Science at St Vigor and St John Primary School

Intent:

Our curriculum intent for Science reflects the purpose and aims of the National Curriculum by helping our pupils to acquire knowledge and understanding of our world by developing a skillset associated with the process of enquiry. The curriculum is sequenced in long- and medium-term plans to help pupils accumulate knowledge (in a logical progression) towards the expected standards in the disciplines of Biology, Chemistry and Physics. The curriculum content is adapted to the context of our school and enhances pupils' moral, social, and cultural development by leading pupils to discover their **ethical** responsibility in a time when our world is facing significant challenges. We encourage our pupils to question and debate cultural norms that could be harmful to our **unique** planet.

The curriculum design helps pupils to read widely by promoting scientific enquiry using a variety of different research sources. The systematic introduction of new scientific vocabulary as each topic is revisited (across key stages) allows pupils to develop a broad, subject-specific vocabulary.

Implementation:

Teachers are committed to providing a stimulating, **adventurous,** and engaging scientific learning environment where children question, research, and observe the world around them. Children develop a love of exploration from an early age.

In EYFS, science is taught through children learning about the world around them. Practitioners stimulate curiosity and develop questioning through providing provocations. Children are scaffolded in their play; their ideas are challenged, and they are encouraged to verbalise their thoughts and ideas through adult interactions. Practitioners give the children the autonomy to investigate these ideas and encourage children to draw conclusions.

To allow children to continue to develop as proficient scientists, teaching and learning (including subject-specific vocabulary) is sequential and progressive across KS1 and KS2 to ensure consistency from year to year. In turn, Teachers are aware of pre-existing learning and use this to plan explorative scientific enquiries that use a range of high-quality resources to stretch and challenge the existing ideas of children. Scientific skills and vocabulary are embedded in lessons to develop children as proficient, inquisitive scientists who ask relevant questions and curiously investigate to discover their own answers.

Alongside regular Science lessons in KS1 and KS2, additional scientific opportunities are provided to create a unique culture of science throughout the whole school (whole-school focus weeks, Mad Science extra-curricular club, CREST awards etc).

Impact:

As a school, we encourage pupils to continually develop, review, and **connect** their existing ideas and working methods in order to make sense of the world in which they live. Teachers work to develop a strong sense of curiosity and excitement about natural phenomena by making it clear to children how Science has changed all of our lives. The necessity to have a broad and comprehensive curriculum is vital for our pupils to understand our world and their unique place within it.

Science at St Vigor and St John Primary School

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Our Science Curriculum Overview

		Biology			Chemistry	Physics		
KS1	Year 1	Animals including humans	Plants		Everyday Materials	Seasonal Changes		
	Year 2	Animals including humans	Plants	Living things in their habitats	Materials and their uses			
LKS2	Year 3	Animals including humans	Plants		Rocks and Soils	Light	Forces and Magnets	
	Year 4	Animals including humans	Living things in their habitats		States of Matter	Sound		Electricity
UKS2	Year 5	Animals including humans	Living things in their habitats		Properties and Changes of Materials	Earth and Space	Forces	
	Year 6	Animals including humans	Living things in their habitats	Evolution and Adaptation		Light		Electricity

