Winchester Science Centre
By Wonderseekers

Solid. Liquid. Squish!

Pre-visit resources for KS1

Solid. Liquid. Squish! KS1 Pre-visit Activities

These activities are designed to be completed before you visit for your Solid. Liquid. Squish! workshop. We recommend working through the activities from 1 to 3 but you are welcome to pick and choose depending on your group's prior knowledge and any ideas they may spark along the way.

Through these activities, the class will be looking at different materials and begin relating materials to states of matter. You will be exploring the different states of matter, comprising solids, liquids and gases. We will begin to explore how some substances can be in different states of matter when exposed to heat.

Teacher Guide:

Learning Objectives:

- To start to identify materials as solids, liquids, or gases.
- To observe that materials can change when heated.

Key Science:

We define anything in our world that has mass and takes up space as matter. All matter is made up of particles. We tend to group matter into three main groups; solids, liquids and gases. We group them because their particles are all arranged in different structures and this causes them to behave differently. The particles in a solid are bonded together in a strong structure. They can be held in our hands and often keep their shape unless we change it. This could be done by cutting or squeezing. Some solids include sand, stone and most metals. The particles in a liquid are still bonded but have weaker bonds than those of a solid. This means there is more space between the particles allowing them to move around more. This allows liquids to flow or be poured. They can also change their shape to fit any container, although they will always take up the same amount of space. The most common liquid we have on Earth is water. The particles in a gas are much freer, having lots of space because the bonds they have are very weak. This allows gases to change their shape and their volume to fill any container they are in. Most are invisible but are really important to us here on Earth. Gases like oxygen allow us to breathe and make up a part of our atmosphere.

Some things in our world can change their state of matter. The best example of this is water. Water usually exists as a liquid but it can be frozen into ice to become a solid or evaporated into water vapour or steam.

Curriculum links:

- Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses
- Compare and group materials together, according to whether they are solids, liquids or gases

Key Definitions:

Solid - Something that stays in place and can be held. Solids keep their shape and do not flow. Solids take up the same amount of space, they do not spread out like gases. Solids can be cut or shaped. Even though they can be poured, sugar, salt and flour are all solids.

Liquid - Liquids can flow or be poured easily. They are not easy to hold in your hand. Liquids change their shape depending on the container they are in. Even though they can change their shape, they always take up the same amount of space.

Gas - Gases are often invisible. They do not have a fixed shape, they spread out and change their shape and volume (space they take up) to fill up whatever container they are in. Gases can be squashed.

Materials - Matter of substances that objects are made from. Different materials have different features, or properties, which make them suitable for different uses.

Freezing - Freezing is when the state of matter changes from a liquid to a solid, usually accompanied by a loss of energy in the particles. It can be triggered by a change in temperature.

Melting – The change in state of matter from a solid to a liquid, accompanied by a gain of energy in the particles. It can be triggered by a change in temperature.

Evaporating – The change in state of matter from a liquid into a gas, accompanied by a gain of energy in the particles. It can be triggered by a change in temperature.

Condensing - The change in state of matter from a gas to a liquid

Non-Newtonian fluid - A non-Newtonian fluid is a fluid that does not follow Newton's law of viscosity, that is, it has variable viscosity dependent on stress

Activity 1: What's the Matter? (10 min)

Overview

This activity introduces the class to the different states of matter with a focus on their properties instead of particles. Using their properties, the class will sort and classify everyday items into solids, liquids, and gases.

You will need

- Prepare images or have real objects for the children to sort
- Labels, these could be signs or boxes for: SOLID, LIQUID, GAS

Instructions

1. Gather the class together and introduce the concept of solids using a few different physical examples, such as a block of Lego for solids, a cup of water and a plastic bag filled with air.
2. One at a time, pupils pull a card or object from a bag. Ask:
    - "What is it?"
    - "What do you think—solid, liquid or gas?"
    - "Why do you think that?"
3. Place it under the right label (solid/liquid/gas).
4. Wrap up with a discussion:
    - "Which ones were tricky?"

Activity 2:
Spot the State! Matter Hunt (10 min)

Overview

In this activity students will look around the classroom to identify everyday materials and classify them as solids, liquids, or gases based on their physical properties. This helps further familiarise students with the different states of matter and gets them to think about how many different states of matter they have around the room.

You will need

- Three sets of different coloured stickers of post it notes.
- Ensure there are a few examples of liquids and containers nearby (e.g. a water bottle, glue stick, hand sanitiser).
- Timer.

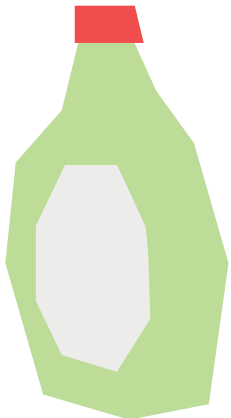
Instructions

1. Group the class into pairs for this activity. Reintroduce the properties of solids, liquids and gases as a reminder.
2. Give each pair one of the three coloured stickers/post-its. Identify which colour relates to each state of matter, for example solid = green.
3. Tell the class they have a few minutes to explore the classroom. If they see something they think is their assigned state of matter, they should stick their identifier on it.
4. Once they have run out of time, go through each of the states of matter with the class. They should find lots of solids, a few liquids and very few gases. There are lots of each, but due to the properties of solids, it is easier to stick something on them – which we can't do with gases even when there are lots around.

Take it further

As the class explores, ask some of the following questions to get them to think more about their state of matter:

- "Can you hold it in your hand?"
- "If you poured it, would it spread out?"
- "Can you squash or squeeze it?"
- "Is it invisible but still there?"



Activity 3: Melting Magic (20-25 minutes)

Overview

In this activity we are going to see how states of matter can start to change. You will observe how heat can change a material (chocolate) from a solid to a liquid, and discuss how it happened.

You will need

- Small paper plates or trays
- Chocolate buttons – avoid filled chocolate and ice cubes can be used instead if there are allergens.
- Pencils
- Paper
- Sticky notes or labels marked **WARM** and **COOL**
- Access to a warm spot (e.g. sunny windowsill, near a radiator—not hot) and a cool spot (e.g. shaded corner)

Instructions

1. Reintroduce the concept of solids, liquids and gases and their properties. Ask the class what they think chocolate or ice is. Ask them what they think will happen if it heats up.
2. Break the children up into groups. Each group will get two chocolate buttons/ice cubes, and two paper plates. They will need to place one button/cube on each plate and then label them "Warm" and "Cold".
3. Have the pairs record how each chocolate button or ice cube looks at the start of the experiment. They could do this with writing or a drawing.
4. Place the plate labelled "Cold" in a shaded area of the classroom and place the plate labelled "Warm" in a sunny area. Alternatively, the children could hold the chocolate button/ice cube using body heat to warm it.
5. Start a timer for 10 minutes. Split the groups in two and have half watch the "Warm" plate and the other half watch the "Cold" plate. Over these 10 minutes, have the children examine their ice cubes/chocolate buttons, and observe how they are changing.
6. At the end of the 10 minutes, have the children record how their ice cube has changed. Have the groups come together and share what happened with their ice cube.
7. Gather the group back together and have them share what happened. They have seen the chocolate/ice melt due to being exposed to heat. Depending on how high the temperature was, it melted faster.
8. Ask the children whether they still think that it is a solid. As you've melted it, it has changed from a solid to a liquid.