ST MARY'S, WELHAM GREEN

V 1.2

"Inspired Young Scientists"

The Big Idea

“Inspired Young Scientists.”

At St Mary’s, we have created a dynamic, high-quality science that engenders curiosity and will enable children to flourish for the future.

We don’t follow a scheme; we follow our curriculum. This has been crafted carefully to align with the National Curriculum for Science and with support from HfL Education advisors. Our curriculum maps out the substantive knowledge and disciplinary skills, making clear the connections between them. Links are made to other subjects but always in the service of science.

As a school we have bought into some high-quality schemes and are able to provide a number of excellent resources. We realise, however, that it is essential that learning starts with where our children are, and that learning is sequenced and adapted to each individual class. This is why we have created our Year group programmes of study (POS).

The prompts in our Year group POS have been designed to help teachers identify the steps in progression within each topic in order for children to achieve the broad National Curriculum objectives (shown in **bold** on the POS). It also aims to guide teachers in how to enrich each topic with objectives which go beyond these statements (shown in *italics*). We have signposted where previous learning has happened so that teachers can ensure objectives from previous years are embedded and where not ensure they are revisited. Future learning is also signposted so that teachers can go broader rather than further.

Many schemes of work have far too much content, so teachers need to be selective based on what best covers the national curriculum knowledge statements whilst maximising the opportunities for developing children’s working scientifically skills through the full range of enquiry types. We also know that some schemes of work do not stick to the national curriculum statements and stray into content from later year groups or key stages. Using our Year Group POS helps our teachers to identify what is necessary and what is not and select activities accordingly.

The non-negotiables

We teach weekly science lessons based on our curriculum and the year group's POS with children having frequent opportunities to revisit and build on previous learning to consolidate it.

Each Academic Year

- A name/subject label on the school pro-forma is stuck on the front of an A4 red book for each child
- The relevant skills wheel is stuck into the back cover of the book for reference

Each Unit

- Teachers use the POS to ensure that substantive information is covered through key enquiry questions.
- Look carefully at how you are explicitly teaching, modelling, and independently giving children the opportunity to use the disciplinary skills (identified on the skills wheel). Not all will come up in every unit, but most should be covered.
- Formative assessment through AFL is our go-to method of immediate and regular analysis of how children are progressing. In KS2 summative quizzes may be used to inform and review teaching.
- Practical work should be carefully planned for the unit. Practical work is most effective when it takes place when pupils have enough prior knowledge to learn from an activity. It should help children learn substantive knowledge, disciplinary knowledge or both, but not cover too many aspects at once (otherwise this will lead to cognitive overload).

Each Lesson

- Lessons are presented as enquiries that help the children, as scientists, to explore the overarching unit gaining substantive and disciplinary knowledge.
- Lessons are designed to enable children to repeatedly practise any key vocabulary.
- Children stick in a lesson sticker with the enquiry question and the disciplinary skills icons.
- Lessons begin with retrieval practice (e.g. an Explorify activity) from prior learning and crucial components are emphasised and repeated (this should include content from previous years to aid with making connections)
- Links to English, maths and geography are always firmly completed in the service of science
- Every lesson ends by reflecting on the enquiry question posed at the start of the lesson, highlighting the key substantive content and identifying the skills that have been used (marking these on the lesson label) A PowerPoint template has been provided to help with this.

Curriculum Overview

Science

R

- Animals, Humans and Habitats
- Materials
- Light and Sound
- Plants
- Push and Pull
- Electricity and Batteries

1

- Different Animals
- Seasonal Changes
- Everyday Materials
- In the Garden

2

- Growth and Survival
- Habitats
- Use of Everyday Materials
- Growing Plants

3

- Healthy Eating and Healthy Bodies
- Rocks, Fossils and Soils
- Light and Shadows
- Investigating Plants
- Forces and Magnets

4

- Teeth and Digestion
- Classification and Interdependence Inc. Food Chains
- Solids, Liquids and Gasses
- Sound and Vibrations
- Circuits and Components

5

- Human Life Cycles
- Life Cycles
- Changes Of Materials
- Forces
- Earth and Space

6

- Humans and Health
- Classification, Evolution and Inheritance
- Light
- Electricity

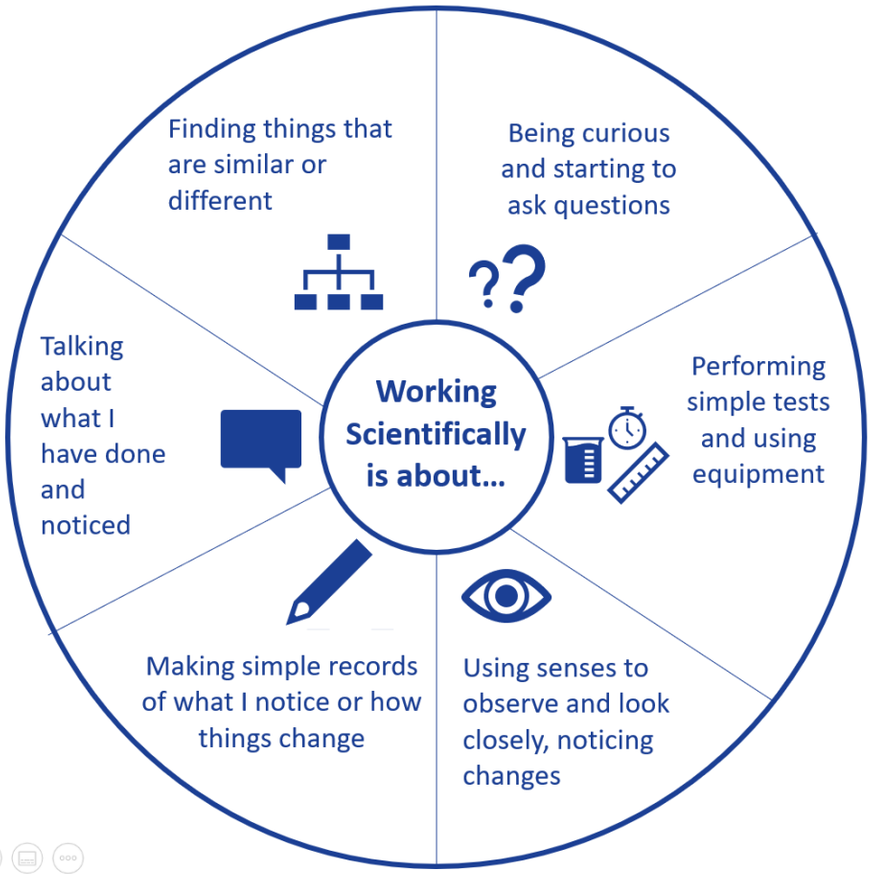
KEY STAGE 3/4+

Based on The National Curriculum in England (DfE, 2014), Statutory Framework for the Early Years Foundation Stage (DfE, 2021) and Progression in Scientific Knowledge (HfL, 2016 Edition)

- Animals, including humans
- Living things and their habitats
- Materials
- Light and sound
- Plants
- Forces
- Electricity

EYFS Science Links

Science, demonstrated through the three characteristics of effective learning, can be used to support the three prime areas of learning and their associated ELGs especially Communication and Language. This guide has been designed to help teachers identify the steps in progression within each of our science areas and to aid in the preparation of children for more formal learning ready for Year 1 and beyond.



Animals, Humans and Habitats

Vocabulary
Animal, head, legs, arms, knee, elbow, neck, face, feet, hands, bread, potatoes, apples, cereals, rice, meat, fish, milk, running, jumping, swimming, walking, chicken, hen, kitten, cat, puppy, dog, duckling, duck

Future Learning:
Year 1: Different Animals
Year 1: Seasonal Changes
Year 2: Habitats
Year 2: Growth and Survival
Year 3: Healthy Eating and Healthy Bodies
Year 4: Classification and Interdependence Inc. Food Chains
Year 4: Teeth and Digestion
Year 5: Human Life Cycles
Year 5: Life Cycles
Year 6: Classification, Evolution and Inheritance
Year 6: Humans and Health

- identify something as an animal
- name some places animals live
- identify and locate parts of their body
- identify and locate parts of animals bodies
- use their observations to describe humans and other animals
- name a very limited range of food
- can identify types of exercise
- name baby, child, adult and the young of some other animals

ELG: Managing Self
ELG: People, Culture and Communities
ELG: The Natural World

Plants

Vocabulary
Root, stem, tree, leaf, flower, water, seed, plant, growth, decay

Future Learning:
Year 1: In the Garden
Year 2: Growing Plants
Year 3: Investigating Plants

- identify something as a plant
- name some common plants, identify leaf, root, stem and flower
- recognise that plants need water to grow
- name some places plants live
- identify the seeds in a fruit

ELG: The Natural World

Materials

Future Learning:
Year 1: Everyday materials
Year 2: Use of Everyday Materials
Year 3: Rocks, Fossils and Soils
Year 4: Solids, Liquids and Gasses
Year 5: Changes of Materials

- make observations of common objects
- make very simplistic observations of materials
- arrange materials into groups
- identify when changes occur e.g. when food is cooked

ELG: Creating with Materials

Push and Pull

Vocabulary
Push, pull, twist, squash, stretch

Future Learning:
Year 3: Forces and Magnets
Year 5: Forces
Year 5: Earth and Space

- observe and describe movements they and objects make

ELG: Gross Motor Skills
ELG: Fine Motor Skills

Light and Sound

Future Learning:
Year 3: Light and Shadows
Year 4: Sound and Vibrations
Year 6: Light

- know that it is dangerous to look at the sun
- relate their sense of sight to their eyes
- relate their sense of hearing to their ears

