



Mickleton Primary School

Science

Intent and Implementation

Progression of Knowledge and Skills for Science

Curriculum Intent Statement:

To provide children with the opportunity to develop their curiosity and build their foundations for understanding the world around them through varied and first hand experiences and investigations. Children will gain an understanding that science has changed our lives and that it is vital to the world's future prosperity. The curriculum aims to provide children with the range of skills and knowledge necessary to make an impact in their future lives.

Science is taught weekly throughout the school for up to 2 hours a week. Our aim is to challenge and question children's thinking. Work is divided in topics for each year group and each lesson clearly indicated which part of the national curriculum it covers. To ensure there is challenge and differentiation, the majority of the lessons provide thinking questions that stimulates and excites pupils' curiosity about phenomena and events in the world around them.

Each year group now has a scientist of the term which is linked to their topic of work. This enables children an opportunity to see how the skills they are learning can be related to the real world.

The objectives for science are to:-

- 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
- equip children with the scientific knowledge required to understand the uses and implications of science, today and for the future.

Science contributes significantly to the teaching of English in our school by actively promoting the skills of reading, writing, speaking and listening. Some of the texts that the children study as part of the Big Write programme are of a scientific nature. The children develop oral skills in science lessons through discussions (for example of the environment) and through recounting their observations of scientific experiments. They develop their writing skills through writing reports and projects and by recording information.

Science contributes to the teaching of mathematics in a number of ways. The children use weights and measures and learn to use and apply number. Through working on investigations they learn to estimate and predict. They develop the skills of accurate observation and recording of events. They use numbers in many of their answers and conclusions. The impact and progress in this curriculum area is measured through book trawls, learning observations, learning walks, data monitoring, pupil interviews and staff questionnaires.

Science is closely linked to our Forest School lessons where the Forest school lead works closely with class teachers to provide hands on and real experiences linked to the Science topic they are learning about. Bird houses, bug hunts, pond dipping and making bird food have all been activities carried out in Forest school.

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
- 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 (may by teachers) 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.

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 – 6 do a weekly science lesson (Up to 2 hours) 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. 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.

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 each key stage teachers have long and medium-term planning. The plans are turned into short term planning 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 – six): 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. We also link Science into our Forest school lessons when able.

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 except in EYFS.

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

Assessment:

At Mickleton Primary 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

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 Insight assessment online to assess Science as one subject. 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 Insight online.

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. End of topic tests are done at the end of each half term; these are recorded in Science 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. Written assessments are introduced in Year One if we feel the children are ready.

Resources:

There are a wide range of resources available such as materials, rocks and soils, electricity circuits and resources to support with Science topics.

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 scientist of the half term displayed on each one.

The teaching of science is also enriched through:

- Theme/Cross curricular lessons
- Whole school science days
- Purple Mash
- Cooking activities
- STEM days
- Links/experiences with High School
- 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.

Science Vocabulary Year One					
Plants	Animals including humans		Seasonal change	Use of everyday materials	Working scientifically
common wild plants garden plants tree deciduous evergreen trunk / bark branches leaf root plant leaf bud flowers blossom petal/s root stem / stalk fruit berry vegetables bulb seed ,	Parts of the body i.e. head, body, eyes, ears, mouth, teeth, leg, tail, wing, claw, fin, scales, feathers, fur, beak, paws, hooves Names of animals experienced first-hand from each vertebrate group Senses: touch, see, smell, taste, hear, fingers (skin), eyes, nose, ear and tongue	Omnivore, herbivore, omnivore human head body neck arms, hands, fingers elbows legs knees face ears, eyes, nose hair mouth, tongue teeth tail fin scales feathers fur beak paw hooves senses – touch, taste, smell, hear, see	season spring summer autumn winter weather hot / warm cool / cold sun / sunny cloud / cloudy wind / windy rain/ rainy snow / snowing hail / hailing sleet frost fog / mist ice / icy rainbow thunder lightning storm light / dark day / night day length	object material wood plastic glass metal water rock brick clay properties hard / soft stretchy stiff shiny dull rough / smooth bendy / stiff waterproof absorbent paper fabrics elastic foil card / cardboard floppy	question answer observe observing equipment identify classify sort group record diagram chart map data compare contrast describe biology chemistry physics

