**3 Schools Progression of Skills: Science**

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| **SCIENCE** |  | **Year 1** | **Year 2** | **Year 3** | **Year 4** | **Year 5** | **Year 6** |
| ***Working scientifically*** | N. Cobjectives | * Asking simple questions and recognising they can be answered in different ways.
* Observing, using simple equipment
* Performing simple tests
* Identify and classifying
* Using their observations and ideas to suggest answers to questions
* Gathering and recording data to help in answering questions
 | * Asking relevant questions and using different types of scientific enquiries to answer them
* Setting up simple practical enquires, comparative and fair tests
* Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers.
* Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions.
* Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts and tables.
* Reporting on findings from enquiries including oral and written explanations, displays or presentations of results and conclusions.
* Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions.
* Identifying differences, similarities or changes related to simple scientific ideas and processes.
* Using straight forward scientific evidence to answers questions or to support their findings.
 | * Planning different types of scientific enquiries to answers questions, including recognising and controlling variables where necessary.
* Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings where appropriate.
* Recording data and results of increasing complexity, using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.
* Using test results to make predictions, to set up further comparative and fair tests.
* Reporting and presenting findings from enquiries, including conclusions, casual relationships and explanations of and a degree of trust in results, in oral and written forms such as displays and other presentations.
* Identifying scientific evidence that has been used to support or refute ideas or arguments.
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| ***Types of enquiry*** | Observation over time |  |  |  |
| Fair and comparative testing  |  |  | * Use an increasingly wide range of equipment to make measurements.
* Learn what it means to measure accurately and check for reliability.
* Learn to independently plan how to record and analyse the data, using tables, pictograms, and bar charts to compare the measurements they make. Use the bar charts to draw conclusions about what they have found out to be the answer to their ‘big question’
* Evaluate the procedure they used and the quality of their data, suggesting ways they could improve their test.
* Plan their own tests to collect data.
* Through fair testing l earn to understand the different types of variables:
* the dependent variable that they will change in their test,
* the independent variable that they are going to measure so that they can find out how the dependent variable affects it,
* the control variables which the children will need to keep the same so that they don’t affect their results.
* Measure and record data that can then be displayed in a scatter graph or line graph.
* Use their data to draw conclusions that identify a causal relationship eg ‘when you increase X, Y will always decrease’.
* Throughout KS2, become progressively more systematic in how they approach fair tests and increasingly independent.
* Written conclusions to become increasingly sophisticated, with more focus on scientific explanations.
* Focus on their skills in evaluating their scientific enquiries.
* Learn to critique not just their experimental methods but also their data by reflecting on reliability and accuracy.
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| Research |  |  | * Reading for information and note-taking.
* Learn to interpret the information they find and critically consider its relevance in answering their ‘big questions’.
* Use a range of secondary sources, including books, websites, and video to find their information.
* Listen to presentations from experts and science professionals to get their information, or ask them questions in interviews and letters
* Find more data in their research and use this to help answer questions
* Start to collect their own data through questionnaires and interviews.
* Begin to evaluate the quality of the information they have found and how well it has enabled them to draw conclusions and answer their ‘big question’.
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| Pattern seeking |  |  | * Begin to think for themselves when deciding what they should measure and observe.
* Begin to make decisions about the most appropriate equipment to use to collect data.
* Begin to think even more about their planning, including identifying the variables that they cannot control and suggesting the potential impact those variables might have on the data they collect.
* Use a data logger to collect the most accurate data they can.
* Using data analysis techniques to spot patterns, including using tabulated data and a variety of charts and graphs.
* Use data and graphs to support their explanations when describing relationships.
* Use pattern seeking as a preliminary test; use their findings to form and justify their own predictions, then propose further investigations to test these predictions.
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| Identifying and classifying |  |  | * Regularly revisit KS1 skills: Focus on asking questions about the similarities and differences between things.
* Go outside to explore the world around them at all times of the year.
* Increased focus on measuring and using data to answer ‘big questions’.
* Continue to build on their observational skills, becoming more independent in identifying, through the use of increasingly complex tools, as well as developing higher order skills in reasoning and justification when explaining how they have chosen to group things.
* Design simple tests to help them classify materials, as well as independently using a range of secondary sources to support them in identifying a range of living things.
