



Harvington C.E. First and Nursery School

Science

Intent and Implementation

Progression of Knowledge and Skills for Science

Curriculum Intent Statement:

Harvington First and Nursery School understands the need for all pupils to develop their Scientific ability as an essential component of all subjects and as a subject in its own right. A good understanding of scientific knowledge and conceptual understanding helps to support pupils work across the curriculum. At Harvington First and Nursery School First School we believe that Science is a body of knowledge built up through experimental testing of ideas. Science is also a practical way of finding reliable answers to questions we may ask about the world around us. Science in our school is about developing children's ideas and ways of working that enable them to make sense of the world in which they live through investigation, as well as using and applying process skills. We believe that a broad and balanced science education is the entitlement of all children, regardless of ethnic origin, gender, class, aptitude or disability. Our aims in teaching science include the following:

1. Preparing our children for life in an increasingly scientific and technological world today and in the future.
2. Helping our children acquire a growing understanding of the nature, processes and methods of scientific ideas.
3. Helping develop and extend our children's scientific concept of their world. Building on our children's natural curiosity and developing a scientific approach to problems.
4. Encouraging open-mindedness, self-assessment, perseverance and developing the skills of investigation – including observing, measuring, predicting, hypothesising, experimenting, communicating, interpreting, explaining and evaluating.

Our curriculum intent includes planned opportunities to:

- Promote enjoyment and enthusiasm for learning through practical activity, exploration and discussion
- Ensure children have access to a high-quality science curriculum that is both enjoyable and challenging
- Provide children with activities that enable them to make connections between scientific enquiry concepts and explore at a greater depth
- Develop scientific knowledge, skills and vocabulary
- Develop a practical understanding of the ways in which information is gathered and presented
- Explore a range of scientific enquiry skills using a range of contexts.
- Understand the importance of science in everyday life and be given the opportunity to apply what they have learnt to real life situations
- Develop independence and inquisitive minds
- Reinforce our Christian values including perseverance
- Revisit science topics in different years to work at a deeper level

Science Curriculum Implementation:

The science curriculum follows the National Curriculum objectives for each year group, long term planning grids ensure all objectives are covered over the course of the year. We use end of topic tests to assess children's knowledge and understanding for each science topic area, these also include working scientifically questions. In some year groups, a topic might be covered more than once within the different years, using the science objective sheets staff can see what has been taught before and what will be taught after.

We ensure there are opportunities to develop other curriculum areas in science such as recording of data using tables and charts and doing observation drawings.

Years 1 – 5 do a weekly science lesson (60 minutes) while EYFS have a science focus each half term as part of their topic area.

Planning:

EYFS

Science is covered in the 'Understanding the World' area of the EYFS Framework. At Harvington C of E First and Nursery School we introduce this topic area indirectly through activities that encourage children to explore, problem solve, observe, predict, think, make decisions and talk about the world around them. Early Years Science also helps children with skills in other Foundation Stage areas of the National Curriculum, such as Physical Development and Expressive Arts. IN EYFS the children will explore creatures, people, plants and objects in their natural environments. They will observe and manipulate objects and materials to identify differences and similarities.

They will also learn to use their senses, feeling dough or listening to sounds in the environment, such as sirens or farm animals. They will make observations of animals and plants and explain why some things occur and talk about changes.

The key areas that will be developed are:

- Explore the natural world around them, making observations and drawing pictures of animals and plants.
- Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class.
- Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter.

Nursery

Communication and Language

- Understand 'why' questions, like: "Why do you think the caterpillar got so fat?"

Physical Development

- Make healthy choices about food, drink, activity and tooth brushing.

Understanding the World

- Use all their senses in hands-on exploration of natural materials.
- Explore collections of materials with similar and/or different properties.
- Talk about what they see, using a wide vocabulary.
- Begin to make sense of their own life-story and family's history.
- Explore how things work.
- Plant seeds and care for growing plants.
- Understand the key features of the life cycle of a plant and an animal.
- Begin to understand the need to respect and care for the natural environment and all living things.
- Explore and talk about different forces they can feel.
- Talk about the differences between materials and changes they notice.

Reception

Communication and Language

- Learn new vocabulary.
- Ask questions to find out more and to check what has been said to them.
- Articulate their ideas and thoughts in well-formed sentences.
- Describe events in some detail.
- Use talk to work out problems and organise thinking and activities. Explain how things work and why they might happen.
- Use new vocabulary in different contexts.

Physical Development

- Know and talk about the different factors that support their overall health and wellbeing:
 - regular physical activity
 - healthy eating
 - tooth brushing
 - sensible amounts of 'screen time'
 - having a good sleep routine
 - being a safe pedestrian

Understanding the World

- Explore the natural world around them.
- Describe what they see, hear and feel while they are outside.
- Recognise some environments that are different to the one in which they live.

- Understand the effect of changing seasons on the natural world around them.

ELG

Listening, Attention and Understanding

Make comments about what they have heard and ask questions to clarify their understanding.

Managing Self

Manage their own basic hygiene and personal needs, including dressing, going to the toilet and understanding the importance of healthy food choices.

The Natural World

Explore the natural world around them, making observations and drawing pictures of animals and plants.

Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class.

Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter.

Things to look for in continuous Provision:

Stories around the world

Multi cultural toys/ dolls/ stories

Natural materials

Mini beast area

Café role play?

Forest school activities

Exploring/ investigation station

High quality examples of life cycles animals / plants

Magnifying glasses

Purple mash

High quality images of plants/ food/ animals/ hygiene

High quality stories about the natural world around them

Seasons- images/ art work/ toys

Key Stages One and Two

Science is a core subject of the National Curriculum.

The aims for each year group are set out in the National Curriculum 2014.

The national curriculum for science aims to ensure that all pupils:

Develop **scientific knowledge and conceptual understanding** through the specific disciplines of biology, chemistry and physics

Develop understanding of the **nature, processes and methods of science** through different types of science enquiries that help them to answer scientific questions about the world around them

Are equipped with the scientific knowledge required to understand the **uses and implications** of science, today and for the future.