ELG: The Natural World

Electricity and batteries

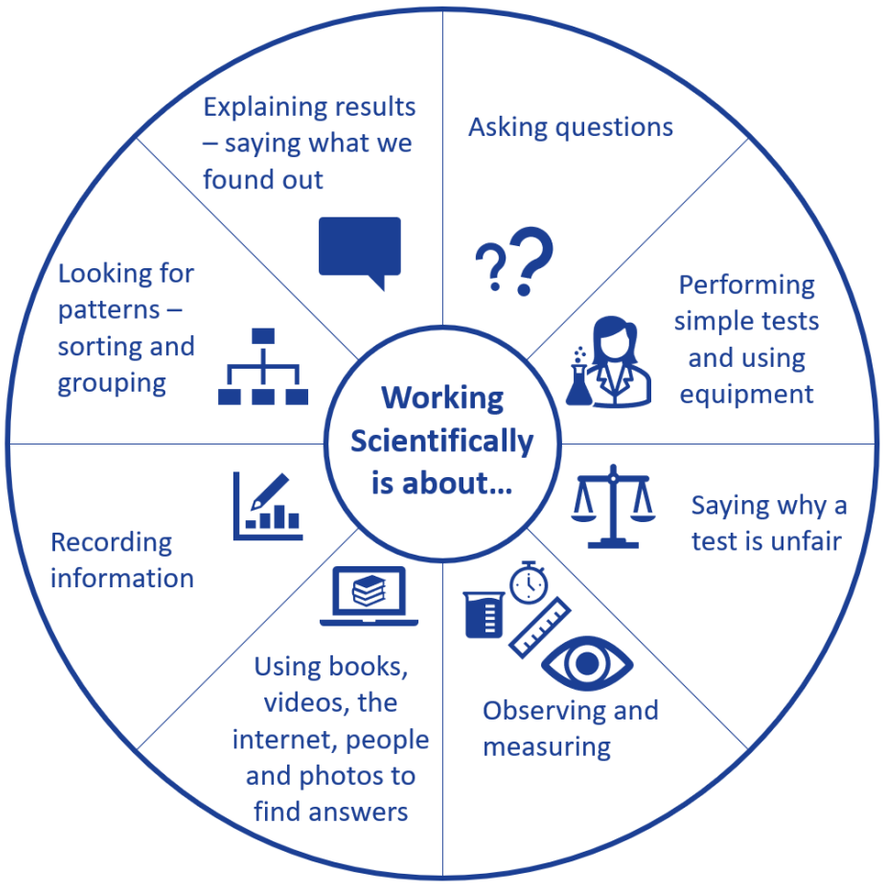
Vocabulary
electricity, switch

Future Learning:
Year 4: Circuits and Components
Year 6: Electricity

- know electricity can be dangerous
- explore a range of battery powered devices

Year 1 Science Curriculum Map

This has been designed to help teachers identify the steps in progression within each topic in order for children to achieve the **broad National Curriculum objectives (shown in bold).** It also aims to guide teachers in how to enrich each topic with objectives which *go beyond these statements (shown in italics).*



In the Garden

Previous Learning:
EYFS: UTW: Plants

Vocabulary
petal, tall, taller, tallest, wild, trunk, similar, different, within, under, next to, soil, blossom, fruit, leaves, branch, bulbs, shrub, alive, vegetables, grass, garden, habitat, deciduous, earth, evergreen, compost, non-living, living, not alive, dead, artificial
Names e.g. daffodil, daisy, sunflower, rose, lavender, tulip, snowdrop, holly, dandelion, oak, beech, chestnut, pine

Future Learning:
Year 2: Growing Plants
Year 3: Investigating Plants

- make observations of plants, including flowers and vegetables they have planted
- identify the leaf, root, stem and flower of a plant
- identify the trunk, branch, roots and leaves of a tree
- know that plants produce seeds
- identify differences between plants
- **identify and describe the basic structure of a variety of common flowering plants, including trees**
- name some common plants
- name some plants that live in the garden
- name some plants that live in the wild
- name some trees in the local environment
- recognise that different plants live in the local environment
- use simple identification guides to name plants in the local environment
- **identify and name a variety of common wild and garden plants, including deciduous and evergreen trees**
- *compare and contrast different plants*
- *sequence pictures of how plants changes over time*
- *describe how deciduous trees changes throughout the year*
- *explain why some plants are only seen at certain times of the year*

Everyday materials

Previous Learning:
EYFS: UTW: Materials

Vocabulary
Hard, stiff, rough, not bendy, opaque, strong, soft, shiny, smooth, waterproof, stretchy, material, transparent, dull, bendy, absorbent, wood, plastic, glass, magnetic, elastic, fabric, metal, water, rock,

Future Learning:
Year 2: Use of Everyday Materials
Year 3: Rocks, Fossils and Soils
Year 4: Solids, Liquids and Gasses
Year 5: Changes of Materials

- name some common materials
- name some common objects around the school and home
- **distinguish between an object and the material from which it is made**
- *name materials which have lots of different uses (e.g. paper- wrapping paper, tissue paper, writing paper, birthday card)*
- identify some naturally occurring materials: wood, rock, water
- identify some man-made materials: glass, metal, plastic
- **identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock**
- *describe objects that are made from lots of different materials*
- *names objects that are sometimes made from different materials (e.g. spoons plastic, wooden, metal)*
- make observations of common objects and the different materials they are made of
- communicate these observations using descriptive words (e.g. bendy, rough, hard)
- identify some properties of materials (e.g. see through, waterproof, absorbent)
- **describe the simple physical properties of a variety of everyday materials**
- *make predictions about which materials will float and sink*
- **compare and group together a variety of everyday materials on the basis of their simple physical properties** (both visible and non-visible)
- *explain why people started using plastic bags rather than paper bags*

Different Animals

Previous Learning:
EYFS: UTW: Animals, Humans and Habitats

Vocabulary
Body parts: eyes, ears, elbows, hair, mouth, nose, teeth, paw, hoof, tail, fin, shell, skin, wings, beak, fur, scales, feathers
Fish: goldfish, tuna, salmon
Birds: blackbird, magpie, robin, sparrow, crow, swan.
Reptiles: snake, lizard, tortoise
Mammals: mouse, horse, cow, sheep, hamster, rabbit
Amphibians: frog, toad, newt
Senses: feel, hear, smell, see, taste, touch
Carnivore, omnivore, herbivore

Future Learning:
Year 2: Growth and Survival
Year 3: Healthy Eating and Healthy Bodies
Year 4: Teeth and Digestion
Year 5: Human Life Cycles
Year 6: Humans and Health

- identify and name a selection of animals • identify and sort animals into different groups
- name the different groups of animals
- **identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals**
- make observations of animals
- know that animals eat different types of food
- identify the food of some common animals
- recall and use the words: carnivore, herbivore and omnivore
- **identify and name a variety of common animals that are carnivores, herbivores and omnivores**
- *group animals that belong to: carnivores, herbivores and omnivores*
- use their observations to point out differences between humans and other animals and between animals and non-living things
- **describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets)**
- identify and locate the sense organs
- use senses to describe textures, sounds and smells
- compare differences in texture, sounds and smells
- name and locate the basic parts of the human body
- draw and label a simple body outline
- *describe differences between the different animal groups (e.g. birds have feathers but mammals have fur)*
- *identify animals which are more likely to be seen in different seasons*
- *explain why some animals are only seen at night*

Seasonal Changes

Previous Learning:
EYFS: UTW: Light and Sound

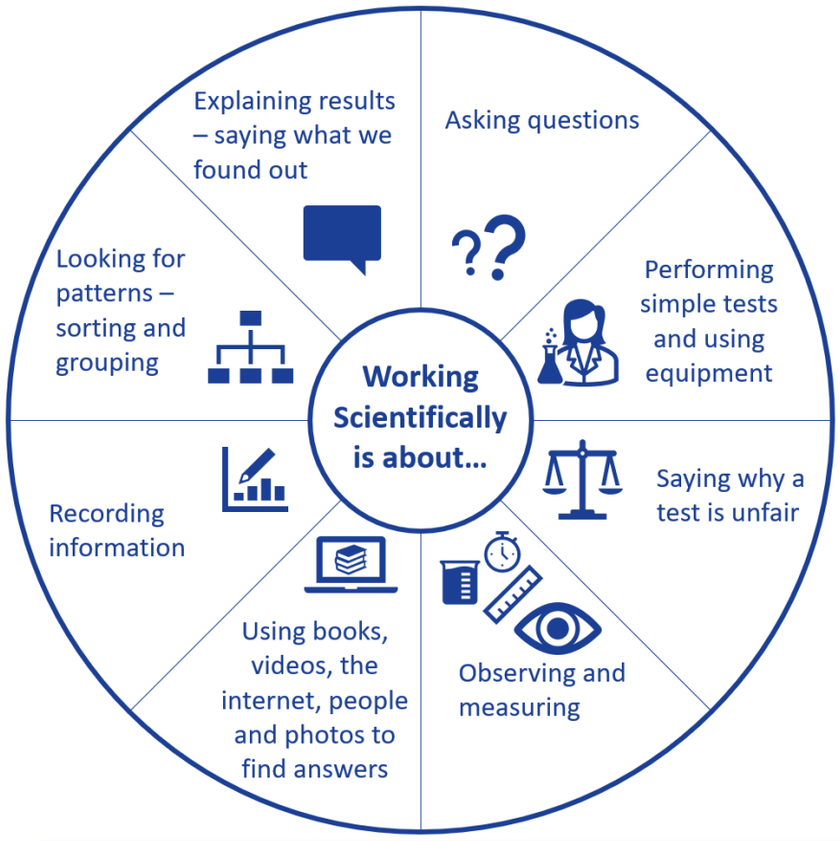
Vocabulary
Seasons: Autumn, Spring, Summer, Winter, deciduous, evergreen, shoot, fruit, earth, seeds, leaves, flowers, weather types: rain, hail, snow, ice, frost, sun, showers, wind, reproduce, babies/adults, life cycles, birds, insects, cold, warm, hot, sunrise, sunset

Future Learning:
Year 2: Habitats
Year 4: Classification and Interdependence Inc. Food Chains
Year 5: Life Cycles
Year 6: Classification, Evolution and Inheritance

- **observe changes across the four seasons**
- identify what to observe
- use descriptive words, photos and pictures to record changes
- collect evidence of changes (e.g. leaves, seeds, flowers)
- name the four seasons
- recall simple changes associated with each season
- observe and name types of weather (e.g. rain, sun, wind, clouds)
- **observe and describe weather associated with the seasons and how day length varies**
- identify what to measure about the weather
- use prepared tables and charts to record data
- *use secondary data to describe weather in another setting*
- *explain why animals are easier to spot at different times of year (e.g. migrating birds, hibernating animals)*

Year 2 Science Curriculum Map

This has been designed to help teachers identify the steps in progression within each topic in order for children to achieve the **broad National Curriculum objectives (shown in bold).** It also aims to guide teachers in how to enrich each topic with objectives which *go beyond these statements (shown in italics).*



Growing Plants

Previous Learning:
Year 1: In the Garden
EYFS: UTW: Plants

Vocabulary
seedling, bulb, buds, shoot, water, sun light, seeds, nuts, fruit stones, warm, grow, temperature, germinate

