# Science

## Scientific Knowledge and Conceptual Understanding: Year 1 Expectations

**Please Note:** Much of the learning in Year 1 can be done throughout the year using the school and the local environment. For example plants can be observed to make a linked to seasonal change and weather at various different times. Materials could be linked to a different creative theme throughout the year. Key learning can also be covered as a blocked science unit in its own right to introduce or consolidate learning at other times.

### Plants: Common Names and Basic Structure

- 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 (at least: flower, leaf, root, stem, trunk, seed, branch and petal).

### Animals - Humans

- Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense.
  - Recognise that humans are animals.
  - Compare and describe differences in their own features (eye, hair, skin colour, etc.).
  - Recognise that humans have many similarities.

### Animals - Other Animals

- Identify and name a variety of common animals including some fish, some amphibians, some reptiles, some birds and some mammals.
- Identify and name a variety of common animals that are carnivores, herbivores and omnivores (i.e. according to what they eat).
- Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, and including pets).
  - Find out and describe how animals look different to one another.
  - Group together animals according to their different features.
  - Recognise similarities between animals:
    Structure: head, body, way of moving, senses, body covering, tail.
  - Animals have senses to explore the world around them and to help them to survive.
  - Recognise that animals need to be treated with care and sensitivity to keep them alive and healthy.
  - Animals are alive; they move, feed, grow, use their senses and reproduce.

### Material Properties – Everyday Materials

- 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, rock, brick, paper and cardboard.
- 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.

### Light and Astronomy – Seasonal Change

- Observe and describe changes across the four seasons.
- Observe and describe weather associated with the seasons and how day length and temperature varies.

# Science

## Scientific Knowledge and Conceptual Understanding: Year 2 Expectations

**Please Note:** There should be plenty of opportunities throughout the year for children to use the school/local environment to observe plant growth, changes in habitats across the seasons and life cycles of a variety of different animals (for example: chicks/other birds, tadpoles/frogs, caterpillars/butterflies, other mini-beasts, other young animals during trips to farms/zoos). This could be done through an ongoing/monthly nature journal to observe, record and review over a period of time. The unit of work on 'Animal survival and growth' can be covered in the same half term as work on 'Habitats' in order to link the concept of survival.

### Environment - Living things and their habitats

- 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.
  - Different kinds of plants and animals live in different kinds of places.
  - There are different kinds of habitat near school which need to be cared for
  - Habitats provide the preferred conditions for the animals/plants that live there (compare local habitats and less familiar examples).
  - Observe living things in their habitats during different seasonal changes.

### Animals - Animal survival and growth

- Notice that animals have offspring which grow into adults.
- Find out about and describe the basic needs of animals for survival (water, food and air).

### Health – How we grow and stay healthy

- Notice that humans have offspring which grow into adults.
- Find out about and describe the basic needs of 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.
  - Medicines can be useful when we are ill.
  - Medicines can be harmful if not used properly.

### Plants – Plant growth

- 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 (and how changing these affects the plant).
  - Plants are living and eventually die.

### Material Properties – Uses of Materials

- Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, water, 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 (applying a force).
  - Some materials can be found naturally; others have to be made.

# Science

## Scientific Knowledge and Conceptual Understanding: Year 3 Expectations

Please Note: There should be plenty of opportunities throughout the year for children to use the school/local environment to observe plant lifecycles with a particular focus on the different parts of a plant (e.g. comparing fruits and seeds and looking for examples of pollination). This could be done through an ongoing/monthly nature journal to observe, record and review over a period of time.

### Plants – Functions of Parts of a Plant

- Identify, locate 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.
  - Roots grow downwards and anchor the plant.
  - Water, taken in by the roots, goes up the stem to the leaves, flowers and fruit.
  - Nutrients (not food) are taken in through the roots.
  - Stems provide support and enable the plant to grow towards the light.
  - Plants make their own food in the leaves using energy from the sun.
  - Flowers attract insects to aid pollination.
  - Pollination is when pollen is transferred between plants by insects, birds, other animals and the wind.
  - Seeds are formed after the flowers are pollinated.
  - Many flowers produce fruits which protect the seed and/or aid seed dispersal.
  - Seed dispersal, by a variety of methods, helps ensure that new plants survive.
  - Plants need nutrients to grow healthily (either naturally from the soil or from fertiliser added to soil).

### Animals - Health/Nutrition

- 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.
- An adequate and varied diet is beneficial to health (along with a good supply of air and clean water).
- Regular and varied exercise *from a variety of different activities* is beneficial to health (focus on *energy in versus energy out*. Include information on making informed choices).

### Animals - Skeletons and Movement

- Identify that humans and some other animals have skeletons and muscles for support, protection and movement.
- Identify animals (vertebrates) which have a skeleton which supports their body, aids movement & protects vital organs (e.g. name and locate skull, backbone, ribs, bones for movement/limbs, pelvis and be able to name some of the vital organs protected).
- Identify animals without internal skeletons/backbones (invertebrates) and describe how they have adapted other ways to support themselves, move & protect their vital organs.
  - Know how the skeletons of birds, mammals, fish, amphibians or reptiles are similar (backbone, ribs, skull, bones used for movement) and the differences in their skeletons.
  - Know that muscles, which are attached to the skeleton, help animals move parts of their body.
  - Explore how humans grow bigger as they reach maturity by making comparisons linked to body proportions and skeleton growth – e.g. do people with longer legs have longer arm spans?
  - Recognise that animals are alive; they move, feed, grow, use their senses and reproduce.