Science Vocabulary Year Two				
Plants	Animals including humans	Living things and their habitat	Use of everyday materials	Working scientifically
water light shade sun warm cool grow suitable temperature grow healthy germination reproduction	offspring grow/th adults young / old nutrition reproduce / reproduction survival water food air exercise heartbeat breathing hygiene germs disease stages egg-chick-chicken egg-caterpillar-pupa-butterfly spawn-tadpole-frog lamb-sheep baby-toddler-child-teenager-adult examples of food (pasta, bread meat, fish, fruit, vegetables)	living dead never been alive suited / suitable habitats micro-habitats basic needs food food chain sun-grass-cow-human alive healthy logs leaf litter stony path under bushes shelter seashore woodland ocean rainforest conditions hot / warm / cold dry / damp / wet bright / shade / dark	names of materials – increase the range from Y1 properties of materials – as Y1 plus: opaque transparent translucent reflective non reflective flexible rigid shape push / pushing pull / pulling twist / twisting squash / squashing bend / bending stretch / stretching	question answer observe observing equipment identify classify sort group record diagram chart map data compare contrast describe biology chemistry physics

Science Vocabulary Year Three					
Plants	Animals including humans	Light	Rocks	Forces & magnets	Working scientifically
structure – flowering plants, roots, stem / trunk, leaves, flowers function – nutrition, support, reproduction, makes own food requirements for life and growth – air, light, water, nutrients from the soil, room to grow, fertiliser life cycle - flowers pollination, seed formation, seed dispersal photosynthesis, pollen insect / wind pollination, seed formation, seed dispersal – wind dispersal, animal dispersal, water dispersal	nutrition nutrients vitamins minerals fat protein carbohydrates sugars fibre water skeletons – support, protection skulls – brain ribs – heart, lungs joint muscles- movement, pull, contract relax	light light source see dark absence of light reflect reflective surface natural star Sun Moon artificial torch candle lamp translucent transparent opaque shiny matt surface shadow reflect mirror sunlight dangerous	rock stone pebble boulder soil layers hard / soft fossil grains crystals hard/ soft texture absorb water marble chalk granite sandstone slate sandy soil clay soil chalky soil peat	Force magnetic force magnetic strength bar magnet ring magnet button magnet horseshoe magnet push pull twist contact non-contact open surface magnet magnetic attract repel magnetic poles north pole south pole metal iron steel	research- relevant questions scientific enquiry comparative and fair test systematic careful observation accurate measurements equipment – thermometer, data logger data- gather, record, classify, present record- drawings, labelled diagrams, keys, bar charts, tables oral and written explanations conclusion predictions differences, similarities, change evidence improve secondary sources guides, keys construct

Science Vocabulary Year Four					
Electricity	Animals including humans	Sound	Living things & their habitats	States of matter	Working scientifically
appliances electricity device electrical circuit cell wire bulb buzzer danger electrical safety sign insulators switch open closed components motor mains / plug circuit complete circuit connect battery / positive / negative connections loose connection short circuit clip motor connector metal / non-metal symbol	human digestive system mouth tongue-mixes, moistens, saliva teeth: incisors- cutting, slicing canines- ripping, tearing molars / premolars - chewing, grinding oesophagus transports stomach acid enzymes small intestine large intestine rectum anus carnivore, herbivore, omnivore brush floss food chain Sun producers prey / predators hibernate	sound sound source noise vibrate vibration travel solid liquid gas pitch (high/low) tune high low volume loud quiet fainter muffle vibrations insulation instrument percussion strings brass woodwind tuned instrument	environment flowering non-flowering plants animals vertebrate danger invertebrates- snails, slugs, worms, spiders, insects vertebrates- fish, amphibians, reptiles, birds, mammals plants – flowering plants, non-flowering plants population development litter deforestation classification, / classification keys environment / habitat - human impact, positive, negative migrate	solid liquid gas air oxygen powder grain / granular crystals ice / water/ steam water vapour heated/ heating cooled/ cooling temperature degrees Celsius solidify molten boil state change melting, freezing, melting point, boiling point, evaporation, temperature, water cycle	research- relevant questions scientific enquiry comparative and fair test systematic careful observation accurate measurements equipment – thermometer, data logger data- gather, record, classify, present record- drawings, labelled diagrams, keys, bar charts, tables oral and written explanations conclusion predictions differences, similarities, change evidence improve secondary sources guides, keys construct interpret

