

Science at St Michael's



Science is a core subject of the National Curriculum. At St Michael's we strive to promote the love of learning Science. We aim for our children to understand and be curious about the Science within their everyday lives, and to have the scientific knowledge required to understand the uses and implications of Science, today and for the future. We aim to stimulate and excite pupils' curiosity about phenomena and events in the world around them. We aim to satisfy their curiosity with knowledge.

Intention

It is our intention that by the end of each Key Stage, each child will have an understanding of a variety of scientific concepts and be able to discuss them with confidence, using the correct Scientific vocabulary. We aim for all children to be given opportunities to work scientifically during lessons, and to work collaboratively when investigating different concepts and ideas.

In KS1 pupils observe, explore and ask questions about living things, materials and physical phenomena. They begin to work together to collect evidence to help them answer questions and to link this to simple scientific ideas. They begin to evaluate evidence and consider whether tests or comparisons are fair. They use reference materials to find out more about scientific ideas. They share ideas and communicate them using scientific language, drawings, charts and tables with the help of ICT if it is appropriate.

In KS2 pupils learn about a wider range of living things, materials and physical phenomena. They make links between ideas and explain things using simple models and theories. They apply their knowledge and understanding of scientific ideas to familiar phenomena, everyday things and their personal health. They think about the effects of scientific and technological developments on the environment and in other contexts. They carry out more systematic investigations, working on their own and with others. They use a range of reference sources in their work. They talk about their work and its significance, using a wide range of scientific language, conventional diagrams, charts, graphs and ICT to communicate their ideas.

Implementation

In order to allow children to reach their full potential, we cover the objectives set out in the Programmes of Study in the National Curriculum. Teachers plan units using our [progression in skills document](#), taking into account the needs of the pupils.

Each teacher has been provided with a [Key word list](#), a [Lesson Sequence](#) and a [Knowledge Organiser](#), that they share and discuss with pupils.

The lessons are **engaging and enjoyable**, and provide a level of appropriate challenge. In each topic there is an expectation that there will be at least 2 opportunities for practical investigation, and that there is at least one lesson that focuses on Scientific Enquiry (this covers the areas of *Comparative or Fair testing, Identifying and Classifying, Observing over time, Pattern seeking and Research*).

Classroom displays are designed to reflect and celebrate learning. We also aim to develop pupils' Social, Literacy and Maths skills by providing opportunities for collaborative work, perseverance, communication, questioning and problem solving.

Example from the Progression in skills document

Revision

absorption, matter, property

Objects are made from materials such as wood, plastic, glass, metal, water, rock. Materials have properties such as being hard, soft, strong, weak, absorbent, heavy, light, solid, runny, smooth and rough; these descriptions denote the properties of a material. Matter (stuff) is made from tiny building blocks.

New learning vocabulary

Conductor, brick, paper, cardboard, friction, movement, suitability, surface, stretch, twist, waterproof, deformation, flexible, rigid.

Know that materials can have useful properties for a given job (including being waterproof, strong, hard, soft, flexible, rigid, light or heavy.)

Know that many types of plastic are waterproof, that steel (a type of metal) is strong, that rock is hard, that cotton wool is soft, that rubber is flexible, that rock is rigid, that polystyrene (a type of plastic) is light and that iron (a type of metal) is heavy.

Know that when objects move across a surface there is friction when they rub against each other and that sometimes this friction is larger or smaller.

Know that applying forces to objects can change their shape.

Example of a Key word and Lesson sequence document

These are used at the beginning of every topic. The pupils have them in their books to refer to during lessons.