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| ***Plants***  | N. Cobjectives  | Pupils should be taught to:* identify and name a variety of common wild and garden plants, including deciduous and evergreen trees
* identify and describe the basic structure of a variety of common flowering plants, including trees.
 | Pupils should be taught to:* observe and describe how seeds and bulbs grow into mature plants
* find out and describe how plants need water, light and a suitable temperature to grow and stay healthy. Plants
 | Pupils should be taught to:* identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers
* explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant
* investigate the way in which water is transported within plants
* explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.
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| Key vocab | Leaf, flower, blossom, petal, fruit, berry, root, seed, trunk, branch, stem, bark, stalk, bud, names of trees in the local area, names of garden and wild flowering plants in the local area \* | As for Year 1 plus light, shade, sun, warm, cool, water, grow, healthy | Photosynthesis, pollen, insect/wind pollination, seed formation, seed dispersal (wind dispersal, animal dispersal, water dispersal) |  |  |  |
| ***Animals (including humans)*** | N. C objectives    | Pupils should be taught to:* identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals
* identify and name a variety of common animals that are carnivores, herbivores and omnivores
* describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets)
* identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense.
 | Pupils should be taught to:* notice that animals, including humans, have offspring which grow into adults
* find out about and describe the basic needs of animals, including humans, for survival (water, food and air)
* describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.
 | Pupils should be taught to:* identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat
* identify that humans and some other animals have skeletons and muscles for support, protection and movement.
 | Pupils should be taught to:* describe the simple functions of the basic parts of the digestive system in humans
* identify the different types of teeth in humans and their simple functions
* construct and interpret a variety of food chains, identifying producers, predators and prey.
 | Pupils should be taught to:* describe the changes as humans develop to old age. Animals inc humans
 | Pupils should be taught to:* identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood
* recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function
* describe the ways in which nutrients and water are transported within animals, including humans.
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| Possible enquiriesIdentifying and classifying (I&c)Results over time (OT) Research (R)Pattern Seeking (PS)Compartive and Fair testing. (C&FT) |  |  |  |  | **I&C** Can you identify all the stages in the human life cycle? **OT** How and why has life expectancy in the UK changed since...? **R**  Why do people get grey/white hair when they get older? Why do some people need to wear glasses to see clearly?**PS** Are the oldest children in our school the tallest? **C&FT**  Who grows the fastest, girls or boys? How does age affect a human’s reaction time?  | **I&C** Which organs of the body make up the circulatory system, and where are they found? Can you classify these observations into evidence for the idea of evolution, and evidence against?**OT**  What ideas did Edward Jenner have about small pox and how did he test them?**R**  How have our ideas about disease and medicine changed over time? What happened when Charles Darwin visited the Galapagos islands? **PS** Is there a pattern between what we eat for breakfast and how fast we can run? Is there a pattern between the size and shape of a bird’s beak and the food it will eat? What ideas did American geneticist Barbara McClintock have about genes that won her a Nobel Prize?**C&FT**  Which type of exercise has the greatest effect on our heart rate? What is the most common eye colour in our class? How does the length of time we exercise for affect our heart rate? Can exercising regularly affect your lung capacity? |
| Key vocab | 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 • Parts of the body including those linked to PSHE teaching (see joint document produced by the ASE and PSHE Association) • Senses – touch, see, smell, taste, hear, fingers (skin), eyes, nose, ear and tongue N.B. The children need to be able to name and identify a range of animals in each group e.g. name specific birds and fish. They do not need to use the terms mammal, reptiles etc. or know the key characteristics of each, although they will probably be able to identify birds and fish, based on their characteristics \* | Offspring, reproduction, growth, child, young/old stages (examples - chick/hen, baby/child/adult, caterpillar/butterfly), exercise, heartbeat, breathing, hygiene, germs, disease, food types (examples – meat, fish, vegetables, bread, rice, pasta) | Nutrition, nutrients, carbohydrates, sugars, protein, vitamins, minerals, fibre, fat, water, skeleton, bones, muscles, support, protect, move, skull, ribs, spine, muscles, joints | Digestive system, digestion, mouth, teeth, saliva, oesophagus, stomach, small intestine, nutrients, large intestine, rectum, anus, teeth, incisor, canine, molar, premolars, herbivore, carnivore, omnivore, producer, predator, prey, food chain | Puberty – the vocabulary to describe sexual characteristics | Heart, pulse, rate, pumps, blood, blood vessels, transported, lungs, oxygen, carbon dioxide, nutrients, water, muscles, cycle, circulatory system, diet, exercise, drugs, lifestyle |
| ***Materials*** ***(including States of Matter)*** | N. C objectives | **Everyday materials**Pupils should be taught to:* distinguish between an object and the material from which it is made
* identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock
* describe the simple physical properties of a variety of everyday materials
* compare and group together a variety of everyday materials on the basis of their simple physical properties.