Science Vocabulary Year Five

Earth & space	Forces	Animals including humans	Living things & their habitats	Properties and changes	Working scientifically
Earth planets Sun solar system Moon celestial body sphere / spherical rotate / rotation spin night and day star planets Mercury Venus Mars Jupiter Saturn Uranus Neptune Pluto 'dwarf' planet orbit revolve geocentric model heliocentric model shadow clocks sundials astronomical clocks	fall gravity force Earth air resistance water resistance friction moving surfaces mechanisms levers pulleys gears magnetic force magnet attract simple machines	human development baby child toddler teenager adult gestation grow grows growing growth foetus embryo womb gestation elderly development puberty	life process of reproduction plants animals vegetable garden flower border reproduction plants- sexual, asexual animals- sexual life cycles- mammal, amphibian, insect, bird rainforest, oceans, desert prehistoric similarities differences germination pollination stamen stigma life cycle reproduce sperm fertilises egg live young metamorphosis plantlets runners bulbs cuttings	solid , liquid , gas air, oxygen powder grain/ granular /crystals ice/ water/ steam water vapour heated/ heating cooled/ cooling temperature degrees Celsius melt , freeze , solidify melting point molten , boil change of state soluble / insoluble transparency conductive magnets dissolve, solution separate/ing filtering / sieving evaporating reversible changes non reversible evaporation irreversible insulation thermal/electrical insulator/conductor burning, chemical opaque, translucent rusting residue condensing	plan variables measurements accuracy precision repeat repeats record data scientific diagrams labels classification keys tables scatter graphs bar graph line graph predictions further comparative and fair tests report and present conclusions casual relationships explanations degree of trust oral and written display presentation evidence support refute ideas arguments identify, classify and describe patterns systematic quantitative measurements

Science Vocabulary Year Six					
Animals including humans	Evolution & inheritance	Electricity	Living things & their habitats	Light	Working scientifically
circulatory system heart blood blood vessels pumps oxygen carbon dioxide lungs nutrients water diet exercise drugs lifestyle pulse rate transported water muscles	evolution suited / suitable adapted / adaptation offspring characteristics vary / variation inherit / inheritance fossils sexual reproduction environment	appliances electrical circuit complete circuit circuit diagram circuit symbol components cell / battery positive/ negative terminal connection loose connection short circuit wire crocodile clip bulb brightness switch buzzer volume motor conductor insulator voltage current resistance danger series circuit	organism micro-organism fungus mushrooms classification keys environment fish amphibians reptiles birds mammals vertebrates invertebrates insects, spiders snails, worms flowering and non-flowering	light travels straight reflect reflection light source object shadows mirrors periscope rainbow filters straight lines light rays	plan variables measurements accuracy precision repeat repeats record data scientific diagrams labels classification keys tables scatter graphs bar graph line graph predictions further comparative and fair tests report and present conclusions casual relationships explanations degree of trust oral and written display presentation evidence support refute ideas arguments identify, classify and describe patterns systematic quantitative measurements

Skills Progression:

	Plan		Do			Review	
	Key questions and predict	Plan review	Set up enquiry	Observe and measure	Sort and record	Interpret and report	Evaluate
KS1 Develop close observations	Ask simple question Begin to predict	Recognise that questions can be answered in different ways	Perform simple test	Observe using simple equipment	Identify and classify Gather and record data to help answer questions	Communicate what they found using simple scientific language	Remind pupils of original questions Use their observations and ideas to suggest answers to questions
Support for progression	Provide question stems Ask pupils to explain predictions	Provide opportunity for setting up different investigations	Ask pupils to make decisions in the setting up of investigations	Provide access to a range of equipment Discuss how to make increasingly accurate measurements	Children to create their own tables and charts	Support children to identify key findings, noting patterns and relationships	Ask children to use their own observations to make predictions
Lower KS2 Develop systematic approach	Ask relevant questions Create predictions using previous experiences	Use different types of scientific enquiries to answer questions	Set up simple, practical enquires, comparative and fair test	Make systematic and careful observations and where appropriate take accurate measurements	Gather, record, classify and present data in a variety of ways to help answer questions Record findings using simple scientific language, drawings, levelled diagrams, keys, bar charts and tables	Report on findings from enquiries using oral and written explanations, present results and conclusions Identify differences, similarities or changes related to simple scientific ideas	Use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions. Use straight forward scientific language to answer key questions.