Year 3

Forces and magnets

Key word list and lesson sequence

| Word | Definition |
|------------------|---|
| Magnetic | Things that are magnetic are attracted to metal. |
| Non-magnetic | Things that are non-magnetic are not attracted to metal. |
| Pole | Either of the two ends of a magnet at which the field of the magnet is most intense. |
| North/South pole | Each pole is designated by the approximate geographic direction in which it points, either North or South. |
| Sliding friction | The resistance created by two objects sliding against each other. Sliding friction is intended to stop an object from moving. |
| Static friction | The friction that exists between a stationary object and the surface on which it's resting. |
| Elastic | Capable of returning to original shape or size after being stretched, pressed or squeezed together. |
| Resist | To withstand a force. |
| Attraction | To exert a force that draws something in. |
| Repulsion | To push back away from a force. |

Lesson Sequence

Lesson 1

What is a force?

Revision: Applying forces to objects can change their shape. Push and pull. Do you have to touch to exert force?

Discussion/investigation: Know that there are 3 types of contact force.

Impact forces (2 surfaces collide). Frictional forces (2 surfaces are already in contact) and strain forces (an elastic material or stretched or squashed).

Lesson 2

What is friction?

Know that objects move differently on rough and smooth surfaces, objects resist movement more on rough surfaces because there is higher friction as the object moves.

New vocabulary: sliding/static friction.

Compare how things move on different surfaces.

Lesson 3

Investigate magnets. Know that there are non-contact forces that can act between objects without them touching and that magnetism is an example of a non-contact force. Know that magnets have two poles called north and south.

Know that ? poles of two magnets repel each other and that opposite poles attract each other.

Lesson 4

Know that there is a magnetic field around a magnet which is strongest at each pole.

Know that there are magnetic and non-magnetic materials.

Compare and group variety of everyday materials.

Lesson 5

How do we use magnet/forces/friction in real life situations? (car scrap metal, door closing, badges attached to clothing, match boxes, nail files)

Investigation/using and applying opportunity leading into lesson 6.


Using and applying knowledge to create.

Example of a Knowledge Organiser

Year 4 Solids liquids and gas - States of matter

New learning

Things are made of a material in one of three states of matter: **solid, liquid or gas**.
 Things are made of **particles** (tiny building blocks) and these are **organized** differently in different states



Materials can change state when **temperature** changes
 There are **bonds** between the particles in a solid
 When the bonds absorb heat energy a solid turns to a liquid and a liquid turns to a gas

solids → liquids

melting

liquids → solids

freezing

liquid → gas

evaporation

gas → liquid

condensation

solid → gas

sublimation

The melting point of water is 0° C and the boiling point is 100° C

Water cycle:
 Water flows around our world in a continuous process called the **water cycle**
 Water moves to the air through **evaporation** and **transpiration** which is when water turns to water vapour (gas) on the surface
Precipitation: Water vapour condenses in clouds and falls to earth as rain, snow or hail
 Water flows across land in rivers & streams and under land as groundwater

Scientific Enquiry opportunities

Comparative table - How do water vapour evaporate quicker than freshwater?
Fun fact - How does the surface area of a container of water affect how long it takes to evaporate?
Identifying & classifying - Can you group these materials and objects into solid, liquid and gases?
Observing over time - How does the level of water in a glass change when left on the windowsill?
Pattern seeking - Is there a pattern in how long it takes different sized ice cubes to melt?

What has surprised you interested you about this topic?