'Working Scientifically' is a statutory requirement for each year group and objectives are split into three sections: KS1, Lower KS2 and Upper KS2.

Specific subject areas are set in the National Curriculum for each year group which are to be followed and covered throughout the year. The statutory requirements must be covered and the non-statutory information is to be used as a guidance.

Within in each key stage teachers have long and medium-term planning. The plans are turned into short term planning by key stage teams working together and the teacher's own ideas and activities which are planned to suit the class being taught.

Key Stage One (year one and two): During Key Stage one, pupils observe, explore and ask questions about living things, materials and the world around them. They begin to work together to collect evidence to help them answer questions, find patterns, classify and group objects, research using a variety of sources and carry out fair testing.

Pupils use reference materials to find out more about scientific ideas. They share their ideas and communicate them using scientific language, drawings, charts and tables.

Key Stage Two (years three – five): Children are encouraged to extend the scientific questions that they ask and answer about the world around them. Pupils carry out a range of scientific enquiries including: observations over time, pattern seeking, classifying, grouping and researching using other sources (including computing resources).

Children in Key Stage Two learn to plan science investigations by only changing one variable to make it a fair test.

In all year groups we follow a yearly plan which maps out science, covering national curriculum objectives. All classes in Key Stage One and Key Stage Two have one separate science lesson a week which is not integrated into a theme. All areas of science are covered throughout each term making sure there is an equal coverage of areas.

The school's curriculum map shows how the national curriculum objectives are distributed across the years in a sequence which promotes curriculum continuity and progress in children's learning.

Science lessons are taught as individual lessons and are not taught as part of a theme expect in EYFS.

Medium term planning ensures that the sequence of work promotes continuity and progression.

Assessment:

At Harvington First and Nursery School, we recognise that Assessment for Learning lies at the heart of promoting learning and in raising standards of attainment. We further recognise that effective AFL depends on using the information gained.

Assessment procedures within our school

Early Years – EYFS staff assess progress based on their professional knowledge and record judgements on their spreadsheet tracking document. In Nursery the checkpoints from 'Development Matters' document will be used to assist judgements. Microsoft TEAMS is used to communicate any remarkable learning moments with parents and parents are encouraged to share learning moments from home.

Staff know what the children's next steps are and ensure activities are incorporated into daily provision.

Questions to consider when monitoring:

Do children know about seasons and can they begin to describe them?

Do children explore the natural world around them?

Do children understand the key features of the life cycle of a plant and an animal.

Do children ask questions to find out more and to check what has been said to them?

Can children describe their immediate environment (this might be school/ home?)

Can children talk about countries they have learnt about/ visited- how are they different/ similar?

Do children respect living things? Can they talk about why this is important?

Can children describe using prepositions (next to, behind, on top of)

Do children use new science vocabulary in different contexts?

•Do children have opportunities to explore collections of materials with similar and/or different properties?

Key Stage One and Two

We assess children against the National Curriculum objectives for their year group. Teachers use a monitoring system (created by the school's assessment lead) to assess children in: Working Scientifically, Biology, Physics and Chemistry. Teachers will monitor objectives for each child to show whether the child is working below, working towards, working at or working at greater depth of the child's year group, this will then be recorded on the class data sheet (excel). An overall judgement is then provided to give information about each child's level within science.

Assessment is carried out

- Orally through questioning
- By observation of the children at work
- Through planned assessment activities
- By end of topic tests
- Monitoring of end of topic tests and their impact on the teacher's judgement.

Teachers listen and observe closely in order to make judgements which are then regularly updated and stored on our staff shared area, class data. End of topic tests are done at the end of each half term; these are recorded in the class data area of the assessment folder and are used alongside the assessment excel sheet to make an accurate judgement of the child's level overall in science. Children's progress is discussed with parents at parents' evenings and recorded on their end of year report.

Resources:

There are a wide range of resources available such as Data Loggers, materials, rocks and soils, electricity circuits and resources to support with the topic of planting as well as many others.

There are a range of books in our library as well as in the resource area to support all topic areas.

We also use Purple Mash to support with children's learning of science.

Each classroom has a science display which contains key vocabulary, visuals and children's work. There is also the science principle displayed on each one.

The teaching of science is also enriched through:

- Theme/Cross curricular lessons
- Whole school science days
- Purple Mash
- Cooking activities
- Parent workshops
- Roots and Shoots
- Forest school
- Trips

Monitoring: Science is monitored by the Science Lead following the Monitoring policy. This includes observations of lessons, discussions with children and analysing assessments. The Science Lead is responsible for writing, updating and evaluating the Science Action

Science Vocabulary List

EYFS

Topic	Key Vocabulary
General	natural, wild, wildlife, native.
Places	habitats: woodland, desert, ocean, jungle, arctic. , microhabitats: log, stone, tree, dead leaves, soil.
Objects	british autumn fruits and vegetables (e.g. apples, pears, beetroot, carrots, potatoes, butternut squash, sweetcorn, cauliflower). bread: mix, knead, prove, rise.
Materials	object, material, properties, suitable, pipette, recycling. properties - waterproof, strong/weak, dense/less dense, hard/soft.
Plants	grow lifecycle: roots, shoots, stem, leaves, buds, flower water, light, warmth, temperature, soil, compost
Animals	body parts. backbone, skeleton, soft body, shell. predator, prey. nocturnal. adult/parent, baby. lifecycle: egg, caterpillar, chrysalis, butterfly. birds (owl, duck), insects/bugs/ minibeasts (lacewing, ladybird, woodlouse, bee, wasp, spider, tarantula, earthworm, snail, locust, cricket, millipede, butterfly, caterpillar), fish, reptiles (snake, tortoise, gecko), amphibians, mammals (mouse, shrew, vole, hare, fox).
Environment	environment, woodland, valley., playground., recycling, compost
Changes	seasons: spring (growth, baby animals) summer autumn (harvest) winter weather: sun, rain, wind, snow, ice, sleet, hail. cold/warm/hot day length, day light.