Our Scientific Skills Progression

Scientific Skills Progression			Plan	Do	Review
	EYFS		• Explore everyday scientific situations and suggest a relevant question • Create explorations/investigations linked to interests	• Make observations using my five sense • Make comparisons, research places, objects, materials, make links and connections	• Communicate my observations through talk and drawings
	KS1 Vocabulary: question, answer, observe, observing, equipment, identify, classify, sort, group, record, diagram, chart, map, data, compare, contrast, describe, biology, chemistry, physics				
	KS1	Year 1	• Identify the questions that can be answered by trying it out myself. • Identify that questions can be answers in ***different*** ways.	• Use my senses to make observations • Use simple equipment to observe closely. • Use ***some*** standard and non-standard measures of length. • Record ***some*** findings in drawings, a table or block graph ***with guidance.*** • Identify, group, and classify with reasons.	• Use observations to suggest answers to questions. • Communicate my findings orally, or by using a drawing, tables, or block graph. • Use appropriate vocabulary to draw a conclusion.
		Year 2	• Ask simple questions and recognise that they can be answered in different ways (including use of ***scientific language***) • Identify different ***types of enquiry*** that answer scientific questions: research, pattern seeking, observation. • Make ***simple*** predictions.	• Make careful observations (***including observing changes over time***) • Use non-standard and standard measures for length. • Record findings in tables, drawings and block graphs. • Use ***simple*** scientific equipment • Identify, group, and classify with reasons by making ***comparisons of similarities and differences***.	• Use observations, ***and recorded data***, to suggest answers to questions (***noticing similarities and differences and patterns***). • ***Link*** simple predictions to outcomes. • Use some ***secondary sources*** of information to support and/or draw conclusions.
	LKS2 Vocabulary: research, scientific enquiry, variable, comparative, fair test, systematic, accurate, observation, measurement, equipment, thermometer, data logger, gather, record, classify, construct, interpret, present, explain, conclude, predict, evidence, secondary source				
	LKS2	Year 3	• Suggest relevant questions and ideas. • Explore ***how*** to collect sufficient evidence e.g. research, pattern seeking, observation, fair testing, classifying. • ***With guidance***, identify ***some*** key variables (control and independent) that must stay the same for it to be a fair test • Make predictions based on everyday experience and knowledge.	• Make ***systematic*** observations and comparisons. • Take ***some*** accurate measurements using standard units (length, time, volume, mass, force). • Record results using ***scientific language***, tables, drawings, and ***bar charts***. • Use a ***range*** of scientific equipment (thermometers, data loggers, scales).	• Use findings from enquiries to form ***oral and written explanations*** to questions (***displays, presentations of results and conclusions***). • Use ***data/results*** to draw ***simple*** conclusions to predictions. • Identify ***differences, similarities, or changes*** in results related to own scientific ideas, and other straightforward ***scientific evidence***. • Use results to make predictions for new values, ***suggest improvements*** for an investigation, and ***raise further questions***.

Our Scientific Skills Progression

Scientific Skills Progression			Plan	Do	Review
LKS2 Vocabulary: research, scientific enquiry, variable, comparative, fair test, systematic, accurate, observation, measurement, equipment, thermometer, data logger, gather, record, classify, construct, interpret, present, explain, conclude, predict, evidence, secondary source					
	LKS2	Year 3	• Suggest relevant questions and ideas. • Explore ***how*** to collect sufficient evidence e.g. research, pattern seeking, observation, fair testing, classifying. • ***With guidance***, identify ***some*** key variables (control and independent) that must stay the same for it to be a fair test • Make predictions based on everyday experience and knowledge.	• Make ***systematic*** observations and comparisons. • Take ***some*** accurate measurements using standard units (length, time, volume, mass, force). • Record results using ***scientific language***, tables, drawings, and ***bar charts***. • Use a ***range*** of scientific equipment (thermometers, data loggers, scales).	• Use findings from enquiries to form ***oral and written explanations*** to questions (***displays, presentations of results and conclusions***). • Use ***data/results*** to draw ***simple*** conclusions to predictions. • Identify ***differences, similarities, or changes*** in results related to own scientific ideas, and other straightforward ***scientific evidence***. • Use results to make predictions for new values, ***suggest improvements*** for an investigation, and ***raise further questions***.
		Year 4	• Suggest relevant questions that can be the basis of the ***different types of scientific enquiry***: research, pattern seeking, observation, fair testing, classifying. • Plan the main steps of practical enquiries, comparative and fair tests. • Identify the ***some*** key variables (control and independent) for a fair test. • Make predictions based on everyday experience and ***existing scientific ideas*** (using scientific vocabulary)	• Make *systematic* observations and comparisons (***simple practical enquiries, comparative and fair tests***). • Take ***increasingly*** accurate measurements using standard units (length, time, volume, mass, force), and begin to ***explain why measures should be repeated***. • Record results using scientific language, tables, ***labelled diagrams***, bar charts, and ***keys***.	• Use findings from enquiries to form oral and written explanations to questions, and begin to ***generalise to broader contexts*** (using wider knowledge and understanding). • Use data/results to draw ***detailed*** conclusions to predictions • Identify ***trends and patterns*** in results, and use scientific evidence to support these findings. • Use results to make predictions for new values, suggest improvements ***linked to variables***, and raise further questions.
UKS2 Vocabulary: variable, measurement, accuracy, precision, repeat readings, classification keys, prediction, fair test, comparative test, conclusion, casual relationship, degree of trust, support/refute ideas, identify, classify, describe, pattern, systematic, quantitative measurements					