Future Learning:
Year 3: Investigating Plants

- know that flowering plants produce seeds which grow into new plants
- know that some plants have bulbs from which they grow
- make observations of plants over time
- explore how plants from seeds and bulbs grow
- describe what happens to bulbs during the plant cycle as they grow
- describe what happens to a seed as it grows and develops
- describe what they observe as new plants grow
- **observe and describe how seeds and bulbs grow into mature plants**
- *compare the plant cycle for a plant from a seed with that from a bulb*
- suggest how to find out about what plants need in order to grow well
- recognise that plants are living and need water, light and warmth to grow
- describe differences between plants grown in the light and in the dark
- **find out and describe how plants need water, light and a suitable temperature to grow and stay healthy**
- *explain how to look after a variety of plants*
- *know that a seed and bulb both contain everything a plant needs to grow*
- *explain that seeds and bulbs do not need light to germinate and identify how this is different to the needs of a plant*
- *explain how plants in the desert survive with little water and plants in the rainforest survive with little light*

Habitats

Previous Learning:
Year 1: Seasonal Changes
EYFS: UTW: Light and Sound

Vocabulary
Dead, alive, living, non-living,
habitats, keys, breathe, grow, eat, have babies, move, sense, go to the toilet, habitat, microhabitat, food chain

Future Learning:
Year 4: Classification and Interdependence Inc. Food Chains
Year 5: Life Cycles
Year 6: Classification, Evolution and Inheritance

- with help, use keys to identify some animals and plants
- recognise that different plants live in the local environment
- identify some local habitats
- describe the simple features of habitats
- recognise a microhabitat as a small habitat (e.g. leaf litter, woodlice under stones)
- describe some microhabitats
- **identify and name a variety of plants and animals in their habitats, including micro-habitats**
- recognise similarities and differences between plants and animals
- **explore and compare the differences between things that are living, dead, and things that have never been alive**
- explain differences between living and non-living things in terms of characteristics such as movement and growth
- use their observations to point out differences between animals, plants and non-living things
- recognise that plants provide food for humans and other animals within an environment
- construct a simple food chain (e.g. grass, cow, human)
- **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**
- name a few of the organisms that live in a particular habitat
- suggest reasons why different plants and animals are found in the different environments
- **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**
- *compare animals found in familiar habitats with unfamiliar habitats*
- *compare plants found in familiar habitats with unfamiliar habitats*
- *use different factors to compare a range of habitats (e.g. water, light, temperature)*

Growth and Survival

Previous Learning:
Year 1: Different Animals
EYFS: UTW: Animals, Humans and Habitats

Vocabulary
Baby, toddler, adult, eggs, fruit, vegetables, water, fibre, meat, fish, cheese, beans
washing, exercise, diet, offspring

Future Learning:
Year 3: Healthy Eating and Healthy Bodies
Year 4: Teeth and Digestion
Year 5: Human Life Cycles
Year 6: Humans and Health

- recognise that animals produce young
- **notice that animals, including humans, have offspring which grow into adults**
- recognise changes that take place as animals get older
- explain that adult animals no longer grow
- describe some differences they observe between babies and toddler
- make comparisons of the differences they observe between babies and toddlers
- identify the offspring of a selection of different animals
- *use evidence to show adult animals no longer grow*
- *use evidence to show that children of the same age are not all the same size*
- *use evidence to show that older children are generally taller than younger children*
- **find out about and describe the basic needs of animals, including humans, for survival (water, food and air)**
- *explain how to look after a pet describing what it needs to survive*
- **describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene**
- recognise that exercise is important
- name some types of food
- identify some types of food that make up their diet and name some examples of each
- recognise that an adequate diet and exercise are necessary for them to grow and stay healthy
- describe some of the types of food that they eat

Use of Everyday materials

Previous Learning:
Year 1: Everyday Materials
EYFS: UTW: Materials

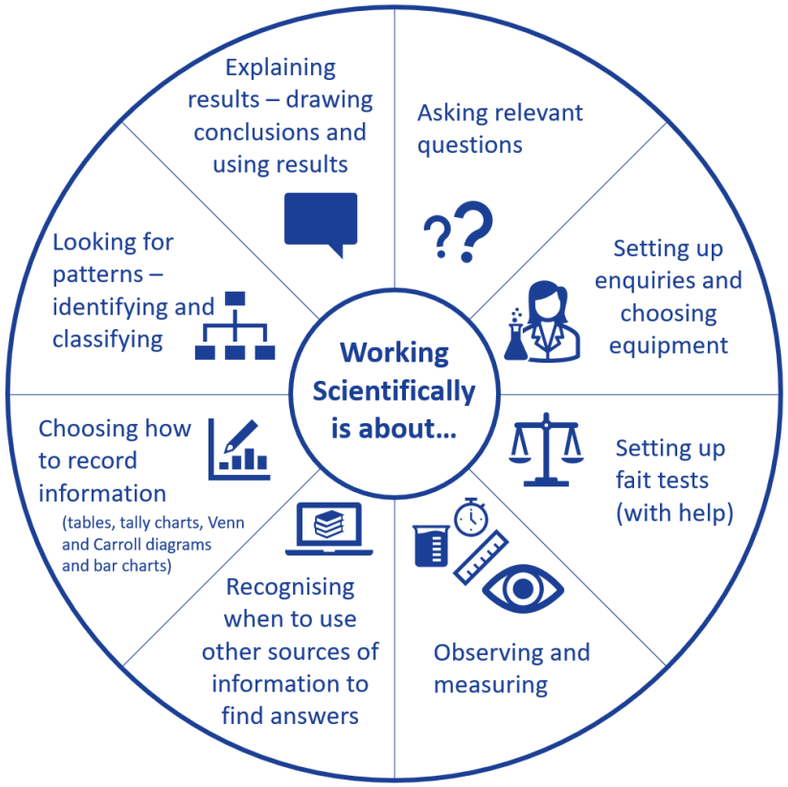
Vocabulary
Brick, cardboard, transparent,
waterproof, insulate, keep warm, hard, rigid, strong, flexible, squash, stretch, twist, bend

Future Learning:
Year 3: Rocks, Fossils and Soils
Year 4: Solids, Liquids and Gasses
Year 5: Changes of Materials

- identify uses of some common materials
- give a reason why a material is suitable for its job
- recognise that some materials will have more than one property which increases its suitability for its purpose (e.g. glass is transparent, rigid and weatherproof)
- **identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses**
- suggest several reasons why a material may or may not be suitable for a particular purpose
- *explain why one material may be more suitable for a purpose than another by discussing properties*
- *explain why plastics cause problems in the oceans*
- *explain the importance of reusing and recycling plastic*
- *describe how swimsuits have changed over time and how the fabric is now more suitable*
- *describe how scientists have invented new materials (e.g. Macintosh, Dunlop)*
- identify materials that can be easily changed with force
- identify materials that cannot be easily changed with force
- describe pushes and pulls needed to change a material as big or small
- **find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching**
- describe changes in shapes as a result of the action of pushes, pulls and twists
- *explain why some materials change shape when a force acts (i.e. push, pull, twist, stretch) as a result of their properties*

Year 3 Science Curriculum Map

This has been designed to help teachers identify the steps in progression within each topic in order for children to achieve the **broad National Curriculum objectives (shown in bold).** It also aims to guide teachers in how to enrich each topic with objectives which *go beyond these statements (shown in italics).*



Investigating Plants

Previous Learning:
Year 2: Growing Plants
Year 1: In the Garden
EYFS: UTW: Plants

Vocabulary
Ground, transport, attract bees, catch sunshine, green, air, nutrients, growth, pollen, pollination, seed formation, seed dispersal, nutrition, support, anchor, reproduction

Future Learning:

- identify parts of flowering plants
- **identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers**
- describe why healthy roots and a healthy stem are needed for plants to grow
- recognise that the leaves of a plant are associated with healthy growth and more specifically nutrition
- recognise that plants need light, water and warmth and healthy leaves, roots and stems in order to grow well
- know that water travels from the roots up the stem
- **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**
- know that plants make their own food
- know that fertilisers contain minerals
- understand that plants absorb minerals from the soil (Teacher Note: plants create their own food using sunlight, water and carbon dioxide, they do not absorb food from the soil)
- describe how changes to light and fertiliser affect plant growth
- *explain that differences in plant growth are due to the amount of light and/or water*
- **investigate the way in which water is transported within plants**
- describe how the stem has a role in support and nutrition (transport of water)
- *explain why healthy roots and a healthy stem are needed for plants to grow*
- **explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal**
- describe why plants need flowers
- sequence pictures to show the life cycle of a plant
- describe how pollen and seeds are dispersed
- explain the role of bees and insects in pollination
- *describe the processes of pollination, seed formation and seed dispersal*
- *compare the roots of different plants (e.g. desert plants or rainforest trees (Teacher Note: rainforest trees have very shallow roots as the quality of the soil is poor and most of the nutrients are near the surface)*

Healthy Eating and Healthy Bodies

Previous Learning:
Year 2: Growth and Survival
Year 1: Different Animals
EYFS: UTW: Animals, Humans and Habitats

Vocabulary
Balanced diet, carbohydrates, protein, fats, fibre, fruit and vegetables, bones, muscles, femur, ribs, spine, tibia, shoulder blade, hollow, relax and contract, protect, support, internal skeleton, exoskeleton

Future Learning:
Year 4: Teeth and Digestion
Year 5: Human Life Cycles
Year 6: Humans and Health

- identify some foods needed for a healthy and varied diet
- name the components of a healthy and varied diet
- describe how their diet is balanced
- **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**
- *describe the role of different food groups*
- *compare and contrast diets of animals including pets*
- *describe an adequate and varied diet for humans, recognising that there are many ways of achieving this*
- know they have bones and muscles in their body
- state that they and other animals have skeletons
- identify animals that do not have an internal skeleton (invertebrates)
- group animals with and without an internal skeleton
- *describe some advantages of having an internal skeleton over no skeleton or an exoskeleton*
- describe some observable characteristics of bones
- describe the main functions of their skeletons
- state that movement depends on both skeleton and muscles
- state that when one muscle contracts another relaxes
- **identify that humans and some other animals have skeletons and muscles for support, protection and movement**
- recognise that their skeletons grow as they grow
- *describe problems associated with broken bones or bones diseases*

Forces and Magnets

Previous Learning:
EYFS: UTW: Push and Pull

Vocabulary
Force, push, pull, speed up, slow down, change shape, change direction, movement, direction, friction, magnets, magnetic, surface, magnetism, north pole, south pole, repel, attract,

