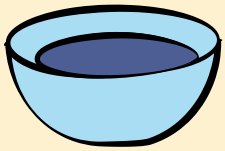
The floating needle

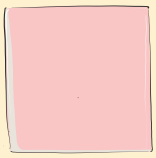
Have you ever wondered how insects walk on the surface of water ? They are light but how do they really do that ? There is a scientific phenomenon that physicists call « surface tension ». We will try to understand together how it works.

What material do you need ?


A needle


A bowl


Scissors


A sheet of toilet paper


Water

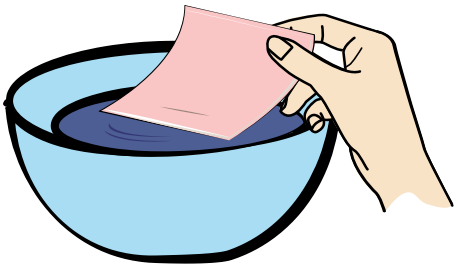
Ready ? Let's experiment !

1

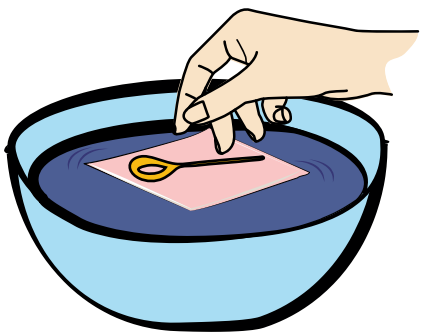
Fill the bowl with tap water.
Drop the needle into the water. What do you observe ?
Is it sinking ? Well, ... yes !

2

Get your needle back and dry it.
Now place the sheet of toilet paper on the surface of the water.

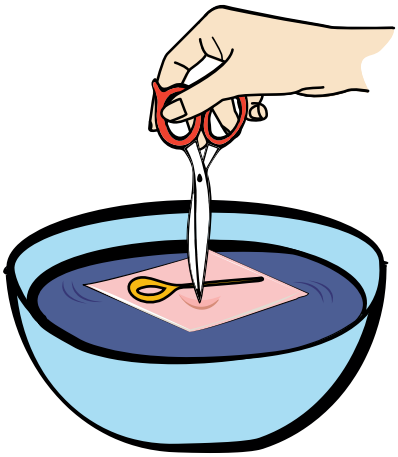


3



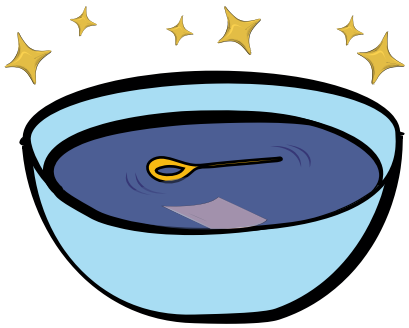
Then carefully put the needle on the piece of paper horizontally.

The floating needle (end)



4 With the tip of your scissors, push softly on the sheet of paper to make it sink into the water.

5 Now your needle is floating on the surface.
Unbelievable !!



6 To keep on having fun with this experiment, you can try again with hot water or water and dish soap, and see if it makes any difference. Will the needle still float or not ?

Why does it work ?

There are forces that push on the needle and keep it on the surface of the water. When you place the needle perfectly horizontally on the water, the force making it floats is at its maximum. This force is called **surface tension**.

On the surface, water can be seen as a « skin ». The particles organize themselves there to reduce contact with air. They are therefore closer to each other and more compact. It is this compact layer of surface water that allows the needle to float, because this surface tension is strong enough.

Why does the soap make the needle sink ?

The soap spreads over the surface and « breaks » this compact membrane made up of water particles. The surface tension decreases to the point wheret it's no longer strong enough to hold the needle. That's why it sinks.