Eaton Primary School
Science
Knowledge Organiser

Unit of work
Properties and Changes of Materials

Year group
5

Prior learning

- A variety of everyday materials including wood, plastic, glass, metal, water and rock.
- The physical **properties** of a variety of everyday **materials** (including those that are **transparent**) and to compare and group **materials** on the basis of these **properties**
- How materials are suitably used based on their **properties**.
- How **magnets** and **electrical circuits** work.
- Some materials which are **magnetic.**
- How shapes of solid objects can be changed by squashing, bending, twisting and stretching.
- **Materials** that are **solids, liquids** and **gases** and their **particle** structure.
- Some **materials** change **state** when they are heated or cooled and the **temperature** at which this happens.
- The roles of **melting, evaporation** and **condensation** in the **water cycle** and the role **temperature** has on the **rate** of **evaporation**.
- Some rocks are **permeable.**

National Curriculum

Pupils should be taught to:

- 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.

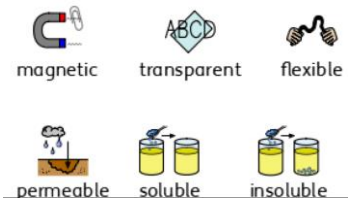
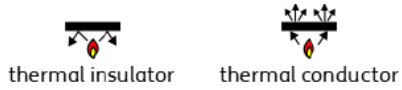
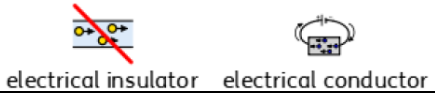
Investigate

- Find the best material to stop an ice cube from melting. Remember to keep it a fair test by using the same number of ice cubes, or same size and thickness material.
- Place the same amount of a hot liquid in a **thermal insulator** and **conductor**. Measure the temperature over time and plot these on the same line graph. Use the line graph to ask and answer questions.
- Find out if **thermal conductors** also make good **electrical conductors.**
- Explain the difference between **dissolving** and **melting.**
- Investigate which **materials** are **soluble** and **insoluble.**
- Design an experiment that investigates **dissolving** - consider which **variables** you could change including: size of beaker, amount of **liquid**, number of stirs, size of **solid**, **temperature** of **solid** (remember that for a fair test all other **variables** must remain the same).
- Create a variety of mixtures using materials such as salt, sand, water, paper clips and rice and use a variety of methods to separate them.
- Observe and compare the changes that take place when cakes are baked or bicarbonate of soda mixes with vinegar.

Vocabulary and definitions

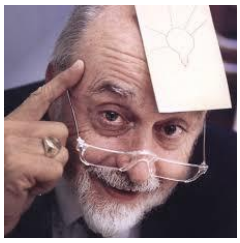
Word	Definition
circuit	a complete route which an electric current can flow around
condensation	small drops of water which form when water vapour or steam touches a cold surface, such as a window
conductor	a substance that heat or electricity can pass through or along
dissolves	when a substance is mixed with a liquid and the substance disappears
electricity	a form of energy that can be carried by wires and in used for heating and lighting, and to provide power for devices
evaporation	to turn from liquid into gas; pass away in the form of vapour.
filtering	a device used to remove dirt or other **solids** from **liquids** or **gases**. A filter can be made of paper, charcoal, or other material with tiny holes in it.
flexible	an object or material can be bent easily without breaking
gas	a form of matter that is neither **liquid** nor **solid**. A **gas** rapidly spreads out when it is warmed and contracts when it is cooled.
insoluble	impossible to **dissolve**, esp. in a given **liquid**.
insulator	a non-conductor of electricity or heat
irreversible	impossible to reverse, turn back, or change.
liquid	in a form that flows easily and is neither a **solid** nor a **gas**.
magnetic	having to do with magnets and the way they work
melting	to change from a **solid** to a **liquid** state through heat or pressure
particles	a tiny amount or small piece
permeable	of a substance, being such that **gas** or **liquid** can pass through it
process	a series of actions used to produce something or reach a goal.
properties	the ways in which an object behaves
rate	the speed with which something happens
resistance	the opposing power of one force against another.
reversible	able to turn or change back
solid	having a firm shape or form that can be measured in length, width, and height; not like a **liquid** or a **gas**
soluble	able to be **dissolved**.
solution	a mixture that contains two or more substances combined evenly
state	the structure or condition of something
temperature	a measure of how hot or cold something is
thermal	relating to or caused by heat or by changes in **temperature**
transparent	If an object is **transparent**, you can see through it
variable	something that can change or that has no fixed value
water cycle	the process by which water on the earth evaporates, then condenses in the atmosphere, and then returns to earth in the form of precipitation.