Future Learning:
Year 5: Forces
Year 5: Earth and Space

- recognise that pushes and pulls are forces
- recognise that a force acts in a particular direction
- observe the movements, shape and direction of objects when forces act on them
- describe how to make a familiar object start moving by pushing or pulling
- describe how to use pushes and pulls to make familiar objects speed up, slow down, change direction or shape
- produce annotated drawings showing the direction of force needed to make an object move
- identify friction as a force
- observe and explore how friction affects the movement of objects
- describe some ways in which friction between solid surfaces can be increased or decreased
- compare how things move on different surfaces
- observe how magnets attract or repel each other and attract some materials and not others
- classify materials as magnetic or non-magnetic
- 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 the difference between a magnet and a magnetic material
- notice that some forces need contact between two objects, but magnetic forces can act at a distance
- describe what happens when some materials are put near a magnet
- recall that magnets have a north and a south pole
- describe magnets as having two poles
- describe the direction of forces between magnets
- predict whether two magnets will attract or repel each other, depending on which poles are facing
- describe some everyday uses of magnets
- explain that a compass works by lining up with the Earth's magnetic field
- describe how lodestone was found to be a naturally occurring magnet and was used as the first compass for navigation

Rocks, Fossils and Soils

Previous Learning:
Year 2: Use of Everyday Materials
Year 1: Everyday Materials
EYFS: UTW: Materials

Vocabulary
Rock, soil, marble, granite, sand, stone, slate, chalk, clay, texture, absorbed, permeable, pebble, characteristic, surface, organic, impermeable, crystal, grains, crumbly, igneous, sedimentary, metamorphic, fossil

Future Learning:
Year 4: Solids, Liquids and Gasses
Year 5: Changes of Materials

- observe the characteristics of a variety of rocks
- name and describe the characteristics of several rocks
- identify fossils in rocks
- classify rocks from the evidence of investigations
- explain that rocks are used for different purposes dependent on their physical properties
- explain that different types of rock react differently to physical forces (e.g. water, rubbing)
- **compare and group together different kinds of rocks on the basis of their appearance and simple physical properties**
- understand that there are rocks under the Earths' surface
- *relate the simple physical properties of some rocks to their formation*
- *explain why certain rocks are used for different purposes and why some rocks could be used for these jobs for example:*
  - *Marble- kitchen worktops or statues*
  - *Slate roof tiles*
  - *Granite walls*
- *explain how a model (e.g. biscuits, chocolate bars) can be used to represent sedimentary, metamorphic and igneous rocks*
- *explain why we might find lots of the same types of rock in one place*
- **describe in simple terms how fossils are formed when things that have lived are trapped within rock**
- *describe how Mary Anning discovered fossils*
- *explain why we do not see the soft parts of animals in fossils*
- recognise that soil is a mixture of different materials and living things
- recognise that soil contains dead plants and animals
- recognise that there is rock under all surfaces and that soils come from rocks
- **recognise that soils are made from rocks and organic matter**

Light and Shadow

Previous Learning:
EYFS: UTW: Light and Sound

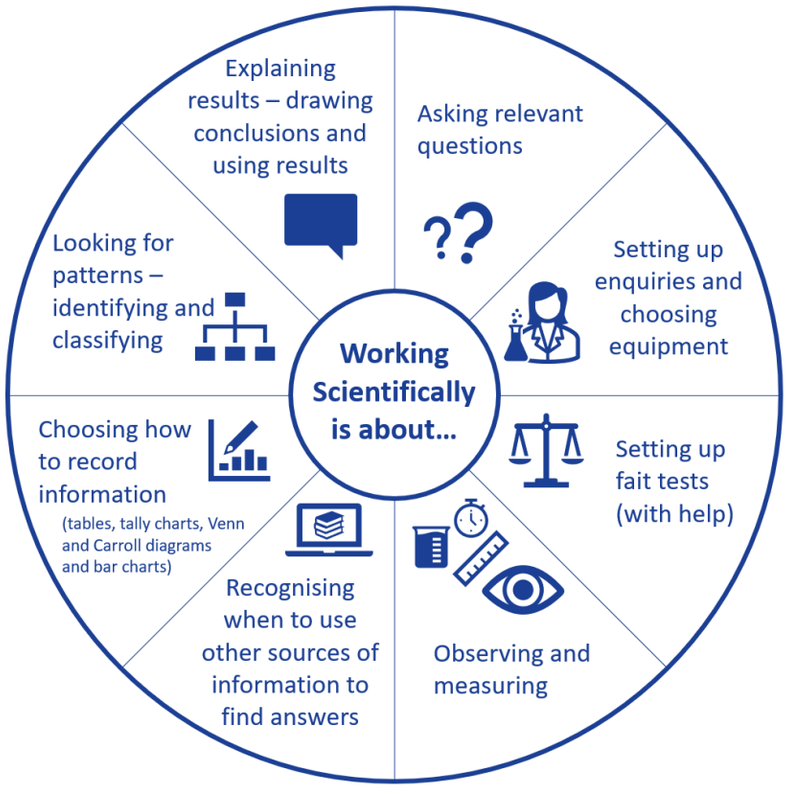
Vocabulary
Shadow, light, flames, opaque, block, direction, light, travels, shortest, longest, highest, torch, shape, similar, transparent, translucent, light source, sun, object, daytime, night-time, reflect, shine, shiny, absorb, reflective surface, surface, mirror, sundial, block, lamp

Future Learning:
Year 4: Sound and vibrations
Year 5: Light

- name a number of light sources, including the sun
- describe and compare some light sources
- state that light sources are seen when light from them enters the eyes
- **recognise that light from the sun can be dangerous and that there are ways to protect their eyes**
- recognise that they cannot see in the dark
- recognise that light travels from a source
- **recognise that they need light in order to see things and that dark is the absence of light**
- explain that places are dark because there is no light and a light source is needed to help us see in such places
- **notice that light is reflected from surfaces**
- state that reflections can be seen in shiny surfaces
- makes generalisations about shiny surfaces (e.g. smooth)
- demonstrate light travelling using a torch and record light bouncing off a mirror
- identify suitable reflective clothing for travelling in the dark
- explain that they cannot see shiny objects in the dark because there are no light sources
- recognise that when light is blocked, a shadow is formed
- **recognise that shadows are formed when the light from a light source is blocked by a solid object**
- recognise that shadows are similar in shape to the objects forming them
- make observations of changes in shadows
- explain that shadows are formed when light from a source is blocked
- state that even transparent objects block some light and form shadows
- describe the difference in shadows cast by opaque, translucent and transparent materials
- explore how to make shadows of different shapes and sizes
- **find patterns in the way that the size of shadows change**
- *use ideas about shadows to make predictions about the shadows formed by different objects or materials*
- *describe how the length of a shadow changes throughout the day as the sun moves across the sky*
- *describe how nocturnal animals are adapted to use what little light there is or their other senses in the dark (e.g. cats, aye-aye, lemurs)*
- *describe how Percy Shaw invented cat's eyes and explain their importance to road safety*

Year 4 Science Curriculum Map

This has been designed to help teachers identify the steps in progression within each topic in order for children to achieve the **broad National Curriculum objectives (shown in bold).** It also aims to guide teachers in how to enrich each topic with objectives which *go beyond these statements (shown in italics).*



Circuits and Components

Previous Learning:
UTW: Electricity and Batteries

Vocabulary
Battery, cell, wires, switch, crocodile clips, buzzer, bulb, circuit, symbols, insulator, conductor, plastic, metal, appliance, component

Future Learning:
Year 6: Electricity

- identify common appliances that run on electricity
- identify mains operated and battery operated devices
- describe some of the dangers associated with mains electricity
- name some components of a simple electrical circuit
- know that batteries are sources of electricity
- recognise that for a circuit to work it must be complete
- construct a working circuit
- construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers
- make drawings of simple working circuits (pictorial only circuit symbols covered in year 6)
- make circuits from drawings provided
- 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
- are methodical in tracing faults in simple circuits
- describe the effect of making and breaking one of the contacts on a circuit
- explain why some circuits work and others do not
- recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit
- describe how switches work
- construct a home-made switch
- identify materials as conductors or insulators
- construct simple circuits and use them to test whether materials are electrical conductors or insulators
- recognise some common conductors and insulators, and associate metals with being good conductors
- relate knowledge about metals and non-metals to their use in electrical appliances
- describe the use of conductors and insulators in components including connecting wires
- identify playdough and graphite as non-metal conductors and explain why this is unusual

Solids, Liquids and Gasses

Previous Learning:
Year 3:Rocks, Fossils and Soils
Year 2: Use of Everyday Materials
Year 1: Everyday Materials
EYFS: UTW: Materials

Vocabulary
Water, air, ice, milk, lemonade, juice, metal, solid, liquid, gas, pour, flow, change shape, squash, heat, cool, grain/granular, temperature, thermometer, freeze, melt, boil, evaporate, condense, steam, smoke, sea water, properties, melting point, degrees Celsius

Future Learning:
Year 5: Changes of Materials

- name some solids and liquids
- state that air is a gas
- state some differences between solids, liquids and gases
- recognise everyday substances as mixtures of solids, liquids and/or gases
- recognise that air is a material and that it is one of a range of gases which have important uses
- recognise that gases flow from place to place
- know that gases can be easily compressed
- describe the differences between solids and liquids
- *describe the behaviour and properties of gases*
- compares simple solids and liquids (e.g. in terms of ease of squashing or pouring)
- **compare and group materials together, according to whether they are solids, liquids or gases**
- *make clear distinctions between the properties of solids, liquids and gases*
- *explain why granular solids have some of the properties associated with liquids*
- *explain why some substances are hard to classify as solids, liquids and gases (e.g. whipped cream, mousse, mayonnaise, muddy water, fizzy drinks, cornflour and water)*
- observe what happens to a variety of materials when they are heated (e.g. chocolate, ice cream, butter, water)
- identify a wide range of contexts in which changes of state take place describe a few examples where these changes occur
- recognise that for a substance to be detected by smell, some of it must be in the gas state
- **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)**
- *compare the boiling point of different liquids*
- state that ice, water and steam are the same material

- identify the processes of melting, freezing, evaporation and condensation
- describe what happens to water when it is heated and cooled
- recognise that these processes can be reversed
- describe how when ice melts it turns to liquid and how when water freezes it becomes ice
- describe how these processes can be reversed
- describe how liquids evaporate to form gases and how gases condense to form liquids
- sequence the changes that happen in the water cycle
- describe the water cycle in terms of these processes
- explain the relationship between liquids and solids in terms of melting and freezing
- explain the relationship between liquids and gases in terms of evaporation and condensation
- **identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature**
- know that temperature can affect the rate of evaporation or condensation
- describe the effect of temperature on evaporation
- explain how changing conditions affects processes such as evaporation and condensation
- identify a range of contexts in which changes take place (e.g. evaporation of puddles in the school playground or from clothes on a washing line, condensation in the bathroom)
- *explore the effect of salt on ice and explain why salt is put on the roads in winter*