<u>Year 1</u>	<u>Topic</u>					
	Forces and Space: Seasonal changes	Materials: Everyday Materials	Animals: Sensitive Bodies	Animals: Comparing Animals	Plants: Introduction to Plants	Making Connections
Vocabulary	• conclusion • data • deciduous tree • evergreen tree • pictogram • predict • record • season • sunrise • sunset • symbol • temperature • thermometer • weather	• absorbent • data • fabric • glass • group • material • metal • object • opaque • plastic • property • rock • tough • transparent • waterproof • wood	• action • bitter • blind • body • compare • data • direction • distance • feeling • group • hearing • investigation • loud • obstacle • pattern • quiet • research • salty • sense • senses • sensitive • sight • smell • sour • sweet • taste • touch • volume	• amphibian • bird • block chart • body • carnivore • compare • data • diet • differences • feature • fish • group • herbivore • hunt • mammal • observe • omnivore • pet • record • reptile • research • scientist • similarities • tally	• data • deciduous • diagram • edible • evergreen • feature • fruit • flower • garden plants • grouping • growth • investigation • leaf • measure • observe • plant • prediction • roots • research • seed • shoot • stem • trunk • wild plants	• amphibian • bird • carnivore • compare • data • diet • difference • feature • fish • group • herbivore • hunt • life cycle • mammal • material • measure • natural • object • omnivore • pattern • predict • property • reptile • season • similarity • test • trunk • waterproof • weather

Year 2	Topic					
	Living Things: Habitats	Living Things: Microhabitats	Materials: Uses of Everyday Materials	Animals: Life Cycles and Health	Plants: Plant Growth	Making Connections
Vocabulary	• alive • analyse • camouflage • carnivore • classify • coastal • dead • depend • diet • energy • excretion • food chain • growth • habitat • herbivore • life process • mammal • movement • nutrition • ocean • omnivore • predator • prey • producer • rainforest • reproduction • sensitivity • shelter • woodland	• botanist • camouflage • characteristics • classification key • classify • comparative/fair test • conclusion • criteria • data • food chain • identify • invertebrate • method • microhabitat • minibeast • research • results • species • survey • tally • test	• bend • block graph • elastic • fabric • flexible • glass • material • metal • object • plastic • property • pull • push • record • rock • squash • stretch • suitable • twist • wood	• adult • air • baby • basic needs • butterfly • child • carbohydrates • caterpillar • dairy • egg • exercise • fitness • food • frog • froglet • fruit • germs • growth • health • height • hygiene • lamb • life cycle • live young • measure • offspring • oils • proteins • pupa • sheep • spawn • spreads • stage • survive	• bulb • comparative test • conclusion • condition • diagram • energy • flower • germinate • growth • leaf • life cycle • measure • nutrient • observe • plant • shoot • seed • seedling • seed coat • stem • wilt	• alive • bubble wrap • eco-friendly • dead • excretion • fabric • flexible • germinate • growth • human-made • life process • material • movement • natural • nutrition • paper • plastic • property • recycle • reduce • reproduction • reuse • seed • sensitivity • soil • strong • suitable • sunlight • tin foil • warmth • water • waterproof • wood

				• tadpole • teenager • toddler • vegetables • water		
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<u>Year 3</u>	<u>Topic</u>					
	Animals: Movement and Nutrition	Forces and Space: Forces and Magnets	Materials: Rocks and Soil	Energy: Light and Shadows	Plants: Plant Reproduction	Making Connections
Vocabulary	• balanced diet • bone • carbohydrate • endoskeleton • exoskeleton • fat • fibre • invertebrate • joint • mineral • movement • muscle • nutrient • protection • protein • skeleton • support • vertebrate • vitamin • water	• attract • contact force • electromagnet • force • friction • magnet • magnetic material • magnetism • non-contact force • non-magnetic material • north pole • repel • south pole	• absorbency • acid rain • bone • clay • clay soil • crystal • earthworm • era • fossil • fossil record • grain • hard • hardness • impermeable • igneous rock • imprint • lava • loam soil • magma • metamorphic rock • mineral • molten rock • organic matter • paelantologist • peaty soil • permeable • rate • rock • sandy • sandy soil • sediment • sedimentary • sedimentation • silt • soft • soil	• cast a shadow • dangerous • light source • luminous • non-luminous • opaque • protect • reflect • reflection • reflective (shiny) • shadow • shadow puppet • translucent • transparent	• absorb • air • animal dispersal • carrying • conclude • disperse • dropping • eating • evaluate • female • flower • fruit • germination • improve • leaves • male • nutrients • petal • pollen • pollination • roots • soil • seed • seed formation • shaking • space • stem/trunk • sunlight • support • testable • transport • water • water dispersal • wind dispersal	• bar chart • bone • carbohydrate • conclusion • evaluate • fat • flower • fruit • friction • grip strength • joint • light source • material • muscle • nutrition • opaque • predict • property • protein • seed • shadow • trustworthy • variable

Year 4	Topic					
	Animals: Digestion and Food	Energy: Electricity and Circuits	Materials: States of Matter	Energy: Sound and Vibrations	Living Things: Classification and Changing Habitats	Making Connections
Vocabulary	- absorb - canine - carnivore - digest - faeces - food chain - herbivore - incisor - large intestine - molar - mouth - oesophagus - omnivore - predator - premolar - prey - producer - saliva - small intestine - stomach	- ammeter - appliance - battery - bulb - buzzer - cell - circuit - component - electrical conductor - electrical insulator - electricity - hazard - mains - material - motor - power source - precaution - property - safety - series circuit - switch - wire	- boiling point - climate change - compress - condensation - condensing - condensing point - drought - evaporating - evaporation rate - flood - force - freezing - freezing point - gas - gaseous - liquid - matter - melting - melting point - precipitation - rate - solid - state - steam - temperature - thermometer - the water cycle - volume - water vapour	- air - decibels (dB) - decibel meter - ear - eardrum - ear protectors - gas - hertz (Hz) - high pitch - insulator of sound - liquid - loud - low pitch - matter - medium - musical instrument - pitch - quiet - solid - sound - sound proofing - vibration - volume	- Carroll diagram - classification key - classify - conservation - conservationist - deforestation - earthquake - endangered - flood - flowering plants - human impact - invertebrate - observe - nature reserve - non-flowering plants - pollution - seasonal changes - taxonomist - uprooted - vertebrate - Venn diagram - waterlogged - wildfire	- bar chart - condensing - cell/battery - conclusion - evaluate - evaporating - gas - insect - liquid - medicine - motor - pharmacology - pharmacologist - precipitation - predict - solid - switch - temperature - the water cycle - trustworthy - variable - viscosity - water vapour