Our Scientific Skills Progression

Scientific Skills Progression			Plan	Do	Review
	UKS2 Vocabulary: variable, measurement, accuracy, precision, repeat readings, classification keys, prediction, fair test, comparative test, conclusion, casual relationship, degree of trust, support/refute ideas, identify, classify, describe, pattern, systematic, quantitative measurements				
	UKS2	Year 5	• ***Independently*** suggest questions that can be the basis of the different types of scientific enquiry. • Plan the main steps of practical enquiries by deciding on a ***suitable form of data to collect.*** • ***With support***, identify ***most*** key variables (control, independent and ***dependent***) to ensure a fair test. • Make ***detailed*** predictions based on ***existing scientific knowledge***.	• ***Using a variety of contexts***, make *systematic, **relevant*** observations and comparisons. • Take ***increasingly*** accurate measurements using standard units (length, time, volume, mass, force), and ***take repeat reading when appropriate***. • Record results using scientific language, tables, ***scientifically labelled diagrams***, bar charts, ***line graphs***, ***classification keys***.	• ***With support***, use findings from enquiries to present a conclusion, ***casual relationship***, and a ***degree of trust*** in results (including oral and written forms). • Use data/results to draw detailed conclusions to predictions – ***sometimes making further predictions from results***. • Identify trends and patterns in results - identifying scientific evidence that has been used to **support or *refute such conclusions***. • Use results to identify limitations to enquiries, and to make predictions to, ***with support***, ***set up further comparative and fair tests***
		Year 6	• ***Independently*** suggest questions with a clear purpose to form a line of scientific enquiry. • ***Understand, select and plan*** the most **appropriate** practical enquiry (including data collection and showing awareness of ***how much evidence is needed***). • Identify and control most key variables where necessary. • Make detailed predictions based on existing scientific knowledge to their own, or others', questions.	• Using a variety of contexts, make systematic, relevant observations and comparisons (***five or more things***) • Make ***independent decisions*** about which measurements to accurately take using standard units – ***explaining why*** repeated measurements are needed. • Record results ***using increasingly complex*** scientific language, tables, scientifically labelled diagrams, bar charts, ***scatter graphs***, line graphs, classification keys.	• ***Use*** findings from enquiries to present a conclusion, ***casual relationship***, and explain the ***degree of trust*** in results. • Use data/results to draw ***coherent conclusions*** to predictions – ***evaluating their own and the scientific ideas of others***. • Identify trends and patterns in results - ***identifying those that don't fi***t and scientific evidence that has been used to support or *refute such conclusions*. • Use results to identify limitations to enquiries, and to make predictions to, ***independently***, *set up further comparative and fair tests*