Sound and Vibrations

Previous Learning:
Year 3: Light and Shadow
EYFS: UTW: Light and Sound

Vocabulary
Sound, pitch, volume, vibrations, medium, insulation, travel, instrument

Future Learning:
Year 5: Sound and vibrations
Year 5: Light

- recognise and describe many sounds and sound sources
- state that they hear sounds through their ears
- recognise that when sounds are generated by objects, something moves or vibrates
- **identify how sounds are made, associating some of them with something vibrating**
- identify what is vibrating in a range of musical instruments
- generalise that sounds are produced when objects vibrate
- describe how sounds are generated by specific objects
- suggest ways of producing sounds
- **recognise that vibrations from sounds travel through a medium to the ear**
- *recognise that sounds travel through solids, water and air*
- *explore how sound travels through a variety of materials*
- distinguish between pitch and volume (loudness)
- describe differences in pitch and volume
- **find patterns between the pitch of a sound and features of the object that produced it**
- know that altering vibrations alters the pitch or volume
- *describe ways in which the pitch of a sound made by a particular instrument or vibrating object can be raised or lowered*
- *generalise the effects of changes on sound (e.g. the tighter the tension the higher the pitch)*
- explore how to vary the pitch and volume of sounds from a variety of objects or instruments
- **find patterns between the volume of a sound and the strength of the vibrations that produced it**

- suggest how to change the loudness of the sounds produced by a range of musical instruments
- **recognise that sounds get fainter as the distance from the sound source increases**
- describe what they observe when they move further away from a source of sound
- *group instruments independently by the way sounds are produced*
- *identify suitable materials to use for sound insulation*
- *recognise that sound can be reflected from a surface which can cause an echo*
- *describe how some animals use echo-location*

Teeth and Digestion

Previous Learning:
Year 3: Healthy Eating and Healthy Bodies
Year 2: Growth and Survival
Year 1: Different Animals
EYFS: UTW: Animals, Humans and Habitats

Vocabulary
Teeth and eating: incisor, molar, canine, diet, decay, healthy, teeth, acids, sugars, mouth, rip, tear, chew, grind
Digestive system: saliva tongue, toilet waste, nutrients energy, stomach, large/small intestine, brain, lungs, movement, acids, urine, faeces, oesophagus

Future Learning:
Year 5: Human Life Cycles
Year 6: Humans and Health

- identify a wider range of body parts, including some internal organs (large intestine, small intestine, brain, lungs, heart, stomach, oesophagus)
- locate and name the different organs in the digestive system
- describe the role of each organ in the digestive system
- **describe the simple functions of the basic parts of the digestive system in humans**
- *explain why food needs to be broken down*
- recognise they need to take care of their teeth
- name the different types of teeth
- describe the role of each type of teeth in digestion
- **identify the different types of teeth in humans and their simple functions**
- explain how they should look after their teeth and recognise why they need to do so
- *explain why dentists are concerned about the amount of sugar children have*
- state that animals have different diets and may have different kinds of teeth
- *explain how fossilised teeth give us clues about an animals' diet*
- *explain why the teeth of certain types of animals need to be different*
- *explain why humans do not have a full set of adult teeth at birth*

Classification and Interdependence Inc. Food Chains

Previous Learning:
Year 2: Habitats
Year 1: Seasonal Changes
EYFS: UTW: Animals, Humans and Habitats

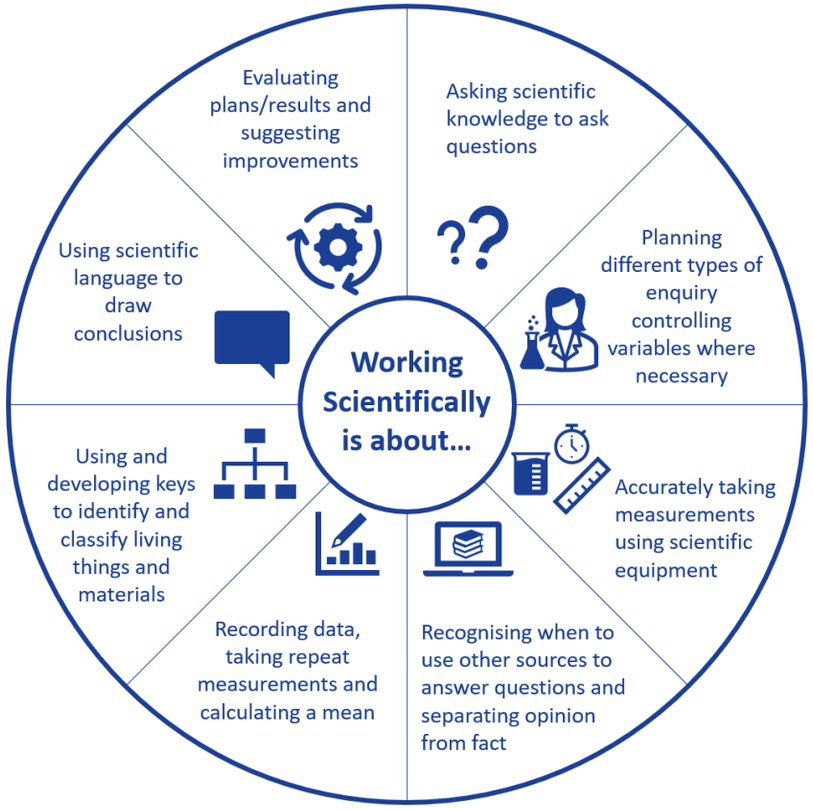
Vocabulary
Predator, prey, producer, river, ocean, desert, arctic, rainforest, mountain, farmland, wood, dry, wet, vegetation, shelter, vertebrate, invertebrate, classify, characteristic, flowering plant, non-flowering plant (fern, moss)

Future Learning:
Year 5: Life Cycles
Year 6: Classification, Evolution and Inheritance

- **explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment**
- **recognise that living things can be grouped in a variety of ways**
- explore ways of grouping living things including animals and plants (flowering and non-flowering)
- recognise that animals can be grouped into vertebrates and invertebrates
- describe some of the characteristics of the vertebrate (fish, mammals, amphibians, reptiles and birds) groups (e.g. warm-blooded, have fur, lay eggs)
- group animals into vertebrate (fish, mammals, amphibians, reptiles and birds) and invertebrates groups (snails, slugs, spiders, worms and insects)
- *explain why some animals are hard to classify (e.g. platypus, echidna, bat, flightless birds)*
- identify that some animals feed on other animals and some on plants
- represent feeding relationships with simple food chains
- recognise that a food chain must always start with a green plant (a producer)
- represent feeding relationships within a habitat with food chains beginning with a green plant which 'produces' food for the other organisms
- recognise that green plants are the ultimate source of food for all animals
- use and understand the terms: producer, predator and prey
- **construct and interpret a variety of food chains, identifying producers, predators and prey** (Teacher Note: statement moved from NC 'Animals including humans' to improve progression within topics)
- *use food chains to predict what might happen to the numbers of an organism if there are suddenly more predators or less prey*
- know the function of some of the more complex features which aid survival in specific habitats (e.g. gills, blubber, camouflage)
- describe why different animals and plants live in different habitats
- **recognise that environments can change and that this can sometimes pose dangers to living things**
- describe how humans can cause changes to environments
- *explain why it is necessary to use a reasonably large sample when investigating the preferences of small invertebrates*
- explain that different organisms are found in different habitats because of differences in environmental factors
- *describe how humans have negatively impacted environments*

Year 5 Science Curriculum Map

This has been designed to help teachers identify the steps in progression within each topic in order for children to achieve the **broad National Curriculum objectives (shown in bold).** It also aims to guide teachers in how to enrich each topic with objectives which *go beyond these statements (shown in italics).*



Life Cycles

Previous Learning:
Year 2: Habitats
Year 1: Seasonal Changes
EYFS: UTW: Animals, Humans and Habitats

Vocabulary
Live young, hatch, tadpole, caterpillar, butterfly, ladybird, pupae, larvae, chrysalis, reproduction, asexual, sexual, life cycle, pollination, seed dispersal, pollen, stamen, stigma

Future Learning:
Year 5: Life Cycles
Year 6: Classification, Evolution and Inheritance

- sequence the life cycles of a variety of plants and animals
- recognise the similarities in the life cycles of plants, animals and humans
- **describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird**
- name the parts of a flower
- describe the functions of some parts of a flower
- describe the main functions of parts of a plant involved in reproduction
- describe the processes of sexual and asexual reproduction in plants
- **describe the life process of reproduction in some plants and animals**
- compare methods of seed dispersal
- know that most animals reproduce by sexual reproduction
- *compare internal and external fertilisation in animals*
- *explain that living things need to reproduce if the species is to survive*
- *compare gestation periods (pregnancy) of different animals*
- *explain what is unusual about the life cycle of a kangaroo or koala*

Human Life Cycles

Previous Learning:
Year 4: Teeth & Digestion
Year 3: Healthy Eating and Healthy Bodies
Year 2: Growth and Survival
Year 1: Different Animals

Vocabulary
New born, infant, child, teenager, puberty, adult, wrinkles, grey hair, height, weight

Future Learning:
Year 6: Humans and Health

- **describe the changes as humans develop to old age**
- identify ways in which the appearance of humans changes as they get older
- identify some characteristics that will not change with age
- recognise stages in growth and development of humans including puberty

Note: This could be taught with living things and their habitats unit Life Cycles

Changes of materials

Previous Learning:
Year 4: Solids, Liquids and Gasses
Year 3:Rocks, Fossils and Soils
Year 2: Use of Everyday Materials
Year 1: Everyday Materials
EYFS: UTW: Materials

Vocabulary
Hardness, solubility, transparency, conductivity, thermal, insulation, dissolve, solution, separation, polymers, reversible, irreversible, evaporating, melting, evaporation, filtering, sieving, , dissolving, burning, rusting, vinegar, bicarbonate of soda, magnetism, insulators, conductors, soluble, insoluble