Year 5	Topic					
	Materials: Mixtures and Separation	Materials: Properties and Changes	Forces and Space: Earth and Space	Living Things: Life Cycles and Reproduction	Forces and Space: Unbalanced Forces	Making Connections
Vocabulary	• control variable • crystallising • dissolve • evaporation • evaporation method • filtering • insoluble • mixture • particle • sieve • sieving • soluble • solution • variable	• burning • change of state • circumference • condensing • conductor • dissolve • electrical conductivity • evaporating • freezing • hard • hardness • insulator • irreversible change • light intensity • light meter • melting • mixture • opaque • property • reversible change • rust • rusting • soft • states of matter • trustworthy • thermal conductivity • translucent • transparency • transparent	• artificial satellite • axis • calibrate • celestial bodies • climate change • day • daytime (daylight) • data • Earth • elliptical • face • first quarter moon • force • full moon • gnomon • gravity • horizon • Jupiter • last quarter moon • Mars • Mercury • midday • moon • natural satellite • Neptune • new moon • night (nighttime) • phase • planet • Pluto	• adolescence • adult • amphibian • asexual reproduction • bird • birth • bulb • carnivore • chrysalis • cocoon • conclusion • cuttings • egg • estimating • extrapolating • fertilisation • fledgling • flowering stage • four-legged tadpole • four-stage life cycle • frog • froglet • germination stage • gestation • gills • hatch • hatchling • herbivore • incubation • infancy • insect • juvenile	• aerodynamics • air resistance • amplify • balanced • contact force • distance • effort • force • friction • gear • gravity • lever • load • machine • mass • matter • non-contact force • pivot • pulley • streamlining • surface area • unbalanced • water resistance	• accurate • air resistance • asteroid • celestial bodies • conclusion • crater • diameter • evaluate • fair test • force • gravity • hardness • material • predict • property • spherical • reliable • trustworthy • variable

			• orbit • our Solar System • reflect • rotate • Saturn • season • shadow • Solar System • space • space junk • spherical • star • summer • sundial • sunrise • sunset • table • the Sun • the Moon • tilt • Uranus • Venus • winter • year	• larva • leaf growing stage • life cycle • line graph • line of best fit • lungs • mammal • mating • metamorphosis • nest • nestling • newborn • nymph • offspring • ovule • pollen • pollination • predict • pupa • reproduction • seed dispersal • seed stage • seedling stage • seed • sexual reproduction • species • tadpole • three-stage life cycle • tuber • two-legged tadpole		
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Skills Progression:

Expectations at the end of Nursery		Vocabulary
ELG: Science Children at the expected level of development will:		natural, wild, British autumn fruits and vegetables (e.g. apples, pears, beetroot, carrots, potatoes, butternut squash, sweetcorn, cauliflower). object, material, grow lifecycle: roots, shoots, stem, leaves, buds, flower water, light, warmth, temperature, soil, compost adult/parent, baby. lifecycle: egg, caterpillar, chrysalis, butterfly. birds (owl, duck), insects/bugs/ minibeasts (lacewing, ladybird, woodlouse, bee, wasp, spider,
Communication and Language	Understand ‘why’ questions, like: “Why do you think the caterpillar got so fat?”	
Personal, Social and Emotional Development	Make healthy choices about food, drink, activity and toothbrushing.	
Understanding the World	Use all their senses in hands-on exploration of natural materials. Explore collections of materials with similar and/or different properties. Talk about what they see, using a wide vocabulary. Begin to make sense of their own life-story and family’s history. Explore how things work. Plant seeds and care for growing plants. Understand the key features of the life cycle of a plant and an animal. Begin to understand the need to respect and care for the natural environment and all living things. Explore and talk about different forces they can feel. Talk about the differences between materials and changes they notice.	
Characteristics of Effective Learning Playing and exploring – engagement Finding out and exploring Playing with what they know Being willing to have a go Active learning – motivation Being involved and concentrating Keeping trying Enjoying achieving what they set out to do Creating and thinking critically – thinking Having their own ideas Making links Choosing to do things		Greater depth Children show good knowledge on how to develop their ideas and select equipment independently.

Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
All About Me Body Parts	People Who Help Us How fast can a vehicle go? Slopes and cars	Space Rocket Science	Julia Donaldson Stories and Rhymes Bug Hunt	Growing Growing area (seeds, plants, minibeasts)	Travel Sink and float
Vocabulary adult/parent, baby	Vocabulary object, material,	Vocabulary object, material,	Vocabulary lifecycle: egg, caterpillar, chrysalis, butterfly. birds (owl, duck), insects/bugs/ minibeasts (lacewing, ladybird, woodlouse, bee, wasp, spider,	Vocabulary British autumn fruits and vegetables (e.g. apples, pears, beetroot, carrots, potatoes, butternut squash, sweetcorn, cauliflower). lifecycle: roots, shoots, stem, leaves, buds, flower water, light, warmth, temperature, soil, compost	Vocabulary object, material,

