

Topic:	Year group	Term
Properties of materials	5	Spring

Background knowledge

The children will already know a lot about the properties of materials from their work in Key stage 1 and lower key stage 2. They have investigated which materials are waterproof, strong, absorbent and transparent in key stage 1. In lower key stage 2, they will have sorted materials according to their ability to let light through, electrical conductivity, hardness (of rocks) and whether they are magnetic.

Common misconceptions

- Children may think that all solids and metals are hard.
- Children may think that all metals are magnetic.
- Children may think that only metals are conductors of electricity.
- Children may think that insulators are only used to keep things warm. They can also keep things cold. Ice melts when the heat in a room is transferred to the ice. An insulator slows down this transfer of heat.

What should I already know?

Year 1

I can distinguish between an object and the material it is made from.

I can explain the materials an object is made from.

I can name wood, plastic, glass, metal, water and rock.

I can describe the properties of everyday materials (hard, soft, stretchy, stiff, shiny, dull, rough, smooth etc.)

I can group objects based on the materials they are made from.

Year 2

I can identify and name a range of materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard.

I can suggest why a material might or might not be used for a specific job.

I can explore how shapes can be changed by squashing, bending, twisting and stretching.

Year 3

I can predict and test whether objects will be magnetic and carry out an enquiry to test this out.

I can sort materials into magnetic and non-magnetic.

I can compare and group rocks based on their appearance and physical properties giving a reason.

I can sort material into opaque, translucent and transparent.

Year 4

I can group materials based on their state of matter (solid, liquid, gas).

I can describe in simple terms the properties of different states of matter

I can sort materials into electrical conductors and insulators.

National Curriculum Objectives / Key Skills	The Journey
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. Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic. <u>Working scientifically</u> Use and develop keys and other information records to identify, classify and describe living things and materials (non-statutory). Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs. Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.	1. Test materials - magnetism, transparency and hardness 2. Test materials - electrical conductivity 3. Plan - insulating heat experiment 4. Investigate - insulating heat experiment 5. Evaluate - insulating heat experiment 6. Uses of everyday materials - plastic, wood and metal

Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate.

Using test results to make predictions to set up further comparative and fair tests.

Use relevant scientific language and illustrations to discuss, communicate and justify their scientific ideas (non-statutory).

Scientific enquiry



Outcomes

Working towards: I can sort materials according to their properties and start to relate a material's properties to its function. I can identify which materials are good at keeping things warm/ cool.

Expected: I can sort materials according to their properties and relate a material's properties to its function. I can identify which materials are good thermo-conductors and insulators.

Exceeding: I can sort materials according to their properties and confidently relate a material's properties to its function. I can identify which materials are good thermo-conductors and insulators giving reasons why.

Key Vocabulary

Timeline / Diagrams

Transparent - an object or material that allows all light to pass through it

Translucent - an object or material that allows some light to pass through it

Opaque - an object or material that does not allow any light to pass through it

Magnetism - a non-contact force created by a magnet

Hardness - a measure of how resistant a solid is to a change of shape or indentation when a force is applied

Electrical conductor - a material that lets electricity pass through it

Electrical insulator - a material that does not let electricity pass through it

Circuit - a complete path that allows electrical energy flow

Cell - a single device which produces electricity

Bulb - a part in a circuit that produces light

Thermal insulator - material that does not let heat pass through it quickly/efficiently/easily

Thermometer - a piece of equipment used to measure temperature

Control breaker - a beaker that is not wrapped in material so it can be used for comparison with other beakers

Temperature - a measure of how hot or cold something is

Anomalous result - a result that does not fit in with the pattern of the other results

Thermal Conductors

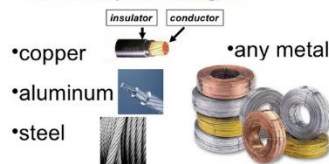
Materials that **transfer heat** quickly and effectively.

Metals such as iron, copper and aluminium are good heat conductors.



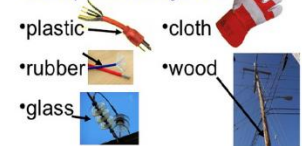
Conductor –

Any material that allows electric current to pass through it



Insulator –

Any material that does not allow electric current to pass through it
•like the protective coating on wires



Key people / places

NUSTEM- Materials engineer.

Famous scientist- Spencer Silver or Ruth Benerito.

Assessment questions / outcomes

- Are they magnetic?
- Are they hard or soft?
- Are they flexible or rigid?
- Are they waterproof?
- Can they be recycled?
- Are they expensive or cheap?
- Can they conduct heat or electricity?
- When would you need to keep something hot?
- When would you need to keep something cold?
- What are the independent, dependent and controlled variables in this experiment?
- What equipment will you use and why?
- How will you record your results?