- observe and explore the properties of materials (e.g. hardness, transparency, magnetism, electrical and thermal conductivity)
- identify some materials that are good thermal insulators and some everyday uses of these
- recognise that metals are both good thermal and good electrical conductors
- suggest why particular materials are used for different jobs depending on their 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**
- *describe the properties of new materials (e.g. aerogel, silly putty, wrinkle-free cotton)*
- *explain why some materials are good thermal insulators*
- recognise that salt or sugar dissolves in water but sand won't
- name some materials that will and some that will not dissolve in water
- recognise that although it is not possible to see a dissolved solid, it remains in the solution
- describe melting and dissolving and give everyday examples of each
- *describe the difference between melting and dissolving*
- identify and explore factors that affect the rate at which a solid dissolves
- recognise that an undissolved solid can be separated from a liquid by filtering
- recognise that a solid can be recovered from a solution by evaporation
- describe the properties of mixtures which can be separated by filtration
- describe some methods that are used to separate simple mixtures
- explain that when solids dissolve they break up so small they can pass through the holes in the filter paper
- **know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution**
- use knowledge about how a specific mixture can be separated to suggest ways in which other similar mixtures might be separated
- **use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating**
- *recognise that inks and dyes are often mixtures of different colours and these can be separated by chromatography*
- *explain why ink or dye moves up the paper in chromatography*
- recognise that dissolving is a reversible change
- recognise that some changes can be reversed and some cannot
- recognise that changes of state are reversible
- **demonstrate that dissolving, mixing and changes of state are reversible changes**
- observe and explore a variety of chemical changes (e.g. burning)
- identify whether some changes are reversible or not
- recognise dissolving as reversible
- classify some changes as reversible (e.g. dissolving) and others as irreversible (e.g. burning)
- recognise that irreversible changes often make new and useful materials
- recognise the hazards of burning materials
- describe what happens when acid and bicarbonate of soda are mixed
- **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**
- explain that in some cases the new materials made are gases and identify some evidence for the production of gases (e.g. vigorous bubbling)

Earth and Space

Previous Learning:
Year 3 Forces and Magnets
EYFS: UTW: Push and Pull

Vocabulary
Earth, Sun, planet, Mercury, Venus, Mars, Jupiter, Moon, Saturn, Uranus, Neptune, solar system, spherical, moon, day and night, celestial body, rotation, hemisphere, orbit, gravity, shadow, daylight

- identify and name the components of the solar system (i.e. Sun, Moon, Earth and other planets)
- locate the Sun, Earth and other planets in the solar system
- recognise that the Earth and other planets orbit the Sun
- recall that the Earth takes one year to orbit the Sun
- recall that the Earth rotates on its' axis and this takes one day
- **describe the movement of the Earth, and other planets, relative to the Sun in the solar system**
- *use simple physical models to explain effects that are caused by the movement of the Earth*
- *recognise that the Moon orbits the Earth*
- *explain that gravity is a force of attraction and it is what holds the planets in orbit around the Sun and the Moon in orbit around the Earth*
- **describe the movement of the Moon relative to the Earth**
- *explain that the changes in the appearance of the Moon over a period of 28 days arise from the Moon orbiting the Earth once every 28 days*
- **describe the Sun, Earth and Moon as approximately spherical bodies**
- recognise that the Earth, Sun and Moon are spherical and support this with some evidence
- recognise that it is daylight in the part of the Earth facing the Sun
- recall that a shadow from the Sun changes over the course of a day
- explore and describe how a shadow from the Sun changes over the course of a day
- explain in terms of the rotation of the Earth why shadows change and the Sun appears to move across the sky during the course of the day
- **use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky**
- explain why it is night time in Australia when it is day time in England
- *explain how ideas about the solar system have changed over time*

Forces

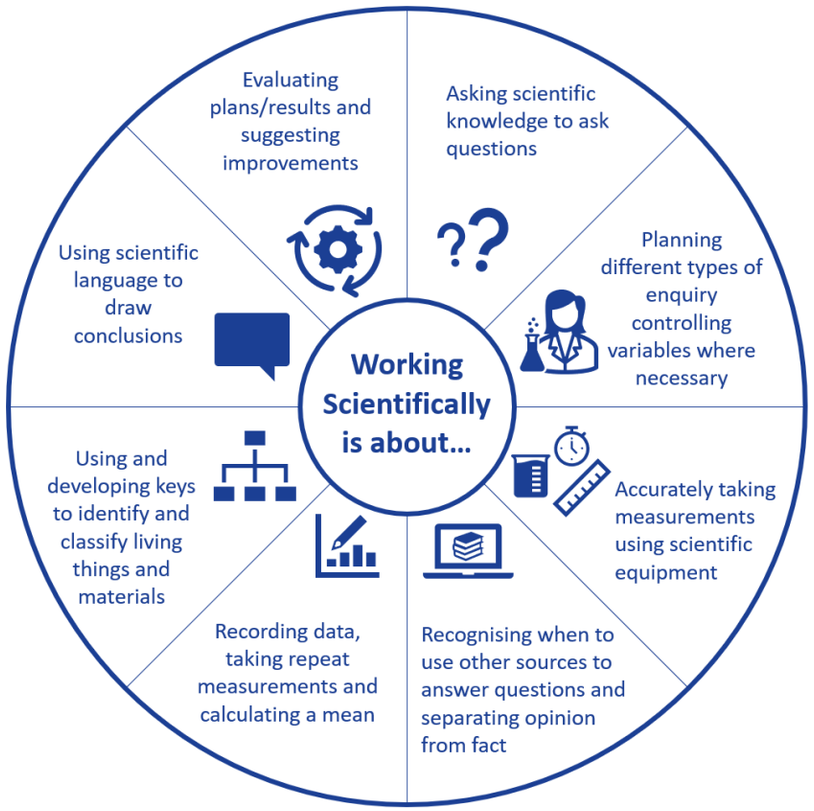
Previous Learning:
Year 3 Forces and Magnets
EYFS: UTW: Push and Pull

Vocabulary
force, air resistance, water resistance, magnetic attraction, gravitational attraction, direction, force, motion, weight, upthrust, Newton, forcemeter, stationary, surface area, force applied, pulley, lever, gear

- identify weight as a force
- identify that force is measured in Newtons
- name simple forces such as gravity, friction and air resistance
- recognise that more than one force can act on an object
- draw force diagrams with arrows showing the direction of forces acting on an object
- observe and explore the effect of several forces on objects
- recognise that air resistance slows things down
- recognise that friction can be useful or not useful **identify the effects of air resistance, water resistance and friction, that act between moving surfaces**
- describe some situations in which there is more than once force acting on an object
- describe and explain the motion of some familiar objects in terms of several forces acting on them
- identify forces on an object as either balanced or unbalanced
- use the terms 'balanced' and unbalanced' when describing several forces on an object
- explain that balanced forces on an object cause it to remain stationary or travel at the same speed
- explain that unbalanced forces on an object cause it to speed up, change shape or slow down
- **explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object**
- understand that air resistance is the frictional force of air on objects moving through it
- describe some of the factors that increase friction between solid surfaces and increase air and water resistance
- describe situations in which frictional forces are helpful as well as those in which frictional forces are unhelpful
- *compare the tread on bicycle tyres according to how much friction they need*
- *identify streamlined objects and describe why they have been designed in this way (e.g. cycling helmets, formula 1 cars, dolphins)*
- explore the effects of levers, pulleys and gears
- **recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect**
- *describe how levers, pulleys and gears are used in everyday life (e.g. describe how having gears can make it easier to pedal a bike, how a bottle opener makes it easier to open a bottle lid)*
- *explain how introducing gears onto bikes has changed cycling*

Year 6 Science Curriculum Map

This has been designed to help teachers identify the steps in progression within each topic in order for children to achieve the **broad National Curriculum objectives (shown in bold).** It also aims to guide teachers in how to enrich each topic with objectives which *go beyond these statements (shown in italics).*



Humans and Health

Previous Learning:

Year 5: Human Life Cycles
Year 4: Teeth and Digestion
Year 3: Healthy Eating and Healthy Bodies
Year 2: Growth and Survival
Year 1: Different Animals
EYFS: UTW: Animals, Humans and Habitats

Vocabulary

Heart, veins, arteries, capillaries, blood, pulse, beats, oxygen, carbon dioxide nutrients, organs, drugs, medicines, minerals, vitamins, lungs, caffeine, medical, legal, illegal, urine, faeces, oesophagus

- identify and name the parts of the circulatory system
- know that the heart is made of muscle
- describe what the heart and blood vessels do
- **identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood**
- state how to measure pulse rate
- recognise that pulse rate is a measure of how fast the heart is beating
- discover that during exercise the heart beats faster to take blood more rapidly to the muscles
- make careful measurements of pulse rate
- describe the different functions of the blood (e.g. transporting and protecting)
- know that the blood comes from the heart in arteries and returns to the heart in veins
- know that blood carries oxygen and other essential materials around the body
- *explain how ideas about the circulatory system have changed over time*
- identify some of the harmful effects of smoking
- **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**
- recognise that care needs to be taken with medicines and that they can be dangerous
- give several reasons why it is sometimes necessary to take medicines
- identify some harmful effects of drugs
- identify food as a fuel for the body
- name the major groups into which food is categorised and identify sources for each group
- describe the main function of organs of the human body
- *explain the effect of diet on particular organs of the body/aspects of health*
- *explain the effect of exercise on particular organs of the body/aspects of health*
- *explain how ideas about smoking have changed over time*
- *explain why advice on diet changes (e.g. butter vs margarine, five a day, tax on sugary drinks)*

Classification, Evolution & Inheritance

Previous Learning:

Year 5: Life Cycles
Year 4: Classification and Interdependence inc. Food Chains
Year 2: Habitats
Year 1: Seasonal Changes
EYFS: UTW: Animals, Humans and Habitats

Vocabulary

Micro-organism, microbe, fungus, bacteria, virus, classified, classification key, yeast, characteristic, microscope, variety, variation, offspring, species, competition, adapt, adaptation, reproduce, survive, evolve, fossil record, gills, blubber, moulting, long neck, hooves, eyelashes, tails, generation

- recognise that there is a wide variety of living things
- understand why classification is important
- identify vertebrates and invertebrates
- name and describe the five vertebrate groups
- **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**
- *devise own keys to classify organisms and objects*
- **give reasons for classifying plants and animals based on specific characteristics**
- *describe early ideas about classification (e.g. Aristotle)*
- understand there are living things that are too small to be seen and these can affect our lives
- recognise that there are many micro-organisms, some which can cause illness or decay
- recognise that there are useful micro-organisms which can be used in food production
- describe how micro-organisms feed, grow and reproduce like other organisms
- describe evidence, from investigations, that yeast is living
- explain how micro-organisms can move from one food source to another or from one animal to another
- *compare the rate of reproduction in microorganisms to other animals*
- *describe how the development of the microscope has contributed to our understanding of microorganisms*
- *describe how ideas about hygiene have changed over time (e.g. Semmelweis)*

- recognise variation in different species (e.g. dogs, horses)
- recognise that offspring have some of the features of their parents
- **recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents**
- recognise that animals have to compete for food
- describe how animals avoid predators (e.g. speed, camouflage)
- describe how animals and plants are adapted to their environments
- **identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution**
- explain how being well adapted to an environment means an organism is more likely to survive
- *explain that animals which are better adapted to an environment are more likely to survive, reproduce and pass on characteristics to their offspring meaning the animal species will gradually change and evolve (giraffe with the tallest neck could reach more leaves to feed on)*
- **recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago**
- explain why we do not have a complete fossil record
- *describe the story of the peppered moth and how this provides evidence for natural selection*
- *explain how antibiotic resistant bacteria provide evidence for natural selection*
- *explain why we can see evidence for natural selection in fast reproducing organisms like bacteria (e.g. antibiotic resistant bacteria and pesticide resistant insects)*
- *explain how the introduction of a new species to an isolated environment can effect native species (e.g. Dodo, Kakapo or Stephen's island wren)*
- *compare the ideas of Darwin and Lamarck on evolution*

Electricity

Previous Learning:

Year 4: Circuits and Components
UTW: Electricity and Batteries

Vocabulary

Voltage, current, series, component, circuit, conductor, positive/negative terminal, complete circuit, battery, cell

- know that the 'amount' of electricity (voltage) depends on the number of batteries
- construct some working series circuits with specified components
- recognise conventional circuit symbols
- **use recognised symbols when representing a simple circuit in a diagram**
- draw circuit diagrams and construct circuits from diagrams using conventional symbols
- explore how to change the brightness of bulbs and the volume of a buzzer
- describe ways of changing the brightness of a bulb in a circuit or the volume of a buzzer
- compare different circuits (e.g. for brightness of bulb)
- recall that the amount of electricity is measured in voltage
- **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**
- *explore the thickness of a wire in a circuit*
- *describe the differences between wires usually used for circuits and fuse wires*
- *describe what would happen if all the lights in a home were connected in the same circuit and one broke*
- *explain the current in circuits using simple models and analogies (e.g. piped water, bicycle chain, children and sweets)*

Light

Previous Learning:

Year 4: Sound and vibrations
Year 3: Light and Shadow
EYFS: UTW: Light and Sound

Vocabulary

Reflection, transparent, translucent, opaque, periscope, luminous, absorb, direction

- explore how light travels using torches and periscopes
- **recognise that light appears to travel in straight lines**
- describe reflection as light 'bouncing off' objects
- understand that in order to be seen, all non-luminous objects must reflect light
- diagrammatically represent light from sources and bouncing off reflective surface using arrows
- **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**
- draw diagrams to illustrate how light is travelling from the source to the eye
- **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**
- describe a variety of ways of changing the size of the shadow produced by an object
- describe the relationship between the size of a shadow and the distance between the light source and an object
- diagrammatically represent the formation of shadows using arrow convention
- **use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them**
- *know that, when sunlight passes through some objects, coloured light is produced (for example in rainbows, soup bubbles and prisms)*
- *describe how curved mirrors distort a reflection*

POK: Animals including humans

EYFS: Animals, Humans and Habitats

Vocabulary

Animal, head, legs, arms, knee, elbow, neck, face, feet, hands, bread, potatoes, apples, cereals, rice, meat, fish, milk, running, jumping, swimming, walking, chicken, hen, kitten, cat, puppy, dog, duckling, duck

- identify something as an animal
- name some places animals live
- identify and locate parts of their body
- identify and locate parts of animals bodies
- use their observations to describe humans and other animals
- name a very limited range of food
- can identify types of exercise
- name baby, child, adult and the young of some other animals

Year 1: Different Animals

Vocabulary

Body parts: eyes, ears, elbows, hair, mouth, nose, teeth, paw, hoof, tail, fin, shell, skin, wings, beak, fur, scales, feathers
Fish: goldfish, tuna, salmon
Birds: blackbird, magpie, robin, sparrow, crow, swan.
Reptiles: snake, lizard, tortoise
Mammals: mouse, horse, cow, sheep, hamster, rabbit
Amphibians: frog, toad, newt
Senses: feel, hear, smell, see, taste, touch Carnivore, omnivore, herbivore

- identify and name a selection of animals • identify and sort animals into different groups
- name the different groups of animals
- **identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals**
- make observations of animals
- know that animals eat different types of food
- identify the food of some common animals
- recall and use the words: carnivore, herbivore and omnivore
- **identify and name a variety of common animals that are carnivores, herbivores and omnivores**
- *group animals that belong to: carnivores, herbivores and omnivores*
- use their observations to point out differences between humans and other animals and between animals and non-living things
- **describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets)**
- identify and locate the sense organs
- use senses to describe textures, sounds and smells
- compare differences in texture, sounds and smells
- name and locate the basic parts of the human body
- draw and label a simple body outline
- *describe differences between the different animal groups (e.g. birds have feathers but mammals have fur)*
- *identify animals which are more likely to be seen in different seasons*
- *explain why some animals are only seen at night*

Year 2: Growth and Survival

Vocabulary

Baby, toddler, adult, eggs, fruit, vegetables, water, fibre, meat, fish, cheese, beans, washing, exercise, diet, offspring

- recognise that animals produce young
- **notice that animals, including humans, have offspring which grow into adults**
- recognise changes that take place as animals get older
- explain that adult animals no longer grow
- describe some differences they observe between babies and toddler
- make comparisons of the differences they observe between babies and toddlers
- identify the offspring of a selection of different animals
- *use evidence to show that adult animals no longer grow*
- *use evidence to show that children of the same age are not all the same size*
- *use evidence to show that older children are generally taller than younger children*
- **find out about and describe the basic needs of animals, including humans, for survival (water, food and air)**
- *explain how to look after a pet describing what it needs to survive*
- **describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene**
- recognise that exercise is important
- name some types of food
- identify some types of food that make up their diet and name some examples of each
- recognise that an adequate diet and exercise are necessary for them to grow and stay healthy
- describe some of the types of food that they eat

Year 3: Healthy Eating and Healthy Bodies

Vocabulary

Balanced diet, carbohydrates, protein, fats, fibre, fruit and vegetables, bones, muscles, femur, ribs, spine, tibia, shoulder blade, hollow, relax and contract, protect, support, internal skeleton, exoskeleton

- identify some foods needed for a healthy and varied diet
- name the components of a healthy and varied diet
- describe how their diet is balanced
- **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**
- *describe the role of different food groups*
- *compare and contrast diets of animals including pets*
- *describe an adequate and varied diet for humans, recognising that there are many ways of achieving this*
- know they have bones and muscles in their body

Year 3: Healthy Eating and Healthy Bodies Continued

- state that they and other animals have skeletons
- identify animals that do not have an internal skeleton (invertebrates)
- group animals with and without an internal skeleton
- *describe some advantages of having an internal skeleton over no skeleton or an exoskeleton*
- describe some observable characteristics of bones
- describe the main functions of their skeletons
- state that movement depends on both skeleton and muscles
- state that when one muscle contracts another relaxes
- **identify that humans and some other animals have skeletons and muscles for support, protection and movement**
- recognise that their skeletons grow as they grow
- *describe problems associated with broken bones or bones diseases*

Year 4: Teeth and Digestion

Vocabulary

Teeth and eating: incisor, molar, canine, diet, decay, healthy, teeth, acids, sugars, mouth, rip, tear, chew, grind
Digestive system: saliva tongue, toilet waste, nutrients energy, stomach, large/small intestine, brain, lungs, movement, acids, urine, faeces, oesophagus

- identify a wider range of body parts, including some internal organs (large intestine, small intestine, brain, lungs, heart, stomach, oesophagus)
- locate and name the different organs in the digestive system
- describe the role of each organ in the digestive system
- **describe the simple functions of the basic parts of the digestive system in humans**
- *explain why food needs to be broken down*
- recognise they need to take care of their teeth
- name the different types of teeth
- describe the role of each type of teeth in digestion
- **identify the different types of teeth in humans and their simple functions**
- explain how they should look after their teeth and recognise why they need to do so
- *explain why dentists are concerned about the amount of sugar children have*
- state that animals have different diets and may have different kinds of teeth
- *explain how fossilised teeth give us clues about an animals' diet*
- *explain why the teeth of certain types of animals need to be different*
- *explain why humans do not have a full set of adult teeth at birth*

Further Animals including Humans work links to Living things and their habitats

Year 5: Human Life Cycles

Vocabulary

New born, infant, child, teenager, puberty, adult, wrinkles, grey hair, height, weight

- **describe the changes as humans develop to old age**
- identify ways in which the appearance of humans changes as they get older
- identify some characteristics that will not change with age
- recognise stages in growth and development of humans including puberty

Year 6: Humans and Health

Vocabulary

Heart, veins, arteries, capillaries, blood, pulse, beats, oxygen, carbon
dioxide nutrients, organs, drugs, medicines, minerals, vitamins, lungs, caffeine, medical, legal, illegal, urine, faeces, oesophagus

- identify and name the parts of the circulatory system
- know that the heart is made of muscle
- describe what the heart and blood vessels do
- **identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood**
- state how to measure pulse rate
- recognise that pulse rate is a measure of how fast the heart is beating
- discover that during exercise the heart beats faster to take blood more rapidly to the muscles
- make careful measurements of pulse rate
- describe the different functions of the blood (e.g. transporting and protecting)
- know that the blood comes from the heart in arteries and returns to the heart in veins
- know that blood carries oxygen and other essential materials around the body
- *explain how ideas about the circulatory system have changed over time*
- identify some of the harmful effects of smoking
- **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**
- recognise that care needs to be taken with medicines and that they can be dangerous
- give several reasons why it is sometimes necessary to take medicines
- identify some harmful effects of drugs
- identify food as a fuel for the body
- name the major groups into which food is categorised and identify sources for each group
- describe the main function of organs of the human body
- *explain the effect of diet on particular organs of the body/aspects of health*
- *explain the effect of exercise on particular organs of the body/aspects of health*
- *explain how ideas about smoking have changed over time*
- *explain why advice on diet changes (e.g. butter vs margarine, five a day, tax on sugary drinks)*

