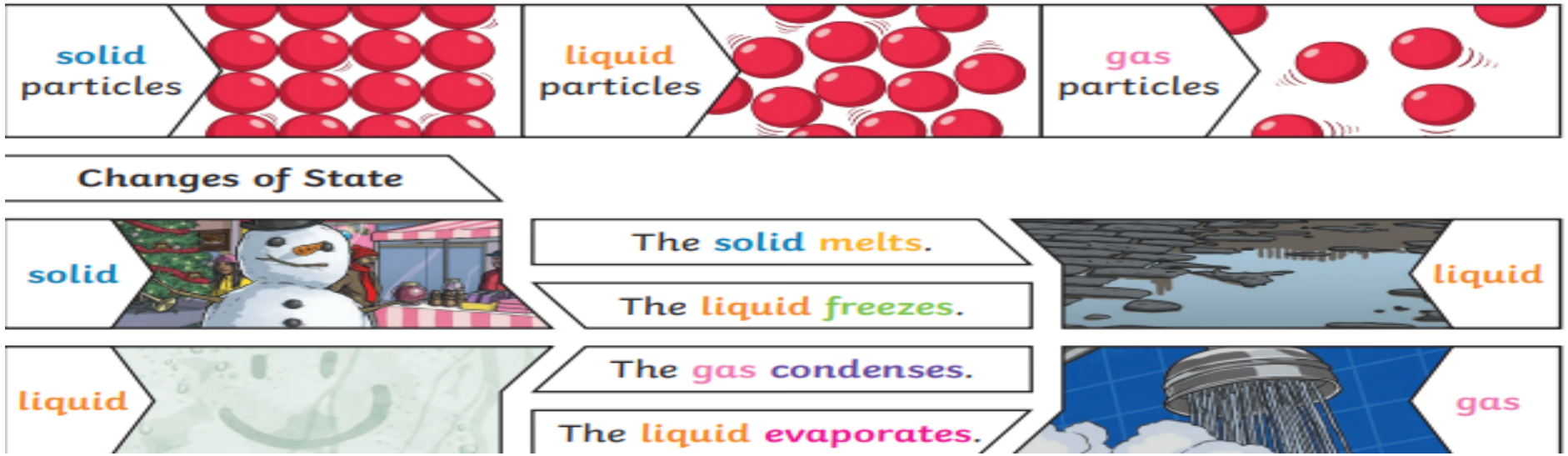
Year 5: Changing Materials

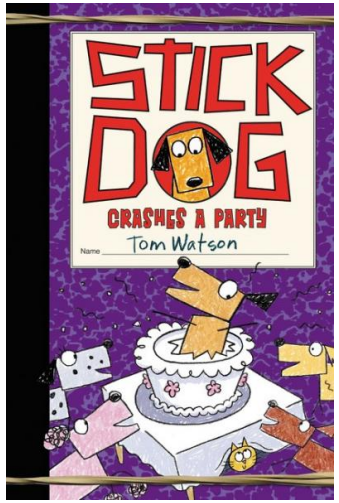
What should I already know?
How to compare and group materials together, according to whether they are solids, liquids or gases
How to use scientific evidence to answer questions and to support my findings.
observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C)

Science - Science is a subject where you ask questions about how the world works and find out the answers	Compare and group together everyday materials on the basis of their properties. Know that some materials will dissolve. decide how mixtures might be separated. Give reasons based on evidence from comparative and fair tests. Explain that some changes result in the formation of new materials.



Significant Information

Different materials are used for particular jobs based on their properties: electrical conductivity, flexibility, hardness, insulators, magnetism, solubility, thermal conductivity, transparency.
For example, glass is used for windows because of its hardness and transparency.

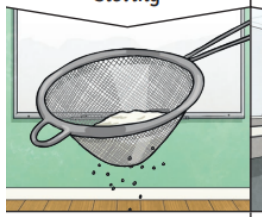


Interesting facts - an insulator is a material that does not allow heat or electricity to pass through it. Oven gloves are made from a thermal insulator So you don't burn your hands!

Glossary/Key Questions

Materials	The substance that something is made out of, e.g. wood, plastic, metal.
Evaporating	When a liquid turns in to a gas or vapour.
Condensing	When a gas, such as water vapour, cools and turns back in to a liquid.
How can materials be grouped together?	Materials can be grouped according to their properties.
How can we keep something cool?	We an keep something cool or warm by using thermal insulators or conductors.
How can we make a bulb brighter?	We can use good electrical conductors to make a bulb shine bright.
Has my material disappeared?	Some materials dissolve in liquid too form a solution.
How can I separate my mixture?	We can use filtering, sieving and evaporating to separate materials.
What are irreversible changes?	Some changes result in new materials; these cannot usually be changed back.