Understanding the World - EYFS

Understanding the World	EYFS		People and Communities	The World	Technology
		22 - 36 months	• Has a sense of own immediate family and relations. • In pretend play, imitates everyday actions and events from own family and cultural background (e.g. making and drinking tea) • Beginning to have their own friends. • Learns that they have similarities and differences that connect them to, and distinguish them from, other.	• Enjoy playing with small-world models such as a farm, a garage, or a train track. • Notices detailed features of objects in their environment.	• Children seek to acquire basic skills in turning on and operating some computer equipment. • Children operate mechanical toys (e.g. turns the knob on a wind-up toy or pulls back on a friction car).
		30 - 50 months	• Shows interest in the lives of people who are familiar to them • Remembers and talks about significant events in their own experience. • Recognises and describes special times or events for family and friends. • Show interest in different occupations and ways of life. • Knows some of the things that make them unique, and can talk about some of the similarities and difference in relation to friends and family.	• Comments and asks questions about aspects of their familiar world such as the place where they live or in the natural work. • Can talk about some of the things they have observed such as plants, animals, natural and found objects. • Talk about why things happen and how things work. • Developing an understanding of growth, decay, and changes over time.	• Children know how to operate simple equipment (e.g. turns on CD player and uses remote control)> • Children show an interest in technological toys with knobs or pulleys, or real objects such as cameras or mobile phones. • Children show skill in making toys work by pressing parts or lifting flaps to achieve effects such as sound, movement, or new images.
		40 – 60	• Enjoys joining in with family customs and routines	• Looks closely at similarities, differences, patterns and change.	• *Children complete a simple program on a computer* • *Children use ICT hardware to interact with age-appropriate computer software.*
		Early Learning Goals	• Children talk about past and present events in their own lives and in the lives of family members. • Children know that other children don't always enjoy the same things, and are sensitive to this. • Children know about similarities and differences between themselves and others, and among families, communities and traditions.	• Children know about similarities and differences in relation to places, objects, materials, and living things. • Children talk about the features of their own immediate environment and how environments might vary from one another. • Children make observations of animals and plants and explain why some things occur and talk about changes.	• *Children recognise that a range of technology is used in places such as homes and schools.* • *Children select and use technology for particular purposes.*

Our Science Curriculum - Biology

			Plants	Living Things and their Habitat	Animals, including Humans
Biology	KS1	Year 1	• Identify and name a variety of common wild and garden plants. • Identify and describe the basic structure of common flowering plants (+trees).		• Identify and name a variety of common animals. • Describe and compare common animals. • Identify, name, draw and label the basic parts of the human body (associated with each sense).
			Evergreen/deciduous tree, branches, trunk, leaves flowers, blossom, petals, fruit, roots, bulb, seed, stem		fish, reptiles, mammals, birds, amphibian, herbivore, carnivore, omnivore head, ear, eye, mouth, nose, leg, knee, arm, elbow, back, wings, beak
		Year 2	• Observe and describe how seeds/bulbs grow into mature plants. • Find out and describe how plants need water, light and a suitable temperature.	• Explore/compare the differences between things that are living, dead, and things that have never been alive. • Identify that most living things live in habitats to which they are suited. • Identify and name a variety of plants and animals in their habitats, including micro- habitats • Describe how animals obtain their food from plants and other animals (simple food chain).	• Notice that animals (humans) have offspring which grow into adults. • Find out about and describe the basic needs of animals (humans) for survival (water, food and air). • Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.
			seeds, bulb, water, light, temperature, growth	living, dead, habitat, micro-habitat, energy, food chain, prey, predator, woodland, pond, desert	survival, water, air, oxygen, food, adult, baby, offspring, kitten, calf, puppy, foal, exercise, hygiene
	KS2	Year 3	• Identify and describe the functions of different parts of flowering plants. • Explore the requirements of plants for life and growth. • Investigate the way in which water is transported within plants.		• Identify that animals (+ humans) need the right types and amount of nutrition, and that they cannot make their own food. • Identify that humans and some other animals have skeletons and muscles for support, protection and movement.
			soil, nutrients, reproduction, seed formation, dispersal, germination, pollination, transportation, species, location, photosynthesis		bones, muscles, skull, ribs, skeleton, support, protection, movement, herbivore, carnivore, omnivore, teeth, canine, incisor, molar