### Material Properties - Rocks

- Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties.
- Describe in simple terms how fossils are formed when things that have lived are trapped within rock.
- Recognise that soils are made from rocks and organic matter
  - Recognise that rocks and soils can feel and look different.
  - Recognise that rocks and soils can be different in different places/environments.

### Light and Astronomy - Light, reflections and shadows

- 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 a solid object.
- Find patterns in the way that the size of shadows can change.

### Forces and Magnets

- Compare how some 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 (like and unlike poles).
- Predict whether two magnets will attract or repel each other, depending on which poles are facing.

# Science

## Scientific Knowledge and Conceptual Understanding: Year 4 Expectations

**Please Note:** There should be plenty of opportunities throughout the year for children to use the school/local environment to observe and identify how a habitat changes. This could include a focus on the relationships between the plants and animals within a habitat. This could be done through an ongoing/monthly nature journal to observe, record and review over a period of time.

### Environment – Living Things and Their Habitats

- 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.
  - Use and make identification keys for plants and animals.

### Animals – Teeth, Eating and Digestion

- 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 *(NB Link with types of teeth and eating in this unit but this concept could be developed further in the yr4 Environment / habitats unit).*
  - Describe how teeth and gums have to be cared for in order to keep them healthy.

### Material Properties and Changes – States of Matter

- 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.
  - Solids, liquids and gases can be identified by their observable properties.
  - Solids have a fixed size and shape (the size and shape can be changed but it remains the same after the action).
  - Liquids can pour and take the shape of the container in which they are put.
  - Liquids form a pool not a pile.
  - Solids in the form of powders can pour as if they were liquids but make a pile not a pool.
  - Gases fill the container in which they are put.
  - Gases escape from an unsealed container.
  - Gases can be made smaller by squeezing/pressure.
  - Liquids and gases can flow.

### Sound

**Vibrations**

- 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 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.
  - Recognise that sounds can be made in a variety of ways (pluck, bang, shake, blow) using a variety of things (instruments, everyday materials, body).
  - Sounds travel away from their source in all directions.
  - Vibrations may not always be visible to the naked eye.

**Pitch**

- Find patterns between the pitch of a sound and features of the object that produced it.
  - Sounds can be high or low pitched.
  - The pitch of a sound can be altered.
  - Pitch can be altered either by changing the material, tension, thickness or length of vibrating objects or changing the length of a vibrating air column.

**Muffling/blocking sounds**

- Recognise that vibrations from sounds travel through a medium to the ear.
  - Sounds are heard when they enter our ears (although the structure of the ear is not important key learning at this age phase).
  - Sounds can travel through solids, liquids and air/gas by making the materials vibrate.
  - Sound travel can be reduced by changing the material that the vibrations travel through.
  - Sound travel can be blocked.

### Electricity

- 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.
  - Electricity can be dangerous.
  - Electricity sources can be mains or battery.
  - Batteries 'push' electricity round a circuit and can make bulbs, buzzers and motors work.
  - Faults in circuits can be found by methodically testing connections.
  - Drawings, photographs and diagrams can be used to represent circuits (although standard symbols need not be introduced until UKS2).

# Science

## Scientific Knowledge and Conceptual Understanding: Year 5 Expectations

Please Note: There should be plenty of opportunities throughout the year for children to use the school/local environment to observe and identify a variety of plant and animal life cycles. This could be done through an ongoing/monthly nature journal to observe, record and review a variety of examples over a period of time. The unit on 'Human life cycles' can be linked to PSHEE work on 'Relationships' and the Year 5 Science unit 'Habitats and life cycles' rather than being taught as a separate unit.

### Environment - Observing Life cycles

- 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.
  - Name, locate and describe the functions of the main parts of reproductive system of plants (stigma, stamen, petal, sepal, pollen, ovary).

### Material Properties – Testing Material Properties

- 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.
- Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic (advantages and disadvantages).
  - Compare a variety of materials and measure their effectiveness (e.g. hardness, strength, flexibility, solubility, transparency, thermal conductivity, electrical conductivity).

#### Temperature and Thermal Insulation

- Heat always moves from hot to cold.
- Some materials (insulators) are better at slowing down the movement of heat than others.
- Objects/liquids will warm up or cool down until they reach the temperature of their surroundings.

### Material Changes - Reversible changes

- Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution.
- Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating.
- Demonstrate that dissolving, mixing and changes of state are reversible changes.
  - Changes can occur when different materials are mixed.
  - Some material changes can be reversed and some cannot.
  - Recognise that dissolving is a reversible change and recognise everyday situations where dissolving occurs.
  - Distinguish between melting and dissolving.
  - Mixtures of solids (of different particle size) can be separated by sieving.
  - Mixtures of solids and liquids can be separated by filtering if the solid is insoluble (un-dissolved).
  - Evaporation helps us separate soluble materials from water.
  - Changes to materials can happen at different rates (factors affecting dissolving, factors affecting evaporation – amount of liquid, temperature, wind speed, etc).
  - Freezing, melting and boiling changes can be reversed (revision from YR4).