Support for progression	Challenge children to ask a range of questions	Provide a structure for group planning	Ask pupils to identify variable	Ask pupils to take repeated readings	Ask pupils to create their own tables, charts and support graphs	Ask pupils to identify patterns	Ask pupils to explain conclusion in terms of scientific concepts.
Upper KS2 Develop independence	Ask testable questions Base predictions on scientific understanding	Plan different types of scientific enquires	Recognise and control variable where necessary	Take measurements using a range of equipment with accuracy and precision Take repeated readings where appropriate	Record data and results using scientific diagrams, labels, classification keys, tables and graphs	Report and present findings from enquiries including conclusions, explanations in various oral and written forms such as displays and other presentations	Use test results to make predictions to set up further comparative and fair tests Identify scientific evidence that has been used to support or refute ideas or arguments
Support for progression	Ask pupils to sort questions	Ask pupils to plan independently	Ask pupils to explain which are key variables	Ask pupils to explain the need for repeated recordings	Ask pupils to select how data is analysed	Ask pupils to identify and suggest reasons for qualifying results	Ask pupils to evaluate their own and others results.

Progression

		EYFS	Year 1	Year 2
Working Scientifically	Ideas and Evidence	Talks about how things happen and why things work (30-50 TW)	I can ask simple questions and recognising that they can be answered in different ways. I can ask relevant questions and using different types of scientific enquiries to answer them.	I can ask simple questions and recognising that they can be answered in different ways. I can ask relevant questions and using different scientific enquiries to answer them.
	Planning Experimental Work	Look closely at similarities and differences in relation to places objects, materials and living things (ELG TW) They make observations of animals and plants and explain why some things occur, and talk about changes. (ELG TW)	I can identify and classify. I can perform simple tests using simple equipment, observing closely. I can set up simple practical enquiries, comparative and fair tests making accurate and careful observations.	I can identify and classify. I can perform simple tests using simple equipment, observing closely. I can set up simple practical enquiries, comparative and fair tests making accurate and careful observations. I can take accurate measurements using standard unit.
	Obtaining and Presenting Evidence		I can gather and record data to help in answering questions. I can gather, record, classify and present data in a variety of ways to help in answering questions.	I can gather and record data to help in answering questions. I can gather, record, classify and present data in a variety of ways to help in answering questions. I can record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables
	Evidence and Evaluating		I can use my observations and ideas to suggest answers to questions I can use results to draw simple conclusions and suggest improvements	I can use my observations and ideas to suggest answers to questions I can use results to draw simple conclusions and suggest improvements I can suggest new questions and predictions for new values in my results. I can identify differences, similarities or changes using my knowledge of scientific ideas and processes. .
Plants		Can talk about some of the things they have observed such as plants, animals, natural and found objects (30-50 TW) Children know about similarities and differences in relation to places,	I can identify the roots, stem, trunk, leaves and flowers of a plant. I can identify and some plants. I know the difference between deciduous and evergreen trees.	I know that plants produce seeds and that seeds grow into new plants. I know that some plants grow from bulbs. I can describe what I see when a plant grows and record my observations in a table. I can test to find out what seeds and bulbs need to have to grow.