Our Science Curriculum - Biology

			Plants	Living Things and their Habitat	Animals, including Humans
Biology	LKS2	Year 3	• Identify and describe the functions of different parts of flowering plants. • Explore the requirements of plants for life and growth. • Investigate the way in which water is transported within plants.		• Identify that animals (+ humans) need the right types and amount of nutrition, and that they cannot make their own food. • Identify that humans and some other animals have skeletons and muscles for support, protection and movement.
			soil, nutrients, reproduction, seed formation, dispersal, germination, pollination, transportation, species, location, photosynthesis		bones, muscles, skull, ribs, skeleton, support, protection, movement, herbivore, carnivore, omnivore, teeth, canine, incisor, molar
		Year 4		• Recognise that living things can be grouped in a variety of ways • Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment • Recognise that environments can change and that this can sometimes pose dangers to living things	• Describe the simple functions of the basic parts of the digestive system in humans • Identify the different types of teeth in humans and their simple functions • Construct and interpret a variety of food chains, identifying producers, predators and prey.
				insects, environment, habitat, vertebrate, invertebrate, exo skeleton, adaptation	oesophagus, stomach, small intestine, large intestine
	UKS2	Year 5		• Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird • Describe the life process of reproduction.	• Identify and name the main parts of the human circulatory system (heart, blood vessels and blood) • Recognise the impact of diet/exercise/drugs/lifestyle • Describe the ways in which nutrients and water are transported.
				reproduction, mammal, bird, insect, amphibian, offspring, complete/incomplete metamorphosis	heart, blood, circulatory system, blood vessels, veins, arteries, valves, oxygenated, deoxygenated, pulse, respiration
		Year 6	• Describe how living things are classified into broad groups (including micro-organisms, plants and animals) Give reasons for classifying plants and animals.	• Recognise that living things have changed over time (fossils provide information) • Recognise that living things produce offspring of the same kind (offspring vary) • Identify how animals and plants are adapted to suit their environment.	• Describe the changes as humans develop to old age.
			classification, vertebrates, invertebrates, micro-organisms, bacteria, fungi	fossils, adaptation, evolution, characteristics, reproduction, genetics	foetus, embryo, womb, gestation, baby, toddler, teenager, puberty, adolescent, adult, elderly, development, growth

Our Science Curriculum - Chemistry

Chemistry	KS1	Year 1	**Everyday Materials** • Distinguish between an object and the material from which it's made. • Identify and name a variety of everyday materials. • Describe the simple physical properties of everyday materials • Group a variety of everyday materials on the basis of their physical properties. material, wood, plastic, glass, paper, fabric, metal, rock, hard, soft, smooth, shiny, rough, bendy (flexible)
		Year 2	• Identify and compare the suitability of a variety of everyday materials. • Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. stiff, shiny, dull, rough, smooth, waterproof, absorbent, transparent, opaque, brick, fabric, foil, squashing, bending, twisting, stretching, elastic
	KS2	Year 3	**Rocks:** • Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties • Describe in simple terms how fossils are formed when things that have lived are trapped within rock • Recognise that soils are made from rocks and organic matter. sandstone, limestone, granite, marble, pumice, slate, crystals, permeable, impermeable, hardness, sedimentary, igneous, metamorphic, fossils, organic matter
		Year 4	**States of Matter:** • Compare and group materials together (solids, liquids or gases) • 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) Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature. solid, liquid, gas, temperature, heating, freezing point, boiling point, particles, evaporation, condensation, thermometer, thermal insulation
		Year 5	**Properties and Changes of Materials** • Compare and group together everyday materials on the basis of their properties. • 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 • Demonstrate that dissolving, mixing and changes of state are reversible changes • Explain that some changes result in the formation of new materials. hardness, solubility, mixing, dissolving, melting, solution, solute, transparency, conductivity, magnetic, filter, filtration, evaporation, condensation, reacting / reactants