### Material Changes – Irreversible 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 (producing a gas / fizzing).

### Animals - Human Life Cycles

- Describe the changes as humans develop to old age.
  - Animals are alive; they move, feed, grow, use their senses, reproduce, breathe/respire and excrete.

### Light and Astronomy – Earth and Space

- Describe the movement of the Earth, and other planets, relative to the Sun and each other in the solar system.
- Describe the movement of the Moon relative to the Earth.
- Describe Sun/Earth/Moon as approximately spherical bodies.
- Use the idea of the Earth's rotation to explain day and night.
  - The Earth spins once around its own axis in 24 hours, giving day and night.
  - The Earth orbits the Sun in one year.
  - We can see the Moon because the Sun's light reflects off it.
  - The Moon orbits the Earth in approximately 28 days and changes to the appearance of the moon are evidence of this.
  - Use the Earth's movement in space to explain the apparent movement of the sun across the sky.
  - The Sun appears to move across the sky from East to West and this causes shadows to change during the day.
  - Changes to shadow length over a day or changes to sunrise and sunset times over a year are evidence supporting the movement of the Earth.

### Forces – Effects on Movement

- 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 (causing things to slow down)
- Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.
  - There are different types of forces (push, pull, friction, air resistance, water resistance, magnetic forces, gravity) which have different effects on objects
  - Gravity can act without direct contact between the Earth and an object.
  - Friction, air resistance and water resistance can be useful or unwanted.
  - The effects of friction, air resistance and water resistance can be reduced or increased for a preferred effect.
  - More than one force can act on an object simultaneously (either reinforcing or opposing each other).

# Science

## Scientific Knowledge and Conceptual Understanding: Year 6 Expectations

Please Note: There should be plenty of opportunities throughout the year for children to use the school/local environment to observe and identify a variety of plants and animals that live there focusing on their adaptations for survival. This could be done through an ongoing/monthly nature journal to observe, record and review a variety of examples over a period of time and would support their learning and wider research in the 'Living Things and Their Habitats' unit and the 'Evolution and Inheritance' unit.

### Living Things and their Habitats - Classification

- 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.
  - Living things can be grouped into micro-organisms, plants and animals.
  - Vertebrates can be grouped as fish, amphibians, reptiles, birds and mammals.
  - Invertebrates can be grouped as snails and slugs, worms, spiders and insects.
  - Plants can be grouped as flowering plants (incl. trees and grasses) and non-flowering plants (such as ferns and mosses).

### Living Things and their Habitats – Evolution and Inheritance

- 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.

### Animals/Health – Exercise, Health and The Circulatory System

- 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 (in the long term and short term).
- Describe the ways in which nutrients and water are transported within animals, including humans.
  - The heart is a major organ and is made of muscle.
  - The heart pumps blood around the body through vessels and this can be felt as a pulse.
  - The heart pumps blood through the lungs in order to obtain a supply of oxygen.
  - Blood carries oxygen/essential materials to different parts of the body.
  - During exercise muscles need more oxygen so the heart beats faster and our breathing and pulse rates increase.
  - Animals are alive; they move, feed, grow, use their senses, reproduce, breathe/respire and excrete.
  - An adequate, varied and balanced diet is needed to help us grow and repair our bodies (proteins), provide us with energy (fats and carbohydrates) and maintain good health (vitamins and minerals).
  - Tobacco, alcohol and other 'drugs' can be harmful.
  - All medicines are drugs, not all drugs are medicines.

### Light and Astronomy – How Light Travels

- 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 the light that travels from light sources to our eyes or from light sources to objects and then to our eyes (and represent this in simple diagrammatic form).
- Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.

### Electricity

- 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 (at least: cells, wires, switches, bulbs, buzzers and motors) when representing a simple circuit in a diagram.
  - Use/interpret circuit diagrams to construct a variety of more complex circuits predicting whether they will 'work'.