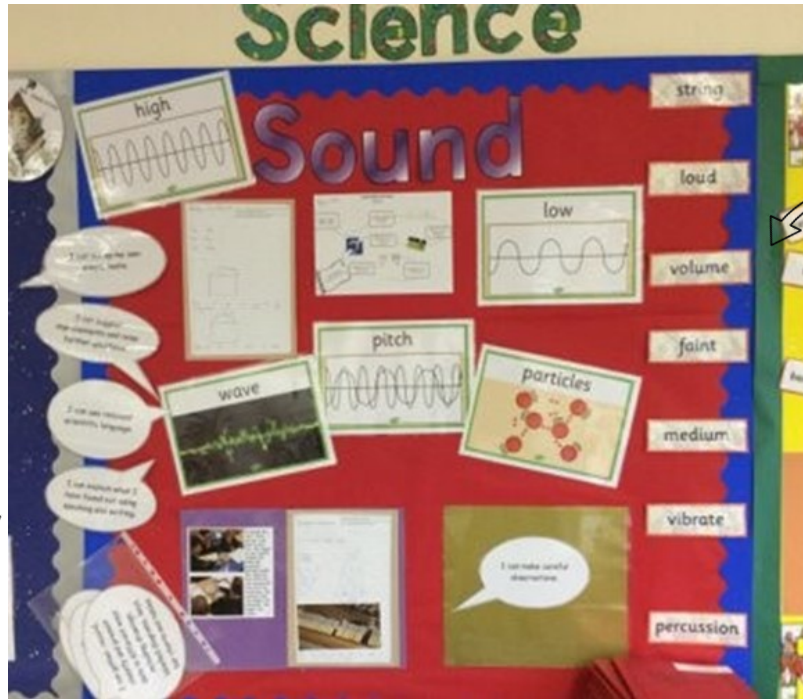
Images to aid EAL understanding

Ideas for scientific enquiry

Opportunity for reflective learning

Example of a class display

Speech bubbles linked to scientific enquiry



Target vocabulary

Example of engaging and enjoyable lessons



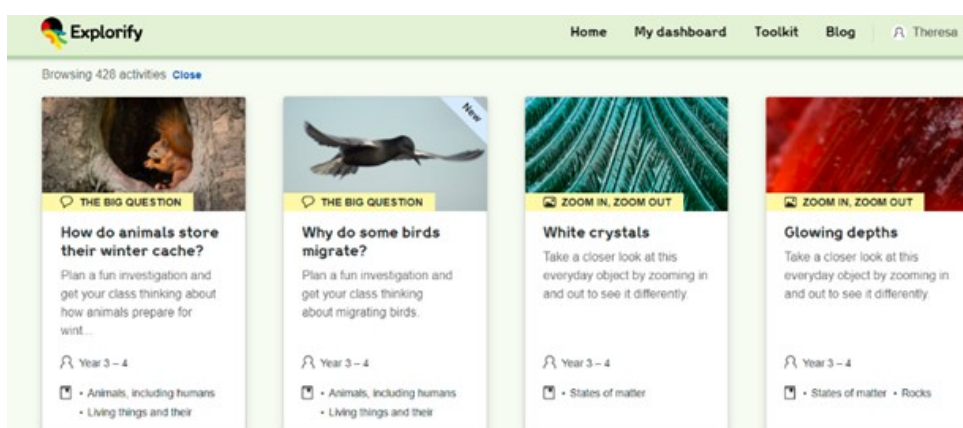
Investigating waterproof materials



Observing and asking questions

Curriculum Enrichment

In addition to Science lessons, pupils are able to further their experiences in Science through Forest School lessons, which are offered on a termly basis to all year groups. There has also been after school Science clubs, most recently offered to KS1 by the Science Coordinator. It is planned that when school returns to normal a LKS2 club will be offered. Pupils are regularly given access to ideas from 'Explorify' - a free resource of engaging, creative science activities that has been designed to spark curiosity, discussion and debate.



In addition, St Michael's is part of a collective of schools who are promoting STEM (Science, Technology, Engineering and Maths), with a particular focus on encouraging girls to take up STEM subjects in KS3. We want girls in particular to have positive role models and also to raise the aspirations for all pupils. This group (named Enthuse) has so far enabled St Michael's to run a lunchtime club aimed at Year 3 and 4. It is hoped that this will continue when school returns to normal.

Local Links

We draw upon the local area to enthuse, embed or extend learning. Examples include visits to the Centre for Life and the Discovery Museum in Newcastle, a Seeds for Life initiative in Elswick, outdoor learning at Gibside in Gateshead, and visitors (including parents) with jobs or hobbies linked to Science.