		objects, materials and living things (ELG TW) They make observations of animals and plants and explain why some things occur, and talk about changes. (ELG TW)	I can observe and record the changes in plants in my local Environment over the course of the year. I know that plants need water and light to grow. I can observe and describe the differences between plants grown in light and dark places.	I can complete a comparative test over time to show what a plant needs to grow well. I can observe and record the changes in plants in my local environment over a year.
Animals including Humans			I can name and draw and label the basic parts of the human body. I know the 5 senses and which part of the body is linked with which sense. I can identify and name some animals. I can describe and compare the main body parts of different animals. I know about common animal's diets and can identify if they are herbivore, carnivore or omnivore. I can group animals by their body parts and what they eat. I can explain how I sorted the groups. I am starting to recognise and use the words fish, amphibian, reptile, bird, and mammal when grouping animals.	I can observe and record how young animals change as they get older. Examples are egg, chick chicken, tadpole, frog I know what foods I need to eat to stay healthy and grow well. I can explain why it is important to keep clean, exercise and eat well to stay healthy. I can find out what other animals need to have to stay alive and healthy. (contact with local vets RSPCA,)
Everyday Materials			I know the difference between an object and the material it is made from. I can identify and name different everyday materials such as; wood, plastic, glass, metal, water and rock. I know that some materials are natural and some are man-made. I can explore and test different materials and can name the different properties; hard, soft, stretchy, stiff, shiny, dull, rough, smooth, bendy, not bendy, waterproof, not waterproof, absorbent, not absorbent, transparent, translucent and opaque. I know we chose the materials we use to make things because of their properties. I can group materials by their properties. I can investigate how the shapes of solid objects can be changed by twisting, squashing, bending and stretching. I can find out about scientists who have discovered and made new and useful materials.	I know that because of the properties of some materials, they can be used for more than one thing. I know that different materials may have similar properties so some items can be made out of different materials. E.g. chairs, spoons, I know that the properties of some materials make them unsuitable to use in some situations. I can predict, observe and describe what happens to some materials when they are heated, looking at changes. I know the dangers of hot water or flames. I can find out about inventors who have made useful new materials.

Seasonal Changes			I can name the four seasons I can observe and record the changes in my environment over the seasons. I can tell you what weather we have with each season. I can see and describe how the length of the day changes with the seasons.	
All Living Things and Their Habitats		Can talk about some of the things they have observed such as plants, animals, natural and found objects (30-50 TW) Shows care and concern for living things and the environment (30-50 TW) Talk about features of their own immediate environment and how environments might vary from one another (ELG TW)		I can explain what is living, what is dead and what has never been alive. I can sort and group things I find in a habitat according to whether it is living dead or never been alive. I know that a habitat is a suitable home to plants and animals. Over the course of the year I can observe and record changes in a habitat. I can describe different habitats and explain the needs of the plants and animals that live there. I know that a micro habitat is a very small habitat that is part of a larger habitat, such as woodlice living under a log. I can explain how animals get their food from plants and other animals. I can organise this information into a simple food chain starting with plants and naming the different foods. I am beginning to recognise the seven life processes of living things. It is these but the correct scientific names will need explaining. (Movement, Respiration or exchange of gasses, Sensitivity, Nutrition or eating or making food, Excretion, Reproduction and Growth.)

		Year 3	Year 4	Year 5	Year 6
Working Scientifically	Ideas and Evidence	I can ask simple questions and recognising that they can be answered in different ways. I can ask relevant questions and using different types of scientific enquiries to answer them. I can use simple models to describe scientific ideas..	I can ask simple questions and recognising that they can be answered in different ways. I can ask relevant questions and using different types of scientific enquiries to answer them. I can use simple models to describe scientific ideas. I can use test results to make predictions to set up further comparative and fair tests	I can ask simple questions and recognising that they can be answered in different ways. I can ask relevant questions and using different types of scientific enquiries to answer them. I can use simple models to describe scientific ideas. I can use test results to make predictions to set up further comparative and fair tests	I can use the outcome of test results to make predictions and set up a further comparative fair test. I can read, spell and pronounce scientific vocabulary accurately.
	Planning Experimental Work	I can identify and classify. I can perform simple tests using simple equipment, observing closely. I can set up simple practical enquiries, comparative and fair tests making accurate and careful observations. I can take accurate measurements using standard unit. I can use a range of equipment, for example thermometers and data loggers.	I can identify and classify. I can perform simple tests using simple equipment, observing closely. I can set up simple practical enquiries, comparative and fair tests making accurate and careful observations. I can take accurate measurements using standard unit. I can use a range of equipment, for example thermometers and data loggers.	I can identify and classify. I can perform simple tests using simple equipment, observing closely. I can set up simple practical enquiries, comparative and fair tests making accurate and careful observations. I can take accurate measurements using standard unit. I can use a range of equipment, for example thermometers and data loggers. I can plan different types of scientific enquiries to answer questions. I recognise and control variables where necessary.	I can plan different types of scientific enquiry. I can control variables in an enquiry.