# Science

## Year Group Expectations for Working Scientifically Skills (Grid 1)

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| **Year 6** | ▪ Use correct scientific knowledge and understanding and relevant scientific language to discuss their observations and explorations (linked to Y6 PoS).<br>▪ Identify changes that have occurred over a very long period of time (evolution) and discuss how changes have impacted the world.<br>▪ Explore more abstract systems / functions / changes / behaviours and record their understanding of these *(e.g. the relationship between diet, exercise, drugs, lifestyle and health; evolutionary changes; how light travels).* | ▪ Recognise the importance of classification to the scientific world and form a conclusion from their sorting and classifying.<br>▪ Compare and contrast more complex processes, systems, functions (e.g. sexual and asexual reproduction).<br>▪ Construct a classification key / branching database using more than two items.<br>▪ Compare and contrast things beyond their locality and discuss advantages / disadvantages, pros / cons of the similarities and differences.<br>▪ Use *research** to identify and classify things.<br>▪ Use classification systems, keys and other information records [databases] to help classify or identify things. | ▪ Recognise scientific questions that do not yet have definitive answers (linked to Y6 PoS).<br>▪ Refine a scientific question to make it testable<br>i.e. ask a testable question which includes the change and measure variables, *e.g. what would happen to…if we changed…?*<br>*e.g. What effect would we have on … if we…?*<br>*e.g. How would exercise affect the pulse rate?*<br>▪ Use observations to suggest a further (testable or research) question.<br>▪ Independently ask a variety of scientific questions and decide the type of enquiry needed to answer them. | ▪ Research how scientific ideas have developed over time and had an impact on our lives.<br>▪ Use evidence from a variety of sources to justify their ideas<br>▪ Recognise which secondary sources will be most useful to research their ideas and begin to separate opinion from fact.<br>▪ Interview people to find out information | ▪ Make / perform and use their own versions of simple models to describe and explain scientific ideas *(e.g. circulatory system drama, periscopes to explain how light travels, burglar alarm to explain components in a circuit).* | ▪ Propose their own ideas and make decisions with agreement in a group.<br>▪ Support, listen to and acknowledge others in the group.<br>▪ Check the clarity of each other's suggestions.<br>▪ Build on / add to someone else's idea to improve a plan or suggestion.<br>▪ Understand that it is okay to disagree with their peers and offer reasons for their opinion. |
| **Year 5** | ▪ Use their developing scientific knowledge and understanding and relevant scientific language and terminology to discuss, communicate and explain their observations (incl. more abstract ideas from Y5 PoS (e.g. friction, air resistance, forces, Earth and space, reversible and irreversible changes).<br>▪ Evaluate their observations and suggest a further test, offer another question or make a **prediction.**<br>▪ Observe (including changes over time) and suggest a reason for what they notice. | ▪ Suggest reasons for similarities and differences.<br>▪ Compare and contrast things beyond their locality and use these similarities and differences to help to classify *(e.g. features of animals, life cycles of different living things, melting compared with dissolving, etc).*<br>▪ Use secondary sources of information to identify and classify.<br>▪ Decide which sources of information (and / or equipment and / or test) to help identify and classify. | ▪ Recognise scientific questions that do not yet have definitive answers (linked to Y5 PoS).<br>▪ Refine a scientific question so that it can be tested e.g. 'What would happen to… if we changed…?'<br>▪ Decide whether their questions can be answered by researching or by testing.<br>▪ Independently ask their own scientific questions taking some ownership for finding out the answers. | ▪ Find out how scientific ideas have changed / developed over time (linked to Y5 PoS).<br>▪ Articulate and explain findings from their research using scientific knowledge and understanding.<br>▪ Make decisions about which information to use from a wide range of sources. | ▪ Perform / create simple models to exemplify scientific ideas using scientific terminology where appropriate *(e.g. spheres to represent movements of the Sun and Earth, solar system models, shadow clocks, a simple lever or mechanism).* | ▪ Propose their own ideas and make decisions with agreement in a group.<br>▪ Support, listen to and acknowledge others in the group *e.g. Yes. I prefer that one too.*<br>▪ Check the clarity of each other's suggestions *e.g. are you saying you think this one is a herbivore?*<br>▪ Build on / add to someone else's idea to improve a plan or suggestion.<br>▪ Understand that it is okay to disagree with their peers and offer a reasons for their opinion. |
| **Year 4** | ▪ Suggest their own ideas on a concept and compare these with what they observe / find out.<br>▪ Use observations to suggest what to do next.<br>▪ Discuss ideas and develop descriptions from their observations using relevant scientific language and vocabulary (from Y4 PoS).<br>▪ Observe and record relationships between structure and function or between different parts of a processes (linked to Y4 PoS).<br>▪ Observe and record changes / stages over time (linked to Y4 PoS). | ▪ Make a simple guide to local living things.<br>▪ Use guides or simple keys to classify / identify [animals, flowering plants and non-flowering plants].<br>▪ Use their observations to identify and classify.<br>▪ Begin to give reasons for these similarities and differences.<br>▪ Record similarities as well as differences and / or changes related to simple scientific ideas or processes or more complex groups of objects / living things / events *(e.g. evaporation and condensation, different food chains, different electrical circuits).* | ▪ Ask / raise their own relevant questions with increasing confidence and independence that can be explored, observed, tested or investigated further.<br>▪ Ask questions such as 'What will happen if…?" or 'What if we changed…? (linked with Y4 PoS).<br>▪ Choose / select a relevant question that can be answered [by research or experiment / test]. | ▪ Make decisions about which information to use from a wide range of sources and make decisions about how to present their research.<br>▪ Recognise when and how secondary sources might help them to answer questions that cannot be answered through practical investigations. | ▪ Make a visual representation or a model of something to represent something they have seen or a process that is difficult to see.<br>▪ Suggest their own ideas on a concept and compare these with models or images. | ▪ Make some decisions about an idea within a group *(e.g. I think we should find out by testing…)*<br>▪ Increasingly support, listen to and acknowledge others in the group.<br>▪ Build on / add to someone else's idea to improve a plan.<br>▪ Understand that it is okay to disagree with their peers and offer reasons for their opinion. |
| | **EXPLORING / OBSERVING**<br>***UKS2 - Developing a deeper understanding of a wide range of scientific ideas and encountering more abstract ideas.***<br>***LKS2 - Developing their own ideas and their understanding of the world around them.*** | **GROUPING AND CLASSIFYING**<br>***UKS2 - Compare and contrast a variety of examples linked to UKS2 PoS.***<br>***LKS2 - Compare and contrast a variety of examples linked to LKS2 PoS.*** | **QUESTIONING**<br>***UKS2 - Asking their own questions about scientific phenomena.***<br>***LKS2 - Asking relevant questions.*** | **RESEARCH**<br>***UKS2 – Summarise research from a wide variety of sources and recognising that scientific ideas change and develop over time.***<br>***LKS2 - Finding things out using a wide range of secondary sources of information.*** | **MODELLING**<br>***Non Statutory***<br>***Using dance, drama or a visual aid to represent science in the real world.*** | **COLLABORATING**<br>***Non Statutory***<br>***Interacting effectively as part of a group.*** |

