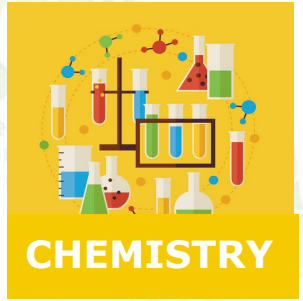
Science
at Shirley Junior School

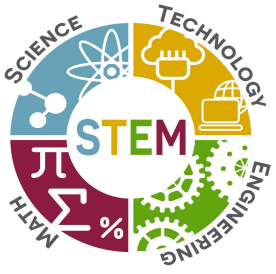
SHIRLEY JUNIOR SCHOOL

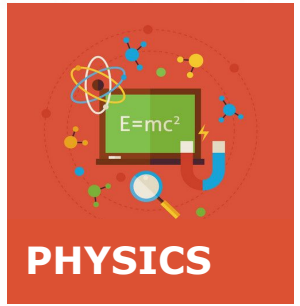
KINDNESS.
RESPECT.
INTEGRITY.

VISION

SCIENCE





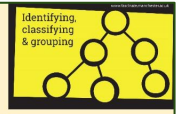


At Shirley Junior School we know that science is a subject that allows children to develop a natural curiosity of the world around them. SJS scientists are given the opportunities to explore, make sense and deepen their understanding of the three disciplines: **biology**, **physics** and **chemistry**. SJS scientists approach their learning through enquiry by asking questions, creating and planning their own experiments and drawing conclusions.

How do we investigate science?

Enquiry Skills

Identifying and Classifying



Identifying and classifying involves **sorting** objects or events into groups. Clear systems (**criteria**) must be developed and used. **Keys** are often used as criteria to carry out a classifying process for example, identifying and naming invertebrates.

Observing over time

This involves the careful observation of something over time, recording changes and/or taking measurements over time.

The time can be short or long

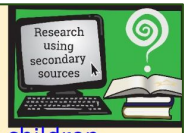
- Children should **RECORD** and/or **MEASURE**
- Children should **INTERPRET** findings
- Children in KS2 might draw their **CONCLUSIONS**
- Children might **PRESENT** findings
- Children in KS2 might predict what might happen

Pattern Seeking

Children observe and record phenomena, carry out surveys or collect data from secondary sources, and then identify relationships between the data in their findings.

They are used when variables can't easily be controlled because of practical or ethical reasons.

Research



This involves finding out information that children may not be able to investigate for themselves.

E.g. The use of books and websites to find out information about space, animals who live in the rainforest etc.

Comparative Test

In simple comparative tests children compare one event with another and identify different outcomes.

For example, does the red car go faster than the green car?

In more sophisticated comparative tests children will compare several different materials, events or artefacts, controlling conditions and variables to ensure validity.

For example, finding out which is best material for mopping up spilt water, when children will control the size of each material and the time given to soak up the water, so that they can rank the materials according to absorbency.

Fair Test

In order to demonstrate a causal relationship between two variables children carry out a fair test . For a fair test **they identify a variable that can be changed and measured,** and test the effect changing it has on another, while keeping the other variables the same.

For example, how does changing the height of a ramp affect how quickly a toy car rolls down it, where the type of car, the surface of the ramp, and other relevant variables are kept the same. Children can answer questions by collecting data to identify, and then explain, the causal relationship between the variables.

Key Concepts

Click Me for full knowledge progression

Biology			
	Animals including humans	Plants	Living things and their habitats

Chemistry			
	Materials	States of Matter	Rocks

Physics - The World Around Us			
	Changes	Earth and Space	Light

Overview

	Year 3		Year 4	Year 5	Year 6
Autumn 1	Biology - Animals	B I O L O G Y - P L A N T S	Chemistry - States or Matter	Physics - Earth & Space	STEM
Autumn 2	Chemistry - Rocks		Physics - Sound	Chemistry - Materials, States of Matter	Biology - Animals
Spring 1	Physics - Electricity		Physics - Forces and Magnets	STEM	Biology - Living things and their habitats Biology - Evolution & Inheritance
Spring 2	STEM		STEM	Chemistry - Materials, States of Matter	
Summer 1	Physics - Light		Biology - Animals	Biology - Animals	Physics - Electricity
Summer 2	Biology - Plants		Biology - Living Things	Physics - Forces	Physics - Light

How we are scientists

Asking questions

Observing

Predicting

Plan and set up an enquiry

Take measurements

Gather and record results

Draw conclusions

Working scientifically

Asking questions

Observing

Shirley Schools
Working Scientifically/ Disciplinary Knowledge Progression

Skill		EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Explore	Asking Questions	Ask **simple** questions about the world around us *(where/ how/why/when)* and respond to questions about *how* to find things out. *Eg. "How can you melt the ice?"*	Ask how, why, what will happen if.... *Eg. "What will happen if I don't water the seed? "What will happen if the seed isn't planted in soil?" "Will it still grow?"*	Asks relevant questions linked to the topic using their prior knowledge Begin to ask a wider variety of questions. *Eg "What are the differences **between** bulbs and seeds?"*	Use my scientific knowledge to explore a Big Question.	Use my prior scientific knowledge to explore a big question and create further questions to stretch my investigation	To use my prior scientific knowledge to create a series of linked questions based on a stimulus.	
	Observing	Know that we use science everyday to see the world around us. Begin to recognise when things might be dangerous and what equipment we can use to keep safe. Follow rules carefully. *Eg. "How can we look in the pond safely?" "What will we do to stay safe?"*	Begin to observe changes over time (growing/ weather topic) Know that science can sometimes be dangerous and we need to follow rules when observing to stay safe. *Eg. exploring using simple equipment magnifying glasses/ mirrors etc)*	Knows that some changes happen over time or some happen instantly in science. Be able to observe safely using equipment correctly if it is needed.	Demonstrate some knowledge of how to use some of the provided equipment to answer the Big Question.	Demonstrate accurate use of certain equipment to help answer the Big Question.	Accurately choose appropriate equipment to be able to answer the Big Question.	

