

## YEAR A

<p><b>THEME: Awe and Wonder</b></p> <p><b>TERM: Spring 1</b></p> <p><b>EXPEDITION: Magic V Science</b></p> 	<p><b>EXPEDITION OVERVIEW:</b></p>  <p>This topic will draw inspiration from the world of magic to allow children to experiment, discover and test scientifically. Drawing on fictional stories and their spells and potions, the children will analyse their creative experiences, look for commonalities, conjecture/predict, test fairly and begin to generalise about <i>states of matter</i> as well as <i>materials and their properties</i>. The pupils will endeavour to become science witches and wizards, who must pass a series of difficult tasks, in order to gain their Licence as members of <i>The Society of Science, Mystery and Magic</i>.</p>	<p><b>CULTURAL CAPITAL:</b></p> <p>The experience will begin with a day of Maths Magic provided by a school visitor: Jon Martin Magic.</p> <p><b>SUPPORTING TEXTS:</b></p> <p>The Firework-Maker’s Daughter by Phillip Pullman will be the main class text for Pico and I’ll read Nevermoor by Jessica Townsend to the children in the afternoons. Children will be guided to read: A Pinch of Magic, Harry Potter, George’s Marvellous Medicine, Starfell</p> 
	<p><b>WORKING SCIENTIFICALLY: These are areas of understanding within our curriculum which are repeated during their Voyage through the school.</b> prediction, measurement, enquiry, dependent variable, independent variable, fair test, similar, theory, hypothesis</p> <p>Know that we can ask questions and answer them by setting up scientific enquiries</p> <p>Know how to make relevant predictions that will be tested in a scientific enquiry</p> <p>Know that in a fair test one thing is altered (independent variable) and one thing that may change as a result is measured (dependent variable) while all other conditions are kept the same</p> <p>Know how to use a range of equipment to measure accurately, including thermometers, data loggers, rulers and stopwatches</p> <p>Know how to draw bar charts; how to label a diagram using lines to connect information to the diagram; how to use a coloured key how to draw a neat table; how to draw a classification key; how to show the relationship between an independent variable in a two-way table; and how to label specific results in a two-way table</p> <p>Know – with structured guidance - how to write a simple scientific enquiry write-up including an introduction, a list of equipment, a numbered method, a detailing of results and a conclusion</p> <p>Know how to precis a scientific enquiry write-up into a brief oral discussion of what was found in a scientific enquiry</p> <p>Know that scientific enquiries can suggest relationships, but that they do <u>not</u> prove whether a prediction is true</p> <p>Know that scientific enquiries are limited by the accuracy of the measurements (and measuring equipment) and by the extent to which conditions can vary even, and that repeating enquiries, measurements and taking measures to keep conditions as consistent as possible can improve an enquiry</p> <p>Know that the conclusions of scientific enquiries can lead to further questions, where results can be clarified or extended to different contexts (e.g. effect of changing sunlight on a plant – does this work with other plants / different types of light / etc)</p> <p>Know that they can draw conclusions from the findings of other scientists</p> <p>Know that a theory is an explanation of observations that has been tested to some extent and that a hypothesis is an explanation that has not yet been tested, but that can be tested through a scientific enquiry</p>	

## KNOWLEDGE AND ASSESSMENT:

### KEEPING COOL

**Thermal Insulators** - Do not let heat travel through easily such as fabrics, wood and plastics. Can keep heat in or out.

**Thermal Conductors** - Lets heat travel easily through such as metals.

When things get hot, atoms start to vibrate. Heat produces energy. This could cause them to change state!

## MATERIALS

**Reversible and Irreversible Changes**  
The following cycle is one which is reversible. (They can be changed back or reversed by adding heat or by cooling down.)

Ice (melts into water) > Water (evaporates into steam) > Steam (condenses into water) > Water (freezes into ice) >

The following examples are ones which are irreversible. (They can NOT be changed or reversed by adding heat or cooling down.)

cooking an egg burning wood

An electrical conductor lets electricity pass through. They are often metals but it also includes water.

An electrical insulator does not let electricity pass through.

**Three states of matter:**  
**SOLID:** particles close together / vibrate around a fixed position  
**LIQUID:** particles close but randomly arranged / move around  
**GAS:** particles far apart and randomly arranged / move around

**CHANGING STATE**

**Heating**  
If ice (solid) is heated, it changes to water (liquid). This change is called melting. Water (liquid) can change to water vapour (gas). This is called evaporation. If water (liquid) is heated until it boils, it changes to water vapour (gas) very quickly. Water boils at 100°C.

**Cooling**  
If water vapour (gas) is cooled, it changes to water (liquid). This change is called condensing. If water (liquid) is cooled, it changes to ice (solid). This change is called freezing. Water freezes at 0°C.

**DISSOLVING**  
Dissolving is when the particles of solids mix with particles of liquids, often appearing like it has disappeared but it has dissolved in the liquid to make a transparent solution (e.g. mixing sugar into water). It does not always need heat to occur. If a material does not dissolve, it is insoluble. If it does, it is soluble.

**MELTING**  
Involves only solids which change into a liquid due to heat. They stay as the same material (e.g. ice to water).