Expectations at the end of Reception			Vocabulary
ELG: Science			wildlife, native habitats: woodland, desert, ocean, jungle, arctic., microhabitats: log, stone, tree, dead leaves, soil. bread: mix, knead, prove, rise. properties, suitable, pipette, recycling. properties - waterproof, strong/weak, dense/less dense, hard/soft. seasons: spring (growth, baby animals) summer autumn (harvest) winter body parts. backbone, skeleton, soft body, shell. predator, prey. nocturnal. tarantula, earthworm, snail, locust, cricket, millipede, butterfly, caterpillar), fish, reptiles (snake, tortoise, gecko), amphibians, mammals (mouse, shrew, vole, hare, fox
Communication and Language	Listening, Attention and Understanding	Make comments about what they have heard and ask questions to clarify their understanding.	
Personal, Social and Emotional Development	Managing Self	Manage their own basic hygiene and personal needs, including dressing, going to the toilet and understanding the importance of healthy food choices.	
Understanding the World	The Natural World	Explore the natural world around them, making observations and drawing pictures of animals and plants. Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class. Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter.	
Children at the expected level of development will: Characteristics of Effective Learning Playing and exploring – engagement Finding out and exploring Playing with what they know			

Being willing to have a go Active learning – motivation Being involved and concentrating Keeping trying Enjoying achieving what they set out to do Creating and thinking critically – thinking Having their own ideas Making links Choosing to do things	Greater depth Children know how to develop their ideas and what materials and joins are most suitable.
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Reception					
Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Food Cooking – making bread to see how yeast rises.	Me in my World How things change. How are you different now compared to when you were a baby?	My World Rain Gauge	House and Home Use playdough to make models of people in their family	Explorers Sink and float	All Creatures Great and Small Wormery / Bug hunt
Vocabulary bread: mix, knead, prove, rise.	Vocabulary body parts. backbone, skeleton,	Vocabulary properties, suitable, pipette, recycling. properties - waterproof, strong/weak, dense/less dense, hard/soft. seasons: spring (growth, baby animals) summer autumn (harvest) winter	Vocabulary properties, suitable, pipette,	Vocabulary properties, suitable, pipette,	Vocabulary wildlife, native habitats: woodland, desert, ocean, jungle, arctic., microhabitats: log, stone, tree, dead leaves, soil. predator, prey. nocturnal. tarantula, earthworm, snail, locust, cricket, millipede, butterfly, caterpillar), fish, reptiles (snake, tortoise, gecko), amphibians, mammals (mouse, shrew, vole, hare, fox

Plants

	Year 1	Year 2	Year 3
Plant structure and function	To know a variety of common plants, and how they differ. To know that deciduous trees lose their leaves seasonally, but evergreen trees do not. To know the basic structure (including leaves, flowers (blossom), fruit, roots, bulb, seed, trunk, branches, stem) of a variety of common plants, including flowering plants and trees.		To understand the functions of the basic parts of a plant and the relationship between structure and function. To know that water is transported within a plant from the root, through the stem, to the leaves.
Plant growth and needs	To begin to understand how plants grow and change over time.	To know that seeds and bulbs grow into seedlings by producing roots and shoots. To know that seedlings grow into mature plants by developing parts such as roots, stems, leaves and flowers. To know that seeds need water and warmth to germinate. To know that plants need water, light and a suitable temperature for growth and health.	To know that plants need water, light, air, nutrients and a suitable temperature for growth and health. To understand that the needs for growth and health vary from plant to plant.
Plant life cycle			To know the life cycle of a plant from seed to mature plant. To know that flowers are the reproductive organ of a plant. To know that the process of pollination is the transfer of pollen to the female (part of the) flower. To know that the process of seed formation is the growth of a seed after pollination. To know some different methods of seed dispersal and the benefits of each.

Animals, including humans

	Year 1	Year 2	Year 3	Year 4	Year 5
Animal growth	To know a variety of common animals (including fish, amphibians, reptiles, birds and mammals).	To understand how living things change, and that animals have offspring that grow into adults. To know which offspring comes from which parent animal. To know the stages in some animal life cycles.			To describe the human life cycle, including the stages of growth and development (baby, toddler, child, teenager, adult, elderly). To describe changes that occur during puberty (in boys and girls). To know that gestation periods vary across mammals.
Animal structure and function	To know the main body parts of common animals (arms, legs, wings, tails, fins, head, trunk, horns/tusks, shell) To know key parts of the human body (including head, neck, arms, elbows, legs, knees, face, ears, eyes, hair, mouth, teeth). To know the five main senses: sight, smell, hearing, taste and touch. To know that the skin is used for touch, the tongue is used for taste, the nose is used for smell, the eyes are used for sight and the ears are used for hearing.		To know that animals can be grouped based on the presence of a skeleton. To know that the skeleton in humans and some animals is used for movement, protection and support. To know that the muscular system in humans and some animals works with the skeleton for movement. To know the main bones in the body.	To know the main organs of the human digestive system (mouth, teeth, tongue, oesophagus, stomach, small and large intestines) and describe their simple functions. To know the different types of human teeth (incisor, canine, premolar and molar) and their simple functions	
Health and nutrition	To know that a carnivore is an animal that eats other animals and give some examples.	To know that animals, including humans, need water, food and air to survive.	To know that animals, including humans, need the right types and amount of nutrition.	To know that teeth can be damaged, including the effect of sugary and acidic food.	

	To know that a herbivore is an animal that eats only plants and give some examples. To know that an omnivore is an animal that eats both animals and plants, and to give some examples.	To understand the importance of exercise, a balanced diet and hygiene for humans. To know that animals, including humans, need the right types and amount of nutrition. To understand that humans cannot make their own food and therefore eat to get the nutrition needed. To know the main food groups (carbohydrates, protein, fats, fibre, vitamins, minerals and water) and their simple functions. To know that a balanced diet should include all food groups. To describe the diets of different animals.	To understand that humans cannot make their own food and therefore eat to get the nutrition needed. To know the main food groups (carbohydrates, protein, fats, fibre, vitamins, minerals and water) and their simple functions. To know that a balanced diet should include all food groups. To describe the diets of different animals.	To know that it is important to brush teeth twice a day, make good food choices and visit the dentist regularly. To describe the teeth of carnivores and herbivores, and understand why they are different. To know that predators hunt for their food and prey are the animals being hunted. To know that producers make their own food. To know that food chains begin with a producer followed by consumers, and arrows to show the energy passed on.	
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Living things and their habitats