	Obtaining and Presenting Evidence	I can gather and record data to help in answering questions. I can gather, record, classify and present data in a variety of ways to help in answering questions. I can record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables	I can gather and record data to help in answering questions. I can gather, record, classify and present data in a variety of ways to help in answering questions. I can record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables I can take measurements, using a range of scientific equipment, with increasing accuracy and precision.	I can gather and record data to help in answering questions. I can gather, record, classify and present data in a variety of ways to help in answering questions. I can record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables I can take measurements, using a range of scientific equipment, with increasing accuracy and precision. I can record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, bar and line graphs.	I can measure accurately and precisely using a range of equipment. I can record data and results using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs. I can report findings from enquiries in a range of ways. I can explain a conclusion from an enquiry.
	Evidence and Evaluating	I can use my observations and ideas to suggest answers to questions I can use results to draw simple conclusions and suggest improvements I can suggest new questions and predictions for new values in my results. I can identify differences, similarities or changes using my knowledge of scientific ideas and processes. I can use straightforward scientific evidence to answer questions or to support their findings	I can use my observations and ideas to suggest answers to questions I can use results to draw simple conclusions and suggest improvements I can suggest new questions and predictions for new values in my results. I can identify differences, similarities or changes using my knowledge of scientific ideas and processes. I can use straightforward scientific evidence to answer	I can use my observations and ideas to suggest answers to questions I can use results to draw simple conclusions and suggest improvements I can suggest new questions and predictions for new values in my results. I can identify differences, similarities or changes using my knowledge of scientific ideas and processes. I can use straightforward scientific evidence to answer questions or to support their findings I can report and present findings from enquiries, including conclusions,	I can relate the outcome from an enquiry to scientific knowledge in order to state whether evidence supports or refutes an argument or theory. I can explain causal relationships in an enquiry.

			questions or to support their findings	causal relationships and explanation of results, in oral and written forms such as displays and other presentations. I can identify scientific evidence that has been used to support or refute ideas or arguments.	
Living things		I recognise that plants need light, warmth and water to grow and that plants need healthy leaves, roots and stems to grow well. I know that different plants need different conditions to grow well. I can explain why plants need healthy roots and stems by investigating how water is transported in a plant. I can name the parts of a flower and the part these play in the life cycle of the plant. I can explain how pollen and seeds are dispersed and how seeds develop. I know that plants make their own food but need nutrients from the soil, air, water and sunlight to do so.			I can classify living things into broad groups according to observable characteristics and based on similarities & differences. I can describe how living things have been classified. I can give reasons for classifying plants and animals in a specific way.