Working scientifically

Predicting

Skill	EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Predict	Able to say what they think might happen in different situations. Begin to offer a simple reason. To know that a prediction is not always correct and it's okay to get things wrong. *Eg "I think the stick will sink and the marble will float because it's smaller."*	Use prior knowledge to **think** about what might happen before deciding what to do. Use some personal experiences to inform your prediction. *Eg. "I know that my wellies are waterproof so Red Riding Hood's coat needs to be the same material"*	Be able to make a simple prediction about what will happen in an investigation/ observation and begin to think about the **reason** behind your prediction. Eg "I know that water can change in different ways so it is a reversible change **because** I have frozen water into ice and watched it melt."	Make a prediction using because based on what I know will be able to observe during the experiment.	Make a prediction using because and accurate scientific evidence learned from the topic.	Make a prediction using because and accurate scientific evidence learned from current and previous topics.	Make a prediction using because and accurate scientific evidence. I will also be able to use my knowledge to predict something that will not happen, supporting it with previously learnt science.

Plan and set up an enquiry

Skill	EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Testing	Be able to talk about **how** to find out the answer to our observations and questions. To be introduced to the concept of something being 'fair' *Eg "Will it be fair if we roll **different** cars down **different** ramps to see how far they go?"*	**Begin** to think about **how** we can find the answers to observations and questions. What will we need to test something? What things will need to stay the same to make it fair? *Eg. "Is it fair to pour **3** cups of water on the paper coat and **1** cup on the tissue coat?"*	Be able to think of some ideas for a test and what information you would like to find out. *Eg. "I need to know if toast can change back to bread. How can I test this fairly?*	undertake an experiment keeping everything the same apart from what I am investigating.	create a control within my experiment to ensure a fair test, whilst testing one thing.	create a fair test and test more than one variable.	independently create a fair test, explaining which variables need to be controlled and why.

Take measurements

Gather and record results

Skill	EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Recording	Quotations and photographs of science in action. Chn can draw simple representations of observations/ predictions/ tests. Begin to use appropriate Scientific vocabulary when modelled by adults. Can sort into 2 groups using given criteria.	To talk about what they have seen/done and adults record quotes. Begin to use labelled drawings Use a 2 column table to record simple results (cross/tick) Use scientific vocabulary and begin to sort using a simple venn diagram/ hoops.	Make own simple table of results and include non standard measurement (*how many star jumps in a minute?)* Label pictures and use appropriate scientific vocabulary. Sort into chosen criteria using a venn diagram/ hoops.	use standard measurement to observe changes and record it. create simple scientific diagrams with labeling. use a bar graph to record my results.	accurately use standard measurements to record a series of observations. create scientific diagrams with appropriate scientific labeling. record data onto a line graph with given intervals.	take accurate measurements, beginning to repeat them to support with precision. begin to identify anomalies in my results. select appropriate intervals for lines and bar graphs.	take accurate and precise measurements, repeating them when needed. recognise anomalies in my measurements. choose how to best represent my results according to the type of data (e.g continuous or discrete).

Draw conclusions

Evaluate an enquiry

Skill	EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Concluding and Evaluating	**Talk** about what happened and **respond** to questions from the adult. *Eg "The fire engine rolled the longest distance because the ramp was higher."*	Talk about the prediction and result. Was it the same? Can chn begin to think about how they can make their tests even better next time?	Begin to identify simple patterns. Was your prediction correct? Do you know why/ why not? How would you change your tests next time?	explain simple patterns in my results. Explain why keeping everything the same has made my results accurate	use scientific knowledge to explain the patterns. Begin to describe how accurate my results are, comparing them to the control. Discuss other factors that could be controlled next time	explain causal relationships from my results. begin to comment on the reliability of my results. Evaluate the accuracy of my results based on my fair testing. Make practical suggestions about how my working methods can be improved.	use scientific ideas to explain my results, accounting for any anomalies refute or agree with scientific arguments using evidence. Independently evaluate the accuracy of my results, and make reasoned suggestions on how to improve my working methods.

What is STEM?

STEM stands for Science, Engineering, Technology and Mathematics. It represents the group of subjects that fall within these four areas of study. STEM education focuses on practical learning, to develop the necessary skills in students so they're prepared for the rapidly-developing real world.

Why teach STEM?

By teaching STEM children will learn invaluable skills that translate into all areas of life, including: problem solving, reasoning, communication and collaboration.

The also allow the children to develop their creative when thinking of about how to solve problems.

A chance to apply and deepen prior scientific knowledge to solve a problem.

Retrieval Practice

SJS STEM Cycle

Evaluate
This could be against the specification, for its effectiveness for it or against other products.

Contextual Explore
Explore the STEM context. This might be information that is shared with the children or they can explore through a P4C or SOLE

The Challenge
Share the problem with the children. Unpick what it is asking them to do.

Make and Test
Children to use their DT skills to make the outcome and test it using working scientifically skills and mathematical concepts.

Retrieval Practise
What specific subject knowledge (DT, Science, Maths) will I need to know to solve the problem.

Design
Children create initial and final designs. Initial designs should be conceptual and artistic and final designs are scientific like an engineering. Measurements and other mathematical concepts may also need to be noted on the designs.

Design Specification
What must my outcome include?