 | **Uses of everyday materials**Pupils should be taught to:* identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses
* find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.
 |  | **States of Matter** Pupils should be taught to:* compare and group materials together, according to whether they are solids, liquids or gases
* observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C)
* identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature
 | **Properties and changes of materials**Pupils should be taught to:* compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets
* know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution
* use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating
* give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic
* demonstrate that dissolving, mixing and changes of state are reversible changes
* explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda.
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| Key vocab | Object, material, wood, plastic, glass, metal, water, rock, brick, paper, fabric, elastic, foil, card/cardboard, rubber, wool, clay, hard, soft, stretchy, stiff, bendy, floppy, waterproof, absorbent, breaks/tears, rough, smooth, shiny, dull, see-through, not see-through\* | Names of materials – wood, metal, plastic, glass, brick, rock, paper, cardboard Properties of materials – as for Year 1 plus opaque, transparent and translucent, reflective, nonreflective, flexible, rigid Shape, push/pushing, pull/puling, twist/twisting, squash/squashing, bend/bending, stretch/stretching |  | Solid, liquid, gas, state change, melting, freezing, melting point, boiling point, evaporation, temperature, water cycle | Thermal/electrical insulator/conductor, change of state, mixture, dissolve, solution, soluble, insoluble, filter, sieve, reversible/non-reversible change, burning, rusting, new material |  |
| ***Seasonal Changes*** | N. C objectives | Pupils should be taught to:* observe changes across the four seasons
* observe and describe weather associated with the seasons and how day length varies.
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| Key vocab | Weather (sunny, rainy, windy, snowy etc.) • Seasons (winter, summer, spring, autumn) • Sun, sunrise, sunset, day length |  |  |  |  |  |
| ***Living things and their habitats***  | N. C objectives  |  | Pupils should be taught to:* explore and compare the differences between things that are living, dead, and things that have never been alive
* identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other
* identify and name a variety of plants and animals in their habitats, including micro-habitats
* describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food.
 |  | Pupils should be taught to:* recognise that living things can be grouped in a variety of ways
* explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment
* recognise that environments can change and that this can sometimes pose dangers to living things.
 | Pupils should be taught to:* describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird
* describe the life process of reproduction in some plants and animals.
 | Pupils should be taught to:* describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals
* give reasons for classifying plants and animals based on specific characteristics.
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| Key vocab |  | Living, dead, never been alive, suited, suitable, basic needs, food, food chain, shelter, move, feed • Names of local habitats e.g. pond, woodland etc. • Names of micro-habitats e.g. under logs, in bushes etc |  | Classification, classification keys, environment, habitat, human impact, positive, negative, migrate, hibernate | Life cycle, reproduce, sexual, sperm, fertilises, egg, live young, metamorphosis, asexual, plantlets, runners, bulbs, cuttings | Vertebrates, fish, amphibians, reptiles, birds, mammals, invertebrates, insects, spiders, snails, worms, flowering, non-flowering |
| ***Rocks***  | N. C objectives  |  |  | Pupils should be taught to:* compare and group together different kinds of rocks on the basis of their appearance and simple physical properties
* describe in simple terms how fossils are formed when things that have lived are trapped within rock
* recognise that soils are made from rocks and organic matter.