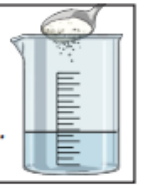
Reversible changes, such as mixing and dissolving solids and liquids together, can be reversed by:

Sieving	Filtering	Evaporating
		
Smaller materials are able to fall through the holes in the sieve, separating them from larger particles.	The solid particles will get caught in the filter paper but the liquid will be able to get through.	The liquid changes into a gas, leaving the solid particles behind.

Irreversible changes often result in a new product being made from the old materials (reactants). For example, burning wood produces ash. Mixing vinegar and milk produces casein plastic.

Dissolving
A solution is made when solid particles are mixed with liquid particles. Materials that will dissolve are known as soluble. Materials that won't dissolve are known as insoluble. A suspension is when the particles don't dissolve.

Sugar is a soluble material.



Sand is an insoluble material.

Science Year 5 – Properties and changes of Materials

National Curriculum Objectives:

- 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 wood, metals 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 this kind of change is usually not reversible, including changes associated with burning and the action of acid on bicarbonate of soda.

Prior Objectives:

- Compare and group materials together, according to whether they are solids, liquids or gases.
- Observe that some materials change state when heated or cooled, and measure and research the temperature at which this happens in degrees Celsius.
- Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature

Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5	Lesson 6
Skill – Group, compare Knowledge – Man made material is something created by humans.	Skill – Investigate Knowledge – Materials that allow heat to pass through easily are called thermal conductors.	Skill – Identify, investigate Knowledge – Materials that allow electricity to pass through are called electrical conductors.	Skill – Observe, investigate Knowledge – When a substance dissolves, it is mixed with the water to make a transparent liquid (solution).	Skill – Explore Knowledge – A reversible change is when materials can be changed back to how they were before	Skill – Explain Knowledge – An irreversible change is when something cannot be changed back to its original form.
WALT: Compare materials according to their properties. WILF: -Name materials -Describe materials -Group materials Look for different materials around the classroom & generate questions about these materials. E.g., Why is the window made of glass? Which materials are natural/man-made? Mystery box: feel & describe what inside the box Chn find materials in the classroom and describe them. (All states). Quick recap on how to use Venn diagrams. **Recording:** Chn use a Venn diagram to group objects.	WALT: Investigate thermal conductors and insulators. WILF: -Identify thermal conductors -Identify thermal insulators -Experiment safely Give chn pictures of different conductors and insulators and chn sort them in any way they want. Chn investigate which materials will be best to keep their lunch warm. Quick recap on how to create a bar graph. **Recording:** Create a bar graph to present results	WALT: Investigate ways to make a bulb brighter. WILF: -Identify electrical conductors -Identify electrical insulators -Experiment safely Why are wires not made from wood? Should I make a crocodile clip from margarine? Is the filament of a bulb made from metal? Create a circuit and then disconnect it. Chn test materials to complete the circuit. Focus on the name of the material and not the name of the object i.e. plastic and not ruler, metal and not pencil sharpener **Recording:** Sort electrical conductors and insulators	WALT: Investigate materials that will dissolve. WILF: -Identify soluble materials -Identify insoluble materials -Experiment safely What is dissolving? What is melting? Chn test whether different materials are soluble or insoluble in water. Record the time of how long materials take to dissolve. **Recording:** Create a bar graph to present results	WALT: Use different processes to separate mixtures of material. WILF: -Identify ways materials can be mixed -Know which method of separation will work. -Experiment safely Exp1. Separate salt and water using evaporation. Exp2. Paperclips + rice using magnets. Exp3. Flour + raisins using a sieve Exp4. Sand + water using filtering. **Recording:** Pictures and videos converted to QR codes.	WALT: Identify irreversible chemical changes. WILF: -Explain reversible changes -Explain irreversible changes -Create a video Heating: Raw egg (video) Mixing: Vinegar and bicarbonate of soda Burning: Wood (video) Look back at previous lessons to find which materials were reversible. Chn create video to show which changes are reversible and which are irreversible. **Recording:** QR Codes. Write explanations on fact cards.

Assessment: Use the vocabulary mat to assess the children's prior knowledge and use the mats again to assess what the children have learnt.

Key Vocabulary: Hardness, Solubility, Transparency, Conductivity, Magnetic, Filter, Evaporation, Dissolving, Mixing, dissolve, insoluble, suspension, chemical, physical, irreversible, solution, reversible, separate, mixture, insulator, transparent, flexible, permeable, soluble, property, magnetic.


hardness


solubility

transparency

conductivity


magnetic


filter

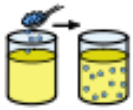

evaporation


dissolving


mixing


dissolve


insoluble


suspension


chemical


physical


irreversible


solution


reversible


separate


mixture


insulator

transparent


flexible


permeable


impermeable


soluble


property


magnetic