# Science

## Year Group Expectations for Working Scientifically Skills (Grid 1)

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| **Year3** | ▪ Observe and record relationships between structure and function (linked to Y3 PoS).<br>▪ Observe and record changes /stages over time (linked to Y3 PoS).<br>▪ Explore / observe things in the local environment / real contexts and record observations (linked to Y3 PoS) – see 'Communicating' section also re links to vocabulary. | ▪ Decide ways and give reasons for sorting, grouping, classifying, identifying things / objects, living things, processes or events based on specific characteristics.<br>▪ Compare and contrast and begin to consider the relationships between different things *(e.g. structures of plants, functions of plant parts, diets, skeletons of humans and other animals, changes over time, etc.).*<br>▪ Record similarities as well as differences *(e.g. what do all skeletons have? as well as the differences between skeletons.* | ▪ Explore their own ideas about 'what if….?' scenarios e.g. humans did not have skeletons.<br>▪ Ask questions such as 'What if we tried….? or 'What if we changed…?'<br>▪ Begin to understand that some questions can be tested in the classroom and some cannot.<br>▪ Within a group suggest questions that can be explored, observed, tested or investigated further.<br>▪ Within a group suggest relevant questions about what they observe and about the world around them. | ▪ Find things out using a range of secondary sources of information *(e.g. books, photographs, videos and other technology).* | ▪ Act out or make a model of something to represent something in the real world using appropriate scientific vocabulary verbally. | ▪ Begin to make some decisions about an idea within a group from a list of choices *(e.g. let's put them all in a pile first OR I think we should try…).*<br>▪ With help; support, listen to and acknowledge others in the group *(e.g. Yes. I prefer that one too).*<br>▪ Build on / add to someone else's idea. *(e.g. we could use x as well as y).*<br>▪ Begin to understand that it is okay to disagree with their peers and offer a reason for their opinion. |
| **Year2** | ▪ Use simple scientific language from the Y2 PoS to talk about / **record** what they have noticed.<br>▪ Use observations to make suggestions and / or ask questions.<br>▪ **Observe** and describe simple processes / cycles / changes with several steps *(e.g. growth cycle, simple food chain, saying how living things depend on one another).*<br>▪ **Observe** closely and communicate with increasing accuracy the features or properties of things in the real world. | ▪ **Name / identify** common examples, some common features or different uses.<br>▪ **Sort** and **group** objects, materials or living things by observable and/or behavioural features.<br>▪ **Compare** and contrast… a variety of things [objects, materials or living things] - focusing on the similarities as well as the differences. | ▪ Raise their own logical questions based on or linked to things they have observed.<br>▪ With help / scaffolds, begin to ask questions such as 'What will happen if…?" | ▪ Talk about how useful the information source was and express opinion about findings.<br>▪ Make suggestions about who to ask or where to look for information.<br>▪ Ask people questions to help them answer their questions.<br>▪ Use simple and appropriate secondary sources (such as books, photographs, videos and other technology) to find things out / find answers. | ▪ Act out something to represent something else about the world around us *(e.g a life cycle).* | ▪ Share ideas in a group and listen to the ideas of others.<br>▪ Work cooperatively with others on a science task making some choices. |
| **Year1** | ▪ Begin to use simple scientific language (from Y1 PoS) to talk about or **record** what they have noticed.<br>▪ Use observations to make suggestions and / or ask questions.<br>▪ Look / **observe** closely and communicate changes over time.<br>▪ Look / **observe** closely and communicate the features or properties of things in the real world.<br>▪ **Observe** closely using their senses. | ▪ **Name** / identify common examples and some common features.<br>▪ With help, decide how to sort and **group** objects, materials or living things.<br>▪ **Name** basic features of objects, materials and living things.<br>▪ Say how things are similar or different.<br>▪ **Compare** and contrast simple observable features / characteristics of objects, materials and living things. | ▪ Ask simple questions about what they notice about the world around them.<br>▪ Demonstrate curiosity by the questions they ask. | ▪ Ask people questions (e.g. an expert or hot-seating).<br>▪ Use simple primary and secondary sources (such as objects, books and photographs) to find things out. | ▪ With help, follow movements (dance / drama) to act out their science. | ▪ Share ideas in a group and listen to the ideas of others.<br>▪ Work with others on a science task. |
| | **EXPLORING / OBSERVING**<br>***LKS2 - Developing their own ideas and their understanding of the world around them.***<br>***KS1 - Observing closely***<br>***Using their observations and ideas to suggest answers to questions.*** | **GROUPING AND CLASSIFYING**<br>***LKS2 - Compare and contrast a variety of examples linked to LKS2 PoS.***<br>***KS1 - Compare and contrast a variety of examples linked to KS1 PoS.*** | **QUESTIONING**<br>***LKS2 - Asking relevant questions.***<br>***KS1 - Asking simple questions.*** | **RESEARCH**<br>***LKS2 - Finding things out using a wide range of secondary sources of information.***<br>***KS1 - Finding things out using secondary sources of information.*** | **MODELLING**<br>***Non Statutory***<br>***Using dance, drama or a visual aid to represent science in the real world.*** | **COLLABORATING**<br>***Non Statutory***<br>***Interacting effectively as part of a group.*** |