POK: Living things and their habitats

EYFS: Animals, Humans and Habitats

Vocabulary

Animal, head, legs, arms, knee, elbow, neck, face, feet, hands, bread, potatoes, apples, cereals, rice, meat, fish, milk, running, jumping, swimming, walking, chicken, hen, kitten, cat, puppy, dog, duckling, duck

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- identify and locate parts of animals bodies
- use their observations to describe humans and other animals
- name a very limited range of food
- can identify types of exercise
- name baby, child, adult and the young of some other animals

Year 1: Seasonal Changes

Vocabulary

Seasons: Autumn, Spring, Summer, Winter, deciduous, evergreen, shoot, fruit, earth, seeds, leaves, flowers, weather types: rain, hail, snow, ice, frost, sun, showers, wind, reproduce, babies/adults, life cycles, birds, insects, cold, warm, hot, sunrise, sunset

- **observe changes across the four seasons**
- identify what to observe
- use descriptive words, photos and pictures to record changes
- collect evidence of changes (e.g. leaves, seeds, flowers)
- name the four seasons
- recall simple changes associated with each season
- observe and name types of weather (e.g. rain, sun, wind, clouds)
- **observe and describe weather associated with the seasons and how day length varies**
- identify what to measure about the weather
- use prepared tables and charts to record data
- *use secondary data to describe weather in another setting*
- *explain why animals are easier to spot at different times of year (e.g. migrating birds, hibernating animals)*

Year 2: Habitats

Vocabulary

Dead, alive, living, non-living, habitats, keys, breathe, grow, eat, have babies, move, sense, go to the toilet, habitat, microhabitat, food chain

- with help, use keys to identify some animals and plants
- recognise that different plants live in the local environment
- identify some local habitats
- describe the simple features of habitats
- recognise a microhabitat as a small habitat (e.g. leaf litter, woodlice under stones)
- describe some microhabitats
- **identify and name a variety of plants and animals in their habitats, including micro-habitats**
- recognise similarities and differences between plants and animals

- **explore and compare the differences between things that are living, dead, and things that have never been alive**
- explain differences between living and non-living things in terms of characteristics such as movement and growth
- use their observations to point out differences between animals, plants and non-living things
- recognise that plants provide food for humans and other animals within an environment
- construct a simple food chain (e.g. grass, cow, human)
- **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**
- name a few of the organisms that live in a particular habitat
- suggest reasons why different plants and animals are found in the different environments
- **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**
- *compare animals found in familiar habitats with unfamiliar habitats*
- *compare plants found in familiar habitats with unfamiliar habitats*
- *use different factors to compare a range of habitats (e.g. water, light, temperature)*

Year 4: Classification and Interdependence Inc. Food Chains

Vocabulary

Predator, prey, producer, river, ocean, desert, arctic, rainforest, mountain, farmland, wood, dry, wet, vegetation, shelter, vertebrate, invertebrate, classify, characteristic, flowering plant, non-flowering plant (fern, moss)

- **explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment**
- **recognise that living things can be grouped in a variety of ways**
- explore ways of grouping living things including animals and plants (flowering and non-flowering)
- recognise that animals can be grouped into vertebrates and invertebrates
- describe some of the characteristics of the vertebrate (fish, mammals, amphibians, reptiles and birds) groups (e.g. warm-blooded, have fur, lay eggs)
- group animals into vertebrate (fish, mammals, amphibians, reptiles and birds) and invertebrates groups (snails, slugs, spiders, worms and insects)
- *explain why some animals are hard to classify (e.g. platypus, echidna, bat, flightless birds)*
- identify that some animals feed on other animals and some on plants
- represent feeding relationships with simple food chains
- recognise that a food chain must always start with a green plant (a producer)
- represent feeding relationships within a habitat with food chains beginning with a green plant which 'produces' food for the other organisms

Year 4: Classification and Interdependence Inc. Food Chains continued

- recognise that green plants are the ultimate source of food for all animals
- use and understand the terms: producer, predator and prey
- **construct and interpret a variety of food chains, identifying producers, predators and prey** (Teacher Note: statement moved from NC 'Animals including humans' to improve progression within topics)
- *use food chains to predict what might happen to the numbers of an organism if there are suddenly more predators or less prey*
- know the function of some of the more complex features which aid survival in specific habitats (e.g. gills, blubber, camouflage)
- describe why different animals and plants live in different habitats
- **recognise that environments can change and that this can sometimes pose dangers to living things**
- describe how humans can cause changes to environments
- *explain why it is necessary to use a reasonably large sample when investigating the preferences of small invertebrates*
- explain that different organisms are found in different habitats because of differences in environmental factors
- *describe how humans have negatively impacted environments*

Year 5: Life Cycles

Vocabulary

Live young, hatch, tadpole, caterpillar, butterfly, ladybird, pupae, larvae, chrysalis, reproduction, asexual, sexual, life cycle, pollination, seed dispersal, pollen, stamen, stigma

- sequence the life cycles of a variety of plants and animals
- recognise the similarities in the life cycles of plants, animals and humans
- **describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird**
- name the parts of a flower
- describe the functions of some parts of a flower
- describe the main functions of parts of a plant involved in reproduction
- describe the processes of sexual and asexual reproduction in plants
- **describe the life process of reproduction in some plants and animals**
- compare methods of seed dispersal
- know that most animals reproduce by sexual reproduction
- *compare internal and external fertilisation in animals*
- *explain that living things need to reproduce if the species is to survive*
- *compare gestation periods (pregnancy) of different animals*
- *explain what is unusual about the life cycle of a kangaroo or koala*

Year 6: Classification, Evolution & Inheritance

Vocabulary

Micro-organism, microbe, fungus, bacteria, virus, classified, classification key, yeast, characteristic, microscope, variety, variation, offspring, species, competition, adapt, adaptation, reproduce, survive, evolve, fossil record, gills, blubber, moulting, long neck, hooves, eyelashes, tails, generation

- recognise that there is a wide variety of living things
- understand why classification is important
- identify vertebrates and invertebrates
- name and describe the five vertebrate groups
- **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**
- *devise own keys to classify organisms and objects*
- **give reasons for classifying plants and animals based on specific characteristics**
- *describe early ideas about classification (e.g. Aristotle)*
- understand there are living things that are too small to be seen and these can affect our lives
- recognise that there are many micro-organisms, some which can cause illness or decay
- recognise that there are useful micro-organisms which can be used in food production
- describe how micro-organisms feed, grow and reproduce like other organisms
- describe evidence, from investigations, that yeast is living
- explain how micro-organisms can move from one food source to another or from one animal to another
- *compare the rate of reproduction in microorganisms to other animals*
- *describe how the development of the microscope has contributed to our understanding of microorganisms*
- *describe how ideas about hygiene have changed over time (e.g. Semmelweis)*

- recognise variation in different species (e.g. dogs, horses)
- recognise that offspring have some of the features of their parents
- **recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents**
- recognise that animals have to compete for food
- describe how animals avoid predators (e.g. speed, camouflage)
- describe how animals and plants are adapted to their environments
- **identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution**
- explain how being well adapted to an environment means an organism is more likely to survive
- *explain that animals which are better adapted to an environment are more likely to survive, reproduce and pass on characteristics to their offspring meaning the animal species will gradually change and evolve (giraffe with the tallest neck could reach more leaves to feed on)*
- **recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago**
- explain why we do not have a complete fossil record
- *describe the story of the peppered moth and how this provides evidence for natural selection*
- *explain how antibiotic resistant bacteria provide evidence for natural selection*
- *explain why we can see evidence for natural selection in fast reproducing organisms like bacteria (e.g. antibiotic resistant bacteria and pesticide resistant insects)*
- *explain how the introduction of a new species to an isolated environment can effect native species (e.g. Dodo, Kakapo or Stephen's island wren)*
- *compare the ideas of Darwin and Lamarck on evolution*

R Animals, Humans and Habitats

1 Seasonal Changes

2 Habitats

3

4 Classification and Interdependence Inc. Food Chains

5 Life Cycles

6 Classification, Evolution and Inheritance

POK: Materials

EYFS: Materials

- make observations of common objects
- make very simplistic observations of materials
- arrange materials into groups
- identify when changes occur e.g. when food is cooked

Year 1: Everyday materials

Vocabulary

Hard, stiff, rough, not bendy, opaque, strong, soft, shiny, smooth, waterproof, stretchy, material, transparent, dull, bendy, absorbent, wood, plastic, glass, magnetic, elastic, fabric, metal, water, rock,

- name some common materials
- name some common objects around the school and home
- **distinguish between an object and the material from which it is made**
- *name materials which have lots of different uses (e.g. paper- wrapping paper, tissue paper, writing paper, birthday card)*
- identify some naturally occurring materials: wood, rock, water
- identify some man-made materials: glass, metal, plastic
- **identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock**
- *describe objects that are made from lots of different materials*
- *names objects that are sometimes made from different materials (e.g. spoons plastic, wooden, metal)*
- make observations of common objects and the different materials they are made of
- communicate these observations using descriptive words (e.g. bendy, rough, hard)
- identify some properties of materials (e.g. see through, waterproof, absorbent)
- **describe the simple physical properties of a variety of everyday materials**
- *make predictions about which materials will float and sink*
- **compare and group together a variety of everyday materials on the basis of their simple physical properties** (both visible and non-visible)
- *explain why people started using plastic bags rather than paper bags*

Year 2: Use of Everyday materials

Vocabulary

Brick, cardboard, transparent, waterproof, insulate, keep warm, hard, rigid, strong, flexible, squash, stretch, twist, bend

- identify uses of some common materials
- give a reason why a material is suitable for its job
- recognise that some materials will have more than one property which increases its suitability for its purpose (e.g. glass is transparent, rigid and weatherproof)
- **identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses**
- suggest several reasons why a material may or may not be suitable for a particular purpose
- *explain why one material may be more suitable for a purpose than another by discussing properties*
- *explain why plastics cause problems in the oceans*
- *explain the importance of reusing and recycling plastic*
- *describe how swimsuits have changed over time and how the fabric is now more suitable*
- *describe how scientists have invented new materials (e.g. Macintosh, Dunlop)*
- identify materials that can be easily changed with force
- identify materials that cannot be easily changed with force
- describe pushes and pulls needed to change a material as big or small
- **find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching**
- describe changes in shapes as a result of the action of pushes, pulls and twists
- *explain why some materials change shape when a force acts (i.e. push, pull, twist, stretch) as a result of their properties*

Year