Knowledge/ Skills

How to group **materials** based on their **properties** using more complex vocabulary.	
What are **thermal insulators** and **conductors?**	• **Materials** which are good **thermal conductors** allow heat to move through them easily. • **Thermal conductors** are used to make items that require heat to travel through them easily, such as a saucepan which requires heat to travel through to cook food. • **Thermal insulators** do not let heat travel through them easily. • Examples of **thermal insulators** include woollen clothes and flasks for hot drinks. 
What are **electrical insulators** and **conductors?**	• **Electrical conductors** allow electricity to pass through them easily while **electrical insulators** do not. • **Electrical insulators** have a high **resistance** which means that it is hard for electricity to pass through these objects. 
What is **dissolving?**	• When the **particles** of a **solid** mix with the **particles** of a **liquid,** this is called **dissolving**. • The result is a **solution.** • **Materials** that **dissolve** are **soluble**. • **Materials** that do not **dissolve** are **insoluble**. 
Can **materials** be separated after they have been mixed?	• Some **materials** can be separated after they have been mixed based on their **properties** - this is called a **reversible** change. • Some methods of separation include the use of a magnet, a **filter** (for insoluble materials), a sieve (based on the size of the solids) and **evaporation.** • When a mixture cannot be separated back into the original components, this is called an **irreversible** change. Examples of this include when materials burn or mixing bicarbonate of soda with vinegar.

Significant people

Spencer Silver
(born 1941)



Spencer Silver is an American scientist who together with Arthur Fry was the inventor of Post-it notes in 1974. At the time, he was working to develop new classes of adhesives.

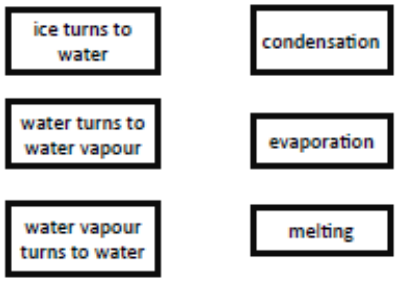
Question 1: Thermal insulators…(tick two)	Start of unit:	End of unit:
do not allow heat to pass through easily		
allow heat to pass through easily		
keep heat contained and keep things warm		
do not keep heat contained and allow things to cool		

Q2: Examples of electrical conductors are….(tick all that apply)	Start of unit:	End of unit:
copper		
plastic		
wood		
iron		
rubber		

Question 3: Materials that dissolve are:	Start of unit:	End of unit:
insoluble		
soluble		
a solution		

Question 4: When solid particles mix with the particles of a liquid, this is called…	Start of unit:	End of unit:
evaporation		
filtering		
dissolving		
sieving		

Question 5: A synonym for the word 'permeable' is...	Start of unit:	End of unit:
waterproof		
absorbent		
magnetic		
transparent		

Question 6: Match these changes to the scientific name for the process.	Start of unit:	End of unit:
		

Question 7: Describe an efficient way of separating paper clips from rice and explain why you chose this method.	Start of unit:	End of unit:

Question 8: You conduct an experiment to investigate if some solids dissolve quicker than others. Name one thing you will do to make the test fair.	Start of unit:	End of unit:

Question 9: Write an 'R' or an 'I' to indicate if these are examples of reversible or irreversible changes.	Start of unit:	End of unit:
frying an egg		
mixing paper clips and sand		
mixing sugar and water		
baking a cake		
mixing flour and water		
mixing coins and flour		
mixing bicarbonate of soda and vinegar		
mixing oil and water		

Question 10: Match these mixtures to the most efficient methods of separation.	Start of unit:	End of unit: