



Knowledge Organiser

Subject: Science

**Topic: Properties and
Changes of Materials**

Year: 5

Key Knowledge

- Compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets.
- Know that some materials will dissolve in liquid to form a solution and describe how to recover a substance from a solution.
- Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating.
- Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic.
- Demonstrate that dissolving, mixing and changes of state are reversible changes.
- Explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda.

Common misconceptions

- Thermal insulators keep cold in or out.
- Thermal insulators warm things up.
- Solids dissolved in liquids have vanished and so you cannot get them back.
- Lit candles only melt, which is a reversible change.

Key Concepts

Properties and Uses of Materials

Understand that materials have specific properties, such as hardness, solubility, transparency, conductivity and magnetic response, that determine their suitability for different uses.

Reversible and Irreversible Changes

Explore how some changes to materials are reversible (for example, dissolving, mixing and changes of state) and others are irreversible (for example, burning, rusting and certain chemical reactions).

Separating Mixtures and Solutions

Investigate how to separate mixtures and solutions, using techniques such as filtering, sieving and evaporation. Develop an understanding of how substances dissolve to form solutions and recover substances from solutions.

Key Learning

- Materials have different uses depending on their properties and state (liquid, solid, gas).
- Properties include hardness, transparency, electrical and thermal conductivity and attraction to magnets.
- Some materials will dissolve in a liquid and form a solution while others are insoluble and form sediment.
- Mixtures can be separated by filtering, sieving and evaporation.
- Some changes to materials such as dissolving, mixing and changes of state are reversible but some changes, such as burning wood, rusting and mixing vinegar with bicarbonate of soda, result in the formation of new materials and these are not reversible.

Disciplinary Skills

- Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.
- Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate.
- Comparing and grouping everyday materials, according to their properties.

**The Big
Question**

How can some materials change?

Key Vocabulary	
Material	The substance that something is made out of – for example, wood, plastic, metal.
Solid	One of the three states of matter. The particles in solids are very close together, meaning that they hold their shape.
Liquid	One of the three states of matter. A liquid can flow and take the shape of its container. Examples of liquids include water and milk.
gas	One of the three states of matter. The particles in gases are further apart than those in solids or liquids and they are free to move around. Examples of gases are oxygen and helium.
melting	The process of heating a solid until it changes into a liquid.
freezing	When a liquid cools and turns into a solid.



For example, glass is used for windows because it is hard and **transparent**. Oven gloves are made from a thermal **insulator** to keep the heat from burning your hand.



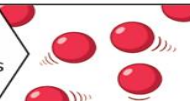
solid particles



liquid particles



gas particles



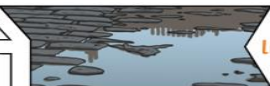
Changes of State

solid



The **solid melts**.

liquid



liquid



The **liquid freezes**.

gas



The **gas condenses**.

The **liquid evaporates**.

Linking Thinking Across Our Learning Journey						
Early Years	Year One	Year Two	Year Three	Year Four	Year Five	Year Six
	Everyday Materials Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock. Describe the simple physical properties of a variety of everyday materials. Compare and group together a variety of everyday materials on the basis of their simple physical properties.	Uses of Everyday Materials Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.	Forces and Magnets Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials.	States of Matter Compare and group materials together, according to whether they are solids, liquids or gases. Observe that some materials change state when they are heated or cooled, and measure temperature degrees Celsius (°C) Identify the processes of evaporation and condensation in the water cycle.	Properties and Changes of Materials	