Animals including Humans		I can describe a healthy and varied diet. I know that humans and some other animals have a skeleton and can describe the main functions of my skeleton. I can name some of the bones in my skeleton and compare these with the skeletons of other animals. I know that I use my muscles and skeleton to move. I know that when one muscle contracts another relaxes and can use a model to show how this happens. I can research different food groups and how they keep us healthy. I can use my research to design menus for different people.	I can identify the different types of teeth I have and explain what their functions are. I can research and investigate what causes damage to my teeth, how to care for them correctly. I can compare and contrast the teeth of carnivores, herbivores and omnivores and suggest why they are different, linking the types of teeth to the diet of a variety of animals. I can use my knowledge of what animals eat to develop food chains showing the feeding relationships within a variety of habitats. I know the main body parts involved with eating and digestion. I can identify, mouth, teeth, tongue, oesophagus, stomach, small and large intestine. I know the functions of the digestive system.	I recognise some stages in the development of humans. I can recognise the stages in the growth and development of humans. I can describe the changes as humans develop from birth to old age.	I can identify and name the main parts of the human circulatory system. I can describe the function of the heart, blood vessels and blood. I can discuss the impact of diet, exercise, drugs and life style on health. I can describe the ways in which nutrients and water are transported in animals, including humans.
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Everyday Materials				I can compare and group together everyday materials based on evidence from comparative and fair tests, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets. I can give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic. Which materials would be the most effective for making a warm jacket, for wrapping ice cream to stop it melting, or for making blackout curtains?' They might compare materials in order to make a switch in a circuit. I can describe the differences between solids, liquids and gases. I can describe and explain the difference between melting and dissolving giving everyday examples of each. I know that gases flow from place to place and that air is a mixture of gases. I know that liquids evaporate to form gas. I can make clear distinctions between the properties of solids, liquids and gases.	I can describe how the earth and living things have changed over time. I can explain how fossils can be used to find out about the past. I can explain about reproduction and offspring (recognising that offspring normally vary and are not identical to their parents). I can explain how animals and plants are adapted to suit their environment.
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				I know that some materials need to be heated to a very high temperature in order to melt or evaporate. I can name some materials that will dissolve in water. I understand that although it is not possible to see a dissolved solid it remains in the solution. I know that solids can be recovered from a solution by evaporation. I can explain that when solids dissolve they can break up so small they can pass through the holes in filter paper. I can identify several factors that affect the rate at which a solid dissolves. How does temperature affect how quickly sugar dissolves? I use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating. I can demonstrate that dissolving, mixing and changes of state are reversible changes. I can classify some changes as reversible and some as irreversible. Under what conditions will water evaporate quickly? I can explain that some changes result in the formation of new materials, and that this kind	
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				of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda. I understand that some irreversible changes make new and useful materials. I can use evidence to explain that in some cases the new materials made are gases. I understand the formation of a gas signifies an irreversible change. Use burning candles to show irreversible change taking place. Model the gas from a blown out candle can be relit. A gas has been formed in the melting and evaporation of candle wax and it is this that burns. Introduce safety and fire triangle. What are the factors that affect the burning candle? I can find out about how chemists create new materials, for example Spencer Silver, who invented the glue for sticky notes or Ruth Benerito, who invented wrinkle-free cotton. I can research and discuss how chemical changes have an impact on our lives, for example cooking, and discuss the creative use of new materials such as polymers, super-sticky and super-thin materials.	
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All Living Things and Habitats			I can observe my local environment over the course of a year, identifying and naming some organisms that live there. I recognise that living things can be grouped in a number of ways and this leads on to developing keys that help us to identify living things. I can use classification keys to identify a wide variety of living things in my local and wider environment. I am able to group a wide selection of different animals into groups according to their characteristics. I can use the terms, vertebrate, invertebrate, fish, amphibian, bird, mammal, reptile, flowering and non-flowering, when grouping living things. I know that environments change over time and that these changes can be a threat to living things if they cannot adapt and survive.	I can observe and name parts of a flower. I can explain how pollen and seeds are dispersed. I can suggest some conditions to test when investigating germination. I can name and explain functions of parts of a flower. I can describe the processes of pollination, fertilisation, seed dispersal and germination. I can explain why it is important to use a number of seeds or plants in an investigation into growth or germination. I can explain why living things need to reproduce if the species is to survive. I can describe the life process of reproduction in some plants and animals by studying my local environment over the course of the year. I can compare, contrast and explain the differences in the life cycles of a mammal, an amphibian, an insect and a bird.	
Rocks		I know that rocks are found under the ground we walk on and can name some common rocks.			

		By observing and testing different rocks, I can group them by their properties and appearance. I know that the different properties of rocks make them suitable for different purposes. I can group rocks according to the way they were formed, using the vocabulary, igneous, sedimentary and metamorphic. I can explain how fossils are formed, and can research more about the living things whose fossils have been found. I can identify similarities and differences between different types of soil. I know that soils are formed partly from rock, partly from other matter that was once alive.			
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Light		I know that I cannot see in the dark. Dark is the absence of light and we need light to see. I can explain why it is dangerous to look at the sun and can tell you what to do to protect your eyes. I can explain that I cannot see shiny objects in the dark because they are not light sources. I know that to see something light must reflect off it. I know that shadows are similar in shape to the objects forming them and that the shadows caused by the sun change over the course of the day. I can explain that shadows are formed when light is blocked. I can investigate how the size of shadows change depending on the position of the object blocking the light. I can explain why there are changes in shadows caused by the sun over the course of a day and can predict changes by observing patterns. I can explain that even transparent objects block some light and form shadows.			I can explain how light travels. I can explain and demonstrate how we see objects. I can explain why shadows have the same shape as the object that casts them. I can explain how simple optical instruments work, e.g. periscope, telescope, binoculars, mirror, magnifying glass etc.
Forces and Magnets		I can describe how to use pushes and pulls to make things speed up, slow down, stop or change direction or shape. I know that pushes and pulls are forces. I know that for push and pull forces to have an affect there		I can explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object.	