**FEATURES**

- Solids hold their shape. (Salt, sand and sugar are tiny solids so they pour like a liquid but they pile up and are not wet.)
- Liquids form a pool not a pile!
- Gases escape from an unsealed container and fill the entire volume of space.

## STATES OF MATTER

**Three states of matter**  
**GAS:** particles far apart and randomly arranged / move around  
**LIQUID:** particles close but randomly arranged / move around  
**SOLID:** particles very close together / vibrate around a fixed position

**Gas**

Examples  
Steam (water vapour)  
Hydrogen  
Carbon Dioxide  
Oxygen

**Liquid**

Examples  
Water  
Milk  
Washing up liquid

**Solid**

Examples  
Ice  
Wood  
Glass  
Diamond

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## NEW VOCABULARY:

**Retrieval vocab:** absorption, dissolving, energy, evaporation, freezing, matter, melting, particle, temperature, ice, water, solid

**New vocab:** bond, condensation, evaporation, reversible, boiling point, melting point, liquid, gas, thermometer, water cycle, continuous precipitation, transpiration, surface runoff process, sublimation

## LEARNING:

### Chemistry

- All matter (stuff) in the universe is made up of tiny building blocks.
- The arrangement, movement and type of the building blocks of matter and the forces that hold them together or push them apart explain all the properties of matter (e.g. hot/cold, soft/hard, light/heavy, etc).
- Matter can change if the arrangement of these building blocks changes.

## What they will be learning:

### Key Science Knowledge:

The children will gain an understanding of materials by exploring and comparing the properties of a broad range of materials, including relating these to what they learnt in KS1.

### Science Capital & Cultural capital:

They should find out about how chemists create new materials, for example, Spencer Silver, who invented the glue for sticky notes or Ruth Benerito, who invented wrinkle-free cotton.

### Knowledge: Pico and Fusion Class will know...

**Chemistry:** Solids, Liquids and Gases

- Know that things are composed of a matter commonly in one of three states of matter: solid, liquid or gas
- Know that things are made of particles (tiny building blocks) and that these are organised differently in different states
- now that materials can change state when temperature changes
- Know that there are bonds between the particles (building blocks) in a solid; as temperature increases, these bonds are somewhat overcome as the particles absorb energy and solids can change into liquids; with a further increase in temperature, the particles become even more energetic and the bonds are overcome entirely so the liquid changes into a gas
- Know that when solids turn into liquids, this is called melting and that the reverse process is called freezing
- Know that when liquids turn into gases, this is called evaporation and that the reverse process is called condensation
- Know that the melting point of water is 0° C and that the boiling point of water is 100° C
- Know that water flows around our world in a continuous process called the water cycle

Solids, liquids and gases are called the three states of matter. Materials can be changed from one state to another by heating or cooling. When things get hot, atoms start to vibrate. Heat produces energy. This could cause them to change state.

Heating: If ice (solid) is heated, it changes to water (liquid). This change is called melting. Water (liquid) can change to water vapour (gas). This is called evaporation. If water (liquid) is heated until it boils, it changes to water vapour (gas) very quickly. Water boils at 100°C.

Cooling: Cooling can lead to condensation and changes of state.

If water vapour (gas) is cooled, it changes to water (liquid). This change is called condensing.

If water (liquid) is cooled, it changes to ice (solid). This change is called freezing. Water freezes at 0°C.

States: Solids hold their shape. (Salt, sand and sugar are tiny solids so they pour like a liquid but they pile up and are not wet.)

Liquids form a pool not a pile!

Gases escape from an unsealed container and fill the entire volume of space.

GAS: particles far apart and randomly arranged / move around LIQUID: particles close but randomly arranged / move around SOLID: particles very close together / vibrate around a fixed position.

### **Knowledge: Pico and Fusion Class will know...**

#### **Chemistry:** Properties and Changes of Materials

- **Know that when a solvent is evaporated from a solution, the original solute is left behind**
- **Know how to dissolve a solute in a solvent and then how to evaporate the solvent to recover the solute**
- **Know that a reversible change is one that can be reversed and that examples of this are mixing, dissolving and changes of state where no chemical reaction takes place**
- **Know that an irreversible change is one that cannot be reversed and that examples of this often involve a chemical change where a new material is made, often a gas (e.g. burning, boiling an egg, the reaction of bicarbonate of soda and acid)**
- **Know that filtering allows solids and liquids to be separated and that sieving allows solids made up of different sizes parts to be separated**

Each class will explore reversible changes, including, evaporating, filtering, sieving, melting and dissolving, recognising that melting and dissolving are different processes. They'll also notice changes that are difficult to reverse, for example, burning, rusting and other reactions, for example, vinegar with bicarbonate of soda. Reversible and Irreversible Changes: The following cycle is one which is reversible. (They can be changed back or reversed by adding heat or by cooling down.)

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Know examples of ones which are irreversible. (They can NOT be changed or reversed by adding heat or cooling down).

Dissolving: Dissolving is when the particles of solids mix with particles of liquids, often appearing like it has disappeared but it has dissolved in the liquid to make a transparent solution (e.g. mixing sugar into water). It does not always need heat to occur. If a material does not dissolve, it is insoluble. If it does, it is soluble.

Melting: Involves only solids which change into a liquid due to heat. They stay as the same material (e.g. ice to water).