Our Science Curriculum - Physics

			Seasons	Electricity	Forces and Magnets
Physics	KS1	Year 1	• Observe changes across the four seasons • Observe and describe weather associated with the seasons and how day length varies		
			summer, spring, autumn, winter, season, sun, day, moon, night, light, dark		
	LKS2	Year 3	Light: • Recognise that they need light in order to see things and that dark is the absence of light (light is reflected from surfaces) • Recognise that light from the sun can be dangerous • Recognise that shadows are formed when the light from a light source is blocked by an opaque object • Find patterns in the changeable sizes of shadows.		• Compare how things move on surfaces. • Notice that some forces need contact between two objects (magnetic forces) • Observe how magnets attract or repel each other/materials. • Group materials on the basis of magnetism. • Describe magnets as having two poles.
			light, dark, shadows, blocking, mirror, reflect, reflective, reflection, opaque		force, push, pull, contact, magnetic, attract, repel, poles (north / south), friction, resistance
		Year 4	Sound: • Identify how sounds are made. • Recognise that vibrations from sounds travel through a medium to the ear • Find patterns between the pitch of a sound and features of the object that produced it Find patterns between the volume of a sound and the strength of the vibrations.	• Identify common appliances that run on electricity • Construct a simple series electrical circuit. • Identify whether or not a lamp will light, and recognise that a switch opens and closes a circuit (simple circuit) • Recognise some conductors and insulators, and associate metals with conductivity.	
			volume, vibration, sound wave, loud, soft, high pitch, low pitch, tone, speaker, amplitude, frequency	cells, batteries, wires, switches, circuit, series/parallel, buzzers, bulbs, mains electricity insulators, conductors	

Our Science Curriculum - Physics

			Earth and Space	Electricity	Forces
Physics	UKS2	Year 5	• Describe the movement of the Earth, and other planets, relative to the Sun in the solar system • Describe the movement of the Moon relative to Earth • Describe the Sun, Earth and Moon as approximately spherical bodies • Use the idea of the Earth's rotation to explain day/night		• Explain that unsupported objects fall towards the Earth because of the force of gravity. • Identify the effects of air resistance, water resistance and friction. • Recognise that some mechanisms (levers/pulleys/gears) allow a smaller force to have a greater effect.
			earth, sea, sun, moon, axis, planets, solar system, star, constellation, phases of the moon, waxing, waning, gibbous moon, full moon		force, friction, Newton, gravity, newton meter, air resistance, water resistance, gears, pulleys, levers
		Year 6	Light: • Recognise that light appears to travel in straight lines • Use the idea that light travels in straight lines to explain that objects give out or reflect light. • Explain that we see things because light travels from light sources to our eyes. • Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.	• Associate the brightness of a lamp (volume of a buzzer) with the number and voltage of cells used in the circuit. • Give reasons for variations in how components function (brightness of bulbs, the loudness of buzzers, on/off position of switches) • Use recognised symbols when representing a simple circuit in a diagram.	
			reflection, refraction, lens, light spectrum, colour, prism, rainbow	cells, batteries, wires, bulbs, switches, buzzers, circuit, series/ parallel, conductors, insulators, amps, volts	

Resources

Scientific Knowledge:

Twinkl Plan It Unit Packs (SharePoint):

- These ensure a progressive subject knowledge that give children opportunities to explore and make sense of the world around them.

Hamilton Trust (access online):

- Hamilton's science scheme uses hands-on investigative science activities to promote a deep understanding of scientific concepts and help children develop effective methods of scientific enquiry.

Bright Idea (SharePoint)

- *These resources encourage children to develop their existing scientific ideas through talking about a specific scientific subject.*

Odd One Out (SharePoint):

- *These resources encourage children to justify their scientific ideas with reasons about a specific scientific subject.*
- *Children are shown three or four pictures and are asked which is the odd one out and why.*
- *The 'why' is key in revealing existing ideas, to assess ideas, or address misconceptions.*

PMI (SharePoint)

- *These resources encourage children's thinking specific to a scientific subject.*
- *Children are given a scenario – a statement – and then have to consider:*
  - *P: the positive*
  - *M: the minus*
  - *I: the interesting*

Working Scientifically:

TAPs (SharePoint):

- These are a selection of ***scientific enquires*** for Biology, Chemistry, and Physics that encourage progressive scientific skills across the key stage.
- These resources were created by Bath Spa University to provide opportunities to ***assess*** a child's scientific understanding by having a positive impact on their learning.
- Bath Spa University have provided work samples to see how different evidence of a child's learning for such enquiries can be assessed and recorded.