

## Vortex

**What to do:** Turn the wheel to control the vortex.

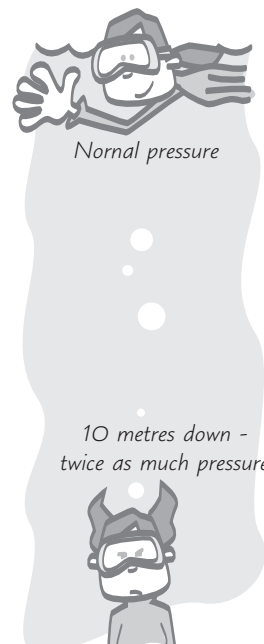
**What happens:** As the water spins round, the pressure is reduced in the middle. The surface curves down and forms an air tube or vortex.

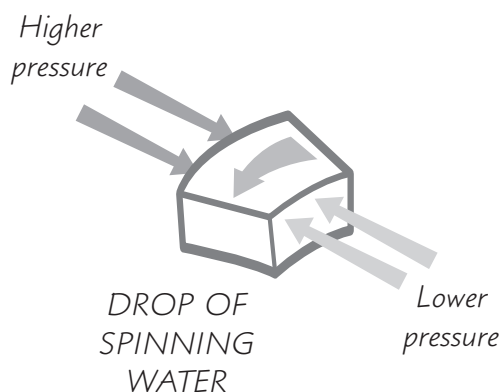
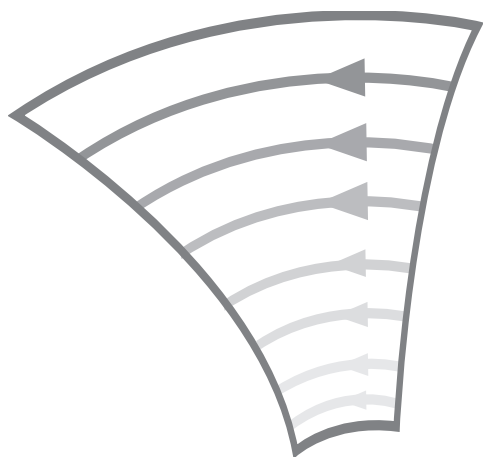
### HOW IT WORKS

1. Water in the perspex cylinder behaves like the water in your bath when it flows out through the plughole – only on a giant scale! You can make the middle of the whirlpool reach right down to the bottom of the cylinder.
2. As the water is pumped out of the bottom of the cylinder, it tends to spin round as it flows out of the “plughole”. Fluids almost always start to spin when they flow – any slight disturbance to a straight flow will set up whirlpools. Dip a teaspoon into your cup of tea or coffee and move it sideways – you will see vortices forming on either side of the spoon.



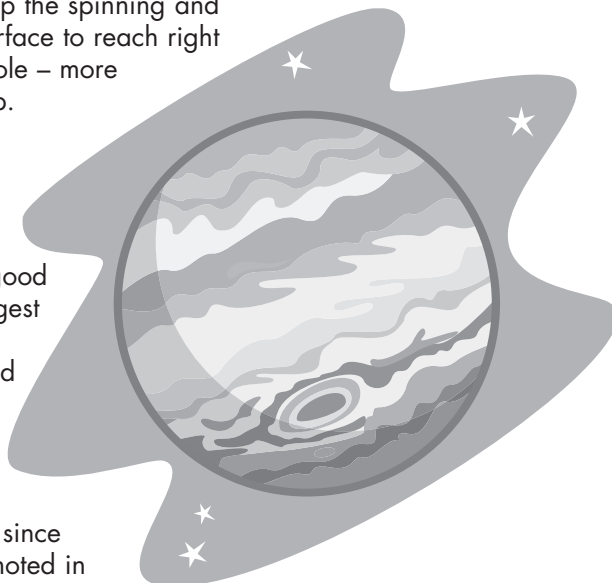
3. Why does the surface curve downwards when the water spins? Anything going round a curve needs a force inwards to stop it from going in a straight line. Think of a hammer-thrower in the Olympic games – the athlete needs to pull inwards very strongly as he spins round before letting go!
4. In still water, the pressure increases as you go deeper – you can feel it on your eardrums if you dive or swim at depth. Ten metres down you have doubled the pressure on your body.





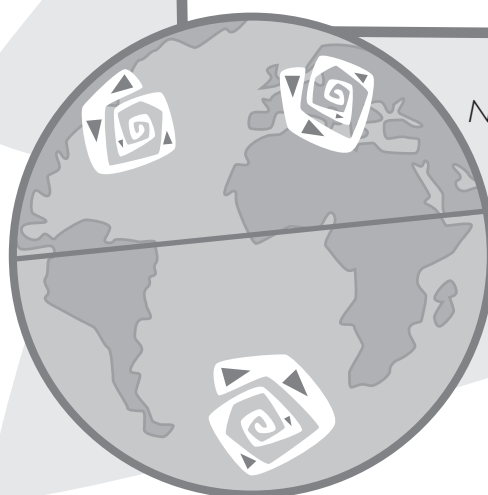
5. A spinning fluid has higher pressure on the outside of the curve in which it is moving than on the inside, so the pressure at any level is lowest in the middle. All of the surface must be at atmospheric pressure – that is where the air meets it – so the surface dips down, keeping this surface pressure on the inside of the curve. Speed up the spinning and you can get the surface to reach right down to the plughole – more than 2 metres deep.

6. Want to see a big vortex? Look at a picture of the planet Jupiter, or view it through a good telescope. The biggest vortex in Jupiter's atmosphere – called "the great red spot" – is bigger than the earth's diameter and has been spinning since before it was first noted in the seventeenth century.



7. The high winds in tropical storms in the atmosphere may turn into huge vortices. Hurricane "Camille" in 1969 was the most destructive hurricane on record in the USA – with wind speeds up to 300km/hour and the lowest atmospheric pressure ever recorded there (10% below normal) in the middle.

8. Some people believe that water spins anti-clockwise in the Northern Hemisphere and clockwise in the Southern Hemisphere when it flows down the plughole. In the same way that winds rotate around regions of low pressure. The effect – called the "Coriolis effect" is due to the rotation of the earth – and is much too tiny to affect your bath water! Try it and see - stir the bath water around before you pull out the plug and see if that has any effect.



*Northern Hemisphere*

*Southern Hemisphere*