# Science

## Year Group Expectations for Working Scientifically Skills (Grid 2)

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| **Year 6** | ▪ Predict what a graph might look like before collecting results.<br>▪ Make a hypothesis where they say how one thing will affect another and give a reason for their suggestion with a developing understanding of the scientific concept.<br>▪ Identify **variables** to change, measure and keep the same in order for a test to be **fair.**<br>▪ Independently plan investigations and explain planning decisions.<br>▪ Decide when it is appropriate to carry out a **fair test** investigation, comparative test or alternative. | ▪ Decide whether to **repeat** any **readings** and justify the reason for doing so.<br>▪ Make their own decisions about what measurements to take (and begin to identify the ranges used).<br>▪ Make, and act on, suggestions to control / reduce risks to themselves and others.<br>▪ Use equipment fit for purpose to take measurements which are increasingly **accurate** and precise.<br>▪ Decide the most appropriate equipment to use to collect data. | ▪ Articulate understanding of the concept using scientific language and terminology when describing abstract ideas, observations and findings (linked to the Y6 PoS).<br>▪ Record data and results of increasing complexity using scientific diagrams and labels, recognised symbols, classification keys, tables, bar and line graphs, and models.<br>▪ Make decisions about how to present and explain their findings through talk, in written forms or in other ways (e.g. using technology). | ▪ Spot unexpected results that do not fit the pattern (anomalies).<br>▪ Identify patterns in results collected and describe them using the **change and measure variables** (causal relationships) *(e.g. as we increased the number of batteries the brightness the bulb increased.* | ▪ Identify **evidence** that refutes or **supports** their ideas.<br>▪ Independently form a conclusion which draws on the **evidence** from the test (linked to Y6 PoS).<br>▪ Use scientific language and terminology (linked to Y6 PoS) to explain why something happened. | ▪ Be able to suggest reasons for unexpected results (anomalies).<br>▪ Describe how to improve planning to produce more **reliable** results.<br>▪ Say how confident they are that their results are **reliable** and give a reason. |
| **Year 5** | ▪ Carry our **fair tests** and other investigations with increasing independence.<br>▪ Suggest more than one possible prediction and begin to suggest which is the most likely. Justify their reason with some knowledge and understanding of the scientific concept.<br>▪ Make decisions about which **variables** to change, measure and keep the same (linked to the appropriate units in the Y5 PoS).<br>▪ Make most of the planning decisions for an investigation.<br>▪ Recognise when it is appropriate to carry out a **fair test**. | ▪ Make their own decisions about what observations to make or measurements to use and how long to take them for (recognising the need for repeat readings on some occasions).<br>▪ Take measurements using a range of scientific equipment with increasing accuracy and using more complex scales / **units.**<br>▪ Identify possible risks to themselves and others and suggest ways of reducing these.<br>▪ Choose the most appropriate equipment and make **accurate** measurements. | ▪ Use their developing scientific knowledge and understanding and relevant scientific language and terminology to communicate more abstract concepts (linked to Y5 PoS).<br>▪ Present and explain their findings through talk, in written forms or in other ways (e.g. using technology) for a range of audiences / purposes.<br>▪ Record data and results of increasing complexity using different formats e.g. tables, annotated scientific diagrams, classification keys, graphs and models.<br>▪ Make decisions about the most appropriate way of recording data. | ▪ Describe straightforward patterns in results linking cause and effect e.g. using er or the word 'more' *(e.g. the longer, thinner shapes move through the water more quickly OR the larger the wings, the longer it takes the spinner to fall).*<br>▪ Look for / notice relationships between things and begin to describe these.<br>▪ Comment on the results and whether they **support** the initial **prediction.** | ▪ Use their scientific knowledge and understanding and appropriate scientific language and terminology (linked to Y5 PoS) to explain their findings and data and answer their initial question.<br>▪ Draw a valid **conclusion** (explain *why* it happened) based on their data and observations (from Y5 PoS). | ▪ Begin to recognise how repeated readings improve the **reliability** of results.<br>▪ Compare results with others and comment on how **reliable** they are. |
