Arrangement of particles

We have learnt that matter can exist in 3 different states: solids, liquids and gases. All the materials around us are in one or more of these three states. For example, you have all three states in your body! There is bone in your skeleton. There is water in your blood. There is air in your lungs. We have also learnt that each of the states (solids, liquids and gases) has unique properties:

- Solids keep their shape.
- Liquids flow and take the shape of their container. They fill up a container from the bottom up to a certain level. They take up a fixed amount of space in the container.
- Gases also flow and take the shape of their container. They always fill up the whole space of the container and will escape if the container is open.

We know when we have a solid or a liquid. It is easy to see a solid or a liquid. We cannot normally see gases. We can still check that gases are present by seeing their effects.

Why do solids keep their shape but liquids and gases flow? Why does a liquid stay inside an open container (unless it is poured out), but a gas escapes?

We have to look deep inside each state for the answers to these questions. We will have to use our imaginations like never before!

Did you know that all matter is actually made up of very small particles? These particles are called atoms and molecules, and we will learn more about them much later. For now, we are going to use the term particle to describe the smallest 'building blocks' that matter is made of.

The particles that matter is made of are very, very small. Much, much smaller than a tiny grain of sand. Much, much smaller even than a speck of dust! Do you have any idea how small that is?

The particles that matter is made of are much too small to see with the naked eye. They are even too small to see with a strong microscope. So how do we know they exist? Scientists, with special microscopes and other special scientific instruments, have collected evidence that they exist. It is now a well-known and accepted fact that all matter is made up of particles.
The particles in a solid

Let's imagine that we can shrink ourselves down to the size of such a 'matter particle'. We would see the particles in the solid are packed tightly together. This explains why solids cannot be squeezed into a smaller shape - solids cannot be compressed.

We would also see that the particles in the solid have fixed positions; they cannot move from their positions. This explains why solids keep their shape.

The particles in a solid.

The particles in a liquid

When it looks like the water inside a glass is still, the water particles are constantly moving!

If we could shrink ourselves down to the size of a 'matter particle', and we could look around inside a liquid, we would see that the particles in the liquid are also very close together. Like solids, liquids cannot be compressed either.

Unlike solids, the particles in a liquid do not have fixed positions. They are always moving around. This explains why liquids flow, to take the shape of their container.

The particles in a liquid.

The particles in a gas

If we could shrink ourselves down to the size of a 'matter particle', and we could look around inside a gas, we would see that the particles in the gas are far apart. The spaces between the particles are huge compared to the size of the particles themselves. These spaces are empty! Gases can be compressed - they can be squeezed into a smaller shape by pushing them closer together. We can make the spaces between them smaller.

The particles of a gas are always moving freely. If they are in a closed container, they will spread out to fill the whole container. If they are in an open container they will not stay inside for long. They will flow out of the container, and disperse (disperse means to spread out over an area or space.)