	Year 2	Year 4	Year 5
Characteristics of living things	To begin to understand some of the life processes, including movement, reproduction, sensitivity, growth, excretion and nutrition. To know the difference between things that are living, dead, and things that have never been alive, using some of the life processes.	To know that living things can be grouped in different ways. To know that a classification key can be used to group and identify plants and animals. To know that vertebrates are animals which have a backbone and invertebrates are animals which do not have a backbone. To know that plants can be grouped into flowering or non-flowering varieties. To know that flowering plants include grasses and non-flowering plants includes ferns and mosses. To know that there are five main vertebrate groups: birds, mammals, reptiles, amphibians and fish. To know that invertebrate groups include snails, slugs, worms, spiders and insects.	
Variation and inheritance	To know a variety of plants and animals and describe some differences.		To know that a life cycle shows the changes an animal or plant goes through until the reproduction of a new generation when the cycle starts again. To know that all living things must reproduce for the species to survive. To know that sexual reproduction requires two parents, whereas asexual reproduction only requires one parent. To know that there are different processes plants and animals use to reproduce (asexual and sexual reproduction).
Habitats and interdependence	To name a variety of habitats, including woodland, ocean, rainforest and seashore. To know that a habitat is the environment where an animal or plant lives/ grows, because it provides what they need to survive.	To know that habitats can change throughout the year and this can be dangerous for living things. To know that humans can have both a positive and negative impact on the environment.	

	To know that a micro-habitat is a very small habitat (e.g. stones, logs and leaf litter). To know that living things depend upon each other (e.g. for food, shelter.) To understand that a food chain can be used to show how animals obtain food from eating either plants and/or other animals.		
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Materials

	Year 1	Year 2	Year 3	Year 4	Year 5
Identifying and naming	To know that objects are items or things. To know that a material is what an object is made from. To identify and name a variety of everyday materials, including wood, plastic, glass, metal, water and rock.		To know that rocks can be grouped based on their appearance or properties, (e.g. colour, texture, hardness, permeability.) To know that rocks may contain grains, crystals or fossils. To know that grains and crystals appear differently and can be used to classify rocks. To know that soils are made from rocks and dead matter.	To know that all substances around us can exist as solids, liquids and gases.	
Properties and uses	To know that property refers to how a material can be described.	To know why objects are made from particular materials and to give examples of their suitability.	To understand the relationship between the	To know that a property of a solid is that it keeps its shape unless a force is applied to it.	To describe a broader range of materials and their properties, including

	To describe the physical properties of a variety of everyday materials. To understand that materials can be grouped based on their physical properties.	To know that one material can be used for a range of purposes (and to give examples.) To know that different materials can be used for the same purpose (and to give examples.) To know why certain materials are unsuitable for particular objects.	properties of rocks and their uses.	To know that a property of a liquid can flow freely and take on the shape of a container. To know that a property of a gas does not have a fixed shape and can escape from an unsealed container.	hardness, solubility, transparency, conductivity and response to magnets.
Change		To know that a push or pull must be applied to change the shape of a solid object. To know that solid objects can be squashed, bent, twisted or stretched. To know that different solid objects may take a different amount of force to change shape.	To know that fossils can form from the remains of living things. To know that rocks can change over time (e.g. erosion, weathering).	To know that heating causes solids to turn into liquids (melting) and liquids to turn into gases (evaporating). To know that cooling causes gases to turn into liquids (condensing) and liquids to turn into solids (freezing). To know that water can exist as a solid, a liquid or a gas. To know that the melting point of water is zero degrees Celsius and the boiling point of water is 100 degrees Celsius. To know that water flows around the world in a continuous process called the water cycle. To know that in the water cycle, evaporation is when bodies of water are heated and turn into water vapour. To know that in the water cycle, condensation is the process of water vapour cooling to form water droplets in clouds, which can result in precipitation. To know that the rate of evaporation increases as temperature rises.	To know that some substances will dissolve in a liquid to form a solution. To know the factors that affect the time taken to dissolve, including temperature and stirring. To understand that dissolving, mixing and changes of state are reversible changes. To know that some liquids and solids can be separated using sieving, filtering and evaporation and to describe these processes. To understand that some changes result in the formation of new materials and that these are usually irreversible. (e.g. burning, rusting, the action of acid on bicarbonate of soda.)

Energy: Light

	Year 3
Sources	To know that light travels from a source (e.g. the Sun, light bulbs and torches). To know that light is needed to see things and that dark is the absence of light. To know that light from the Sun can be dangerous and how to protect their eyes.
Transfer	To know that all materials reflect light. To know that shadows are formed when the light from a light source is blocked by an opaque object.
Factors affecting energy	To know that shadows change as a result of different factors: - Changing the position of the light source. - Changing the distances between the light source, object and surface. To know that shadows change position and length throughout the day as the Sun changes position in the sky.

Energy: Sound

	Year 4
Sources	To understand that sound is a result of vibrations.
Transfer	To know that vibrations from sounds travel through mediums to the ear. To know that an insulating material reduces the amount of vibrations that pass through it and this can be used to protect the ears from damaging sounds. To know that different materials provide different amounts of insulation against sound.
Factors affecting energy	To know a variety of ways to change the pitch or volume of a sound. To know that quicker vibrations cause higher-pitched sounds and slower vibrations cause lower-pitched sounds. To know that stronger vibrations cause louder sounds and weaker vibrations cause quieter sounds. To know that sounds get fainter as the distance from the sound source increases.

Energy: Electricity

	Year 4
Sources	To know that all electrical appliances need a power source, including batteries or mains electricity. To know that an electrical circuit needs a complete path for the electrical charge to flow through. To know the main components in a simple series circuit. To know the precautions for working safely with electricity.
Transfer	To know that some materials allow electrical charge to pass through them quickly and these are known as electrical conductors (e.g. metals). To know that some materials do not allow electrical charge to pass through them easily and these are known as electrical insulators (e.g. wood and plastic). To know that metals are used for cables and wires because they are good conductors of electricity. To know that plastic is used to cover cables and wires because it is a good insulator.
Factors affecting energy	To understand that an open switch breaks a series circuit so the components will be off. To understand that a closed switch completes a series circuit so the components will be on. To understand the relationship between bulb brightness and the number of bulbs in a circuit.