| **Year 4** | ▪ Carry out simple **fair tests** with increasing confidence investigating the effect of something on something else (linked to Y4 PoS).<br>▪ Start to make their own decisions about the most appropriate type of science enquiry they might use to answer scientific questions *(is a fair test the best way to investigate their question?)*<br>▪ Make a **prediction** based on the knowledge acquired from previous explorations / observations and apply it to a new situation.<br>▪ Explain their planning decisions and choices.<br>▪ Make some of the planning decisions about what to change and measure / observe.<br>▪ Begin to recognise when a **fair test** is necessary. | ▪ Begin to identify where patterns might be found and use this to begin to identify what data to collect.<br>▪ Make more of the decisions about what observations to make, how long to make them for and the type of equipment that might be used.<br>▪ Recognise obvious risks and how to keep themselves and others safe.<br>▪ Learn how to use new equipment, such as data loggers and measure temperature in degrees Celsius (°C) using a thermometer.<br>▪ Collect data from their own observations and measurements, using notes / simple tables / standard **units**.<br>▪ Make **accurate** measurements using standard **units** [and more complex units and parts of units] using a range of equipment and scales. | ▪ Record findings using relevant scientific language and vocabulary (from Y4 PoS), including discussions, oral and written explanations, notes, drawings (annotated), pictorial representations, labelled diagrams, tables and bar charts [where intervals and ranges agreed through discussion], displays or presentations.<br>▪ Begin to select the most useful ways to collect, record, classify and present data from a range of choices.<br>▪ Make decisions on how best to communicate their findings in ways that are appropriate for different audiences. | ▪ Notice / find patterns in their observations and data. (Describe the effect of something on something else). *(e.g. as I lengthen the ruler I notice that the pitch gets lower).*<br>▪ With some independence, analyse results / observations by writing a sentence that matches the **evidence** i.e. deciding the important aspect of the result and summarising in a **conclusion** *(e.g. metals tend to be good conductors of electricity).* | ▪ Begin to develop their ideas about relationships and interactions between things and explain them.<br>▪ Use relevant scientific language and vocabulary (from Y4 PoS) to begin to say / explain *why* something happened. | ▪ Use results to suggest improvements, new questions and / or predictions for setting up further tests.<br>▪ Compare their results with others and give reasons why results might be different. |
| | **PLANNING AND TESTING**<br>***UKS2 - Using different types of scientific enquiry making decisions about and explaining choices for testing.***<br>***LKS2 - Making decisions about and setting up simple practical enquiries, comparative tests and fair test.*** | **USING EQUIPMENT AND MEASURES**<br>***UKS2 - Increasing complexity and increasing accuracy and precision***<br>***Make their own decisions about the data to collect.***<br>***LKS2 - Making accurate measurements and gathering data.*** | **COMMUNICATING**<br>***UKS2 / LKS2 / KS1***<br>***Reporting findings, recording data, presenting findings.***<br>***Read, spell and pronounce scientific vocabulary correctly linked to the relevant year group.*** | **CONSIDERING THE RESULTS OF AN INVESTIGATION / WRITING A CONCLUSION**<br>**DESCRIBING RESULTS / LOOKING FOR PATTERNS**<br>***UKS2 - Looking for patterns analysing functions, relationships and interactions more systematically.***<br>***LKS2 - Describing their findings/ results.*** | **EXPLAINING RESULTS**<br>***UKS2 - Draw conclusions based on / supported by evidence.***<br>***LKS2 - Reporting on findings saying why something happened.*** | **TRUSTING RESULTS**<br>***UKS2 - Comment on how reliable the data is.***<br>***LKS2 - Suggest improvements for further tests.*** |