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| Key vocab |  |  | Rock, stone, pebble, boulder, grain, crystals, layers, hard, soft, texture, absorb water, soil, fossil, marble, chalk, granite, sandstone, slate, soil, peat, sandy/chalk/clay soil |  |  |  |
| ***Light*** | N. C objectives  |  |  | Pupils should be taught to:* recognise that they need light in order to see things and that dark is the absence of light
* notice that light is reflected from surfaces
* recognise that light from the sun can be dangerous and that there are ways to protect their eyes
* recognise that shadows are formed when the light from a light source is blocked by an opaque object
* find patterns in the way that the size of shadows change.
 |  |  | Pupils should be taught to: * recognise that light appears to travel in straight lines
* use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye
* explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes
* use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.
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| Key vocab |  |  | Light, light source, dark, absence of light, transparent, translucent, opaque, shiny, matt, surface, shadow, reflect, mirror, sunlight, dangerous |  |  | As for Year 3 - Light, plus straight lines, light rays |
| ***Forces*** | N. C objectives  |  |  | Pupils should be taught to:* compare how things move on different surfaces
* notice that some forces need contact between two objects, but magnetic forces can act at a distance
* observe how magnets attract or repel each other and attract some materials and not others
* compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials
* describe magnets as having two poles
* predict whether two magnets will attract or repel each other, depending on which poles are facing.
 |  | Pupils should be taught to:* explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object
* identify the effects of air resistance, water resistance and friction, that act between moving surfaces
* recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect
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| Key vocab |  |  | Force, push, pull, twist, contact force, non-contact force, magnetic force, magnet, strength, bar magnet, ring magnet, button magnet, horseshoe magnet, attract, repel, magnetic material, metal, iron, steel, poles, north pole, south pole |  | Force, gravity, Earth, air resistance, water resistance, friction, mechanisms, simple machines, levers, pulleys, gears |  |
| ***Sound*** | N. C objectives  |  |  |  | Pupils should be taught to:* identify how sounds are made, associating some of them with something vibrating
* recognise that vibrations from sounds travel through a medium to the ear
* find patterns between the pitch of a sound and features of the object that produced it
* find patterns between the volume of a sound and the strength of the vibrations that produced it
* recognise that sounds get fainter as the distance from the sound source increases.
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| Key vocab |  |  |  | Sound, source, vibrate, vibration, travel, pitch (high, low), volume, faint, loud, insulation |  |  |
| ***Electricity***  | N. C objectives  |  |  |  | Pupils should be taught to:* identify common appliances that run on electricity
* construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers
* identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery
* recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit
* recognise some common conductors and insulators, and associate metals with being good conductors.
 |  | Pupils should be taught to:* associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit
* compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches
* use recognised symbols when representing a simple circuit in a diagram
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| Key vocab |  |  |  | Electricity, electrical appliance/device, mains, plug, electrical circuit, complete circuit, component, cell, battery, positive, negative, connect/connections, loose connection, short circuit, crocodile clip, bulb, switch, buzzer, motor, conductor, insulator, metal, non-metal, symbol N.B. Children in Year 4 do not need to use standard symbols for electrical components, as this is taught in Year 6. |  | Circuit, complete circuit, circuit diagram, circuit symbol, cell, battery, bulb, buzzer, motor, switch, voltage N.B. Children do not need to understand what voltage is but will use volts and voltage to describe different batteries. The words “cells” and “batteries” are now used interchangeably. |
| ***Earth and Space***  | N. C objectives  |  |  |  |  | Pupils should be taught to:* describe the movement of the Earth, and other planets, relative to the Sun in the solar system
* describe the movement of the Moon relative to the Earth
* describe the Sun, Earth and Moon as approximately spherical bodies
* use the idea of the Earth’s rotation to explain day and night and the apparent movement of the sun across the sky
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| Key vocab |  |  |  |  | Earth, Sun, Moon, (Mercury, Jupiter, Saturn, Venus, Mars, Uranus, Neptune), spherical, solar system, rotates, star, orbit, planets |  |
| ***Evolution and Inheritance*** | N. C objectives  |  |  |  |  |  | Pupils should be taught to:* recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago
* recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents
* identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.
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| Key vocab |  |  |  |  |  | Offspring, sexual reproduction, vary, characteristics, suited, adapted, environment, inherited, species, fossils |