		must be contact but magnetic forces act from a distance. I can investigate with magnets, looking at materials that are attracted to a magnet. I can classify materials as magnetic or non-magnetic. I can investigate different types of magnet and devise an investigation to find out which magnet is the strongest. I can describe some uses for magnets and suggest other creative ways to use magnets in everyday life. I can describe magnets as having two poles and observe what happens when the similar or opposite poles are placed next to each other.		I know that friction is a force. I can describe some ways friction can be increased between solid surfaces. I can describe some of the factors that increase air and water resistance. I can measure forces using a forcemeter. I know that force is measured in Newtons. I can identify the effects of air resistance, water resistance and friction, acting between moving surfaces. I can identify when frictional forces are helpful. I can name situations when frictional forces resist motion. I understand that force and motion can be transferred through mechanical devices such as gears, pulleys, levers and springs. I can research the use of these devices through history and design and make an artefact that uses simple levers, pulleys, gears and/or springs and explore their effects.	
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States of Matter			I can name some solids, liquids and gases. I know that a solid keeps its shape, a liquid takes the shape of its container or forms a pool and that gases flow from place to place. I can group materials according to these properties, I know that some materials change from solids to liquids to gases when they are heated, and from gases to liquids to solids when they are cooled. I can name and describe examples of the main processes associated with water changing state. I know that these processes can be reversed. I can investigate and explain the water cycle by observing evaporation, condensation, freezing and melting. I can research and record the temperature at which different materials melt or evaporate.		
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Sound			I know that sounds are made when objects vibrate. I know that sounds can travel through solids, liquids and gases, and can suggest ways of investigating how well sound travels through different materials. I can suggest ways of changing the pitch and loudness of a sound made by a musical instrument. I can describe how to raise or lower the pitch of a musical instrument or object. When investigating sound I can identify patterns. I recognise that sounds get fainter as the distance from the source increases. I can research and investigate the Doppler effect.		
Electricity			I can identify common appliances which use electricity. I can describe the dangers associated with mains electricity.		I can explain how the number and voltage of cells in a circuit links to the brightness of a lamp or the volume of a buzzer. I can compare and give reasons for why components work and do not work in a circuit.

			I can construct and make a simple circuit. I can record my circuit as a drawing I can predict if a bulb will light or not in a simple circuit, explaining why some circuits work and others do not. I can construct a simple circuit to test whether materials are electrical conductors or insulators and how switches work. I know why metals and non-metals are used in different ways in electrical appliances. I can systematically investigate the effect of changing components in a circuit on the brightness of a bulb.		I can draw circuit diagrams using the correct symbols.
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Space				I know that the Earth, Sun and Moon are spherical in shape. I can observe and describe how shadows change as the Sun appears to move across the sky. I can describe the movement of the Earth, and other planets, relative to the Sun in the solar system. I know the 8 planets of our solar system and their order from the Sun. I know that the rotation of the Earth causes shadows to change through the day and causes the Sun to appear to be moving I can use the idea of the Earth's rotation to explain day and night. I understand that it is only daylight on the side of the Earth facing the sun. I know the Moon orbits the Earth. I know that a moon is a celestial body that orbits a planet (Earth has one moon; Jupiter has four large moons and numerous smaller ones). I understand that the appearance of the Moon changes over 28 days due to it's orbiting of the earth. I know that ideas about the solar system have developed over time by considering the work of scientists such as Ptolemy, Alhazen and Copernicus.	
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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 Mickleton 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 Sandfield Farm Park, Batsford, Brandon Marsh, 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 – Science Dome
- 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.
- 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
- Promote enjoyment and enthusiasm for learning about everyday science around them from an early age.
- Explore hands on Science through Forest School experiences.

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