# Science

## Year Group Expectations for Working Scientifically Skills (Grid 2)

| | PLANNING AND TESTING | USING EQUIPMENT AND MEASURES | COMMUNICATING | CONSIDERING THE RESULTS OF AN INVESTIGATION / WRITING A CONCLUSION | | |
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| | | | | DESCRIBING RESULTS / LOOKING FOR PATTERNS | EXPLAINING RESULTS | TRUSTING RESULTS |
| **Year 3** | ▪ Help to decide about how to set up a simple **fair test** and begin to recognise when a test is not **fair**.<br>▪ Make a **prediction** based on everyday experience.<br>▪ With support / as a group, set up simple practical enquiries including comparative and **fair tests** e.g. make a choice from a list of a things (variables) to change when conducting a **fair test**. *(e.g. choose which magnets to compare and which method to use to test their strength).*<br>▪ As a group, begin to make some decisions about the best way of answering their questions.<br>▪ Find / suggest a practical way to compare things *e.g. rocks, magnets.* | ▪ Collect data from their own observations and measurements using notes / simple tables / standard units.<br>▪ Help to make some decisions about what observations to make, how long to make them for, the type of simple equipment that might be used and how to work safely.<br>▪ Make simple **accurate** measurements using whole number standard **units**, using a range of equipment.<br>▪ Gather data in a variety of ways to help in answering questions.<br>▪ Use equipment **accurate**ly to improve the detail of their measurements / observations *(e.g. microscopes, measuring syringes, measuring cylinders, hand lenses).* | ▪ Record and present findings using simple scientific language and vocabulary from the Y3 PoS, *including discussions, oral and written explanations, notes, annotated drawings, pictorial representations, labelled diagrams, simple tables, bar charts (using scales chosen for them), displays or presentations.*<br>▪ With scaffold / support record, and present data in a variety of ways to help in answering questions.<br>▪ Communicate their findings in ways that are appropriate for different audiences. (linked to Y3 PoS). | ▪ With scaffold / support, describe and compare the effect of different factors on something *(e.g. we noticed that larger magnets are not always stronger).*<br>▪ With help, look for changes and simple patterns in their observations, data, chart or graph.<br>▪ Use their results to consider whether they met their **predictions**. | ▪ Use their experience and some **evidence** or results to draw a simple **conclusion** to answer their original question.<br>▪ Write a simple explanation of why things happened (using the word 'because') and using simple scientific language and vocabulary from the Y3 PoS. | ▪ Say whether what happened was what they expected and notice any results that seem odd.<br>▪ Begin to recognise when a test is not **fair** and suggest improvements. |
| **Year 2** | ▪ Carry out simple comparative tests as part of a group, following a **method** with some independence.<br>▪ Make a simple prediction about what might happen and try to give a vague reason (even though it might not be correct).<br>▪ With support, make suggestions on a **method** for setting up a simple comparative test.<br>▪ Talk about a practical way to find answers to their questions. | ▸ **Measure** using non-standard and simple standard measures (e.g. cm, time) with increasing accuracy.<br>▸ Begin to make decisions about which equipment to use.<br>▪ Correctly and safely use **equipment** provided to make observations and/or take simple measurements. | ▸ **Record** and communicate their findings in a range of ways to a variety of audiences.<br>▸ Use simple scientific language with increasing accuracy (from Y2 PoS).<br>▸ **Record** simple data with some accuracy to help in answering questions;<br>– With support or using frameworks, make decisions about how to complete a variety of tables/charts *(e.g. a 2 column table, tally charts, Venn diagram, pictograms, block graphs with 1:1 scale).*<br>– *Present findings in a class displays.*<br>– *Sequence / annotate photographs of change over time.*<br>▪ *Produced increasingly detailed drawings which are labelled / annotated.* | ▪ With guidance, begin to notice **patterns** in their data *e.g. order their findings, sequence best to worst, say what happened over time, etc.*<br>▪ Recognise if **results** matched **predictions** (say if results were what they expected).<br>▪ Use their recordings to talk about and describe what has happened. | ▪ Begin to use simple scientific language (from Y2 PoS) to explain what they have found out.<br>▪ Give a simple, logical reason why something happened *(e.g. I think … because…).* | ▸ Begin to discuss if the test was un**fair.** |
| **Year 1** | ▪ With help**, carry out** a simple test / comparative test.<br>▪ With help, make a simple prediction or suggestion about what might happen.<br>▪ Begin to suggest some ideas e.g. choose which equipment to use, choose which materials to test from a selection.<br>▪ **Talk** about ways of setting up a test. | ▪ **Measure** using non-standard units e.g. how many lolly sticks / cubes / handfuls, etc.<br>▪ Observe closely, using simple **equipment** (e.g. hand lenses, egg timers).<br>▪ Use senses to **compare** different textures, sounds and smells. | ▪ Communicate their ideas to a range of audiences in a variety of ways.<br>▪ Complete a pre-constructed table / chart using picture records or simple words.<br>▪ Contribute to a class display.<br>▪ Add annotations to drawings or photographs.<br>▪ Begin to use some simple scientific language from Y1 PoS.<br>▪ **Record** simple visual representations of observations made. | ▪ Use recordings to talk about and describe what happened.<br>▪ Sequence photographs of an event / observation. | ▪ Begin to use simple scientific language (from Y1 PoS) to talk about what they have found out or why something happened. | ▸ N/A in Y1. |
| | ***LKS2 - Making decisions about and setting up simple practical enquiries, comparative tests and fair tests.***<br>***KS1 - Performing simple tests.*** | ***LKS2 - Making accurate measurements and gathering data.***<br>***KS1 - Using simple equipment and gathering data to help in answering their questions.*** | ***UKS2 / LKS2 / KS1***<br>***Reporting findings, recording data, presenting findings.***<br>***Read, spell and pronounce scientific vocabulary correctly linked to the relevant Year Group.*** | ***LKS2 - Describing their findings / results.***<br>***KS1 - Talk about what happened / what they noticed.*** | ***LKS2 - Reporting on findings saying why something happened.***<br>***KS1 - Talk about what they found out.*** | ***LKS2 - Suggest improvements for further tests.***<br>***KS1 – Beginning to spot when a method is not fair.*** |