Earth and Space

	Year 1	Year 5
Key facts	To know the name and order of the four seasons; spring, summer, autumn and winter. To know that it is unsafe to look directly at the Sun.	To know that the Sun is a star at the centre of our solar system. To know that the Sun, Earth and Moon are approximately spherical bodies. To know the names, order and relative positions of the planets and other main celestial bodies. To know that a moon is a celestial body that orbits a planet and give examples of moons that orbit other planets.
Forces in motion	To know weather associated with the four seasons and how it changes (in the UK). To understand that day length varies across the four seasons, with fewer daylight hours in the winter and more in the summer.	To know that the Earth and other planets orbit around the Sun. To know that the tilt of the Earth and its orbit around the Sun causes the seasons. To know that the Moon orbits around the Earth. To understand how the Earth's rotation causes day and night and the apparent movement of the Sun across the sky.

Forces

	Year 3	Year 5
Key facts	To know some examples of contact and non-contact forces. To know that some forces are a result of contact between two surfaces, but some forces can act at a distance (e.g. magnetism). To know the North and South poles of a magnet. To know some examples of magnetic materials, including iron and nickel, and how they react to a magnet and each other. To know some different examples of magnets, including bar, horseshoe, button and ring, To know some uses of magnets.	To know that gravity is a non-contact force that pulls objects together. To know that air resistance and water resistance are both types of friction.
Forces in motion	To know that friction is a contact force that acts between two surfaces to slow an object down. To know that magnetism is a non-contact force that affects objects containing magnetic metal. To understand that the opposite poles of a magnet attract one another and like poles repel one another.	To know that unsupported objects fall towards the Earth because of gravity. To know that friction, air resistance and water resistance act in the opposite direction to a moving object. To know that when forces are imbalanced, the speed, shape or direction of an object changes. To know that when forces are balanced the speed, shape or direction of an object stays the same. To know that some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect.
Factors affecting forces	To know that rougher surfaces have more friction between them than smoother surfaces. To understand that the strength of different magnets may vary.	To know that rougher surfaces have more friction between them than smoother surfaces and how that may affect movement. To know that the larger the surface area of an object the greater the air or water resistance it creates.

Working Scientifically

	Year 1	Year 2	Year 3	Year 4	Year 5
Posing Questions	Exploring the world around them and raising their own simple questions. Recognising there are different types of enquiry (ways to answer a question). Responding to suggestions on how to answer questions.		Beginning to raise further questions during the enquiry process. Considering what makes a testable question. Beginning to recognise that there are different types of enquiry and that they are suitable for different questions. Beginning to make suggestions about how different questions could be answered.		Raising questions throughout the enquiry process. Identifying testable questions. Selecting the most appropriate enquiry method to answer questions and give justification.
Planning	Beginning to recognise whether a test is fair. With support, deciding if suggested observations are suitable. Ordering a simple method.		Beginning to select from options which variables will be changed, measured and controlled. Suggesting what observations to make and how long to make them for. Planning a simple method, verbally and in writing. Beginning to write a simple method in numbered steps. Selecting and beginning to decide what simple equipment might be used to aid observations and measurements.		Suggesting which variables will be changed, measured and controlled. Making and explaining decisions about what observations to make and how long to make them for. Writing a method including detail about how to ensure control variables are kept the same. Writing a method that considers reliability by planning repeated readings. Suggesting the most appropriate equipment to make observations and measurements and justifying their choices.
Predicting	Suggesting what might happen, often justifying with personal experience.		Making predictions about what they think will happen by: • Using scientific knowledge and/or personal experience to explain their prediction (because...) • Beginning to consider cause and effect when making predictions, where appropriate. • Predicting a trend by considering how the changing variable will affect the measured variable. (The smoother the surface, the longer the distance the car will travel)		Making increasingly scientific predictions by: • Using previous scientific knowledge and evidence to inform their predictions. • Using scientific language to describe a potential outcome or explain why they think something will happen. • Making links between topics to evidence a prediction.
Observing (qualitative data)	Using their senses to describe, in simple terms, what they notice or what has changed.		Using their senses to describe, in more detail and with simple scientific vocabulary, what they notice or what has changed.		Using their senses to describe, in detail and with a broader range of scientific vocabulary, what they notice or what has changed.

Measuring (quantitative data)	Using non-standard units to measure and compare. Beginning to use standard units to measure and compare. Beginning to use simple measuring equipment to make approximate measurements. Reading simple numbered scales.	Using standard units to measure and compare. Using measuring equipment with increasing accuracy. Reading scales with unmarked intervals between numbers.	Using standard units to measure and compare with increasing precision (decimals). Reading a wider variety of scales with unmarked intervals between numbers.
Researching	Gathering specific information from one simplified, specified source.	Gathering specific information from a variety of sources.	Gathering answers to open-ended questions from a variety of sources.
Recording (diagrams)	Drawing and labelling simple diagrams.	Beginning to draw more scientific diagrams by: • Using some standard symbols. • Drawing in 2D to produce simple line diagrams. • Labelling with more scientific vocabulary.	Drawing scientific diagrams by: • Using a wider range of standard symbols. • Drawing with increasing accuracy. • Labelling with a broader range of scientific vocabulary. • Annotating diagrams to explain concepts and convey opinions.
Recording (tables)	Using a prepared table to record results including: • Numbers. • Simple observations. • Tally frequency.	Using a prepared table to record results including more detailed observations. Using tables with more than two columns. Identifying and adding headings to tables. Beginning to design simple results tables.	Using tables with columns that allow for repeat readings. Suggesting headings to tables, including units. Designing results tables with increasing independence with consideration of variables where applicable. Calculating the mean average.
Grouping and Classifying	Grouping based on visible characteristics. Organising questions to create a simple classification key.	Grouping based on visible characteristics and measurable properties. Populating a pre-prepared branching and number key. Choosing appropriate questions for classification keys.	Grouping in a broader range of contexts. Organising the layout of number and branching keys. Formulating appropriate questions for classification keys.
Graphing	Representing data using pictograms and block charts.	Representing data using bar charts. Drawing bars with greater accuracy. Reading the value of bars with greater accuracy.	Representing data by using line graphs and scatter graphs. Plotting points with greater accuracy. Reading the value of plotted points with greater accuracy.
Analysing and drawing conclusions.	Using their results to answer simple questions.	Writing a conclusion to summarise findings using simple scientific vocabulary. Beginning to suggest how one variable may have affected another.	Writing a conclusion to summarise findings using increasingly complex scientific vocabulary. Suggesting with increasing independence how one variable may have affected another.

	Beginning to recognise when results or observations do not match their predictions.	Beginning to quote results as evidence of relationships. Identifying data that does not fit a pattern (anomalous data). Recognising when results or observations do not match their predictions. Beginning to use identified patterns to predict new values or trends.	Quoting relevant data as evidence of relationships. Identifying anomalies in repeat data and excluding results where appropriate. Comparing individual, class and/or model data to the prediction and recognising when they do not match. Using identified patterns to predict new values or trends.
Evaluating	Beginning to recognise whether a test is fair or not.	Beginning to identify steps in the method that need changing and suggest improvements. Beginning to identify which variables were difficult to control and suggesting how to better control them. Commenting on the degree of trust by reflecting on: • Results that do not fit a pattern (anomalies). • The quality of results (accurate measurements and maintaining control variables). Beginning to identify new questions that would further the enquiry.	Identifying steps in the method that need changing and suggesting improvements. Identifying which variables were difficult to control and suggesting how to control them better. Commenting on the degree of trust by also reflecting on: • Accuracy (human error with equipment). • Reliability (repeating results). • Sources of information (e.g. websites, books). Posing new questions in response to the data that would extend the enquiry. Deciding what data to collect to further test direct relationships.

Mastery

What is Mastery?

A child's ability to skilfully **apply** their learning in more in-depth ways is called **Mastery**. Mastery is not just knowing a fact, but it is using that fact in increasingly more complex situations to extend their learning. Mastery also enables children to work in ways which show a deeper understanding of a given task.

What is Mastery in Science?

There are a lot of different interpretations of what is meant by a mastery curriculum, so at Harvington C E First and Nursery School we want to make it clear in our principles for science what we are trying to achieve. In our curriculum we have identified both the knowledge and the skills (working scientifically) in the programme of study to ensure that children meet a broad and balanced knowledge base and develop these skills throughout their school career. By clearly identifying the key concepts that need to be understood we can revisit and check that children have understood and that they have remembered them. The key to achieving mastery is being able to apply the concepts to problem solving and challenging investigations.

We know that good science leading to mastery occurs in our school when:

- Children are excited there are "Wow" moments.
- They want to do more.
- Children are active and engaged in their learning.
- Children ask good questions.
- Children can talk about what they have learnt and identify the next stages and steps.
- Children are involved in practical hands on activities.
- They are able to make links between the experiences and other subjects.
- They develop and extend their own learning, applying their knowledge to other situations. This will be through exploring and discovering new things.
- Science has the wow factor of the school ethos using our school values.
- Children can: Explore, Engage, Enquire, Explain

In the classroom:

- Children ask questions to develop their knowledge and understanding.
- They have access to a range of stimulating and interesting resources.
- Children can explore at their own level.

- Children talk to each other with statements such as, "Come and look," or, "I didn't
- know that."

Teaching and Learning:

- Approaches include opportunity in the classroom, outside and from visits and visitors.
- There are opportunities to master exploration and investigation.
- There are opportunities to use a range of resources.
- Book scrutiny will show evidence of observations, the children's own comments as well as those of the teacher, i.e. a dialogue. Through talking the children will have shown they can predict, hypothesise, use variables within fair testing, measure accurately and evaluate with clear explanations.

Examples of Cultural Capital in Science

The aim of Science teaching is to

- Give children the knowledge they need to be able to ask questions and explore answers in many different ways.
- Get children excited and engaged in their learning by giving them experiences that they might not have in home.
- Teach children to become naturally curious about the world around them including weather and seasons.
- Allow children to experience trips to the Farm Park, Bishops wood, Space Centre, experience the outdoors during a residential.
- Develop children's enjoyment and interest by the science of whole school science days.
- Learn and use scientific vocabulary as this is explicitly taught.
- Science visitors to share why science is important and how it can be used in everything in life – Fizz Pop Science, Planetarium, Mad Science
- Science club including the Royal Microscopical Society and STEM – to understand why science is important and how science is used in career choices later on in life
- Learn about seasons and how the outdoor changes through the Roots and Shoots programme of learning
- The use of the outdoor learning environment including mud kitchens and camp fires.
- Use of resources to provide 'hands on' learning
- Equip children with the knowledge about the use of scientific enquiry and investigation.
- To develop resilient learners who are willing to try new things and to persevere even when challenging
- To communicate and articulate science concepts and ideas with confidence.
- Home learning challenges to develop higher level thinking and to apply knowledge and skills learnt in school.
- Children are curious and want to learn more. Children ask questions in class and want to additional learning at home.
- Dress as a scientist when taking part in science lessons to heighten the focus for the children and to encourage enthusiastic learning.
- Take part in science debates to understand how science is not always seen as right E.G. should animals be cloned?
- Cross-curricular learning – cooking, use of IT, use of music, art and drama
- Take part in national STEM challenges – A Home for Nature.
- Promote enjoyment and enthusiasm for learning about everyday science around them from an early age.

Examples of how Science skills are relevant for future jobs:

Please use this list to suggest to children how these skills can be used. Suggest that this format is used to display with the learning objective:

Learning Objective:.
How you can use this learning for a job when you are older:

- Doctor
- Vet
- Nurse
- Chemist
- Conservationist
- Environmental Scientist
- Forensic Scientist
- Robotics
- Researcher
- Teacher
- Lecturer
- Farmer
- Astronaut
- Dentist
- Meteorologist
- Palaeontologist
- Author
- Vaccination scientist
- Pilot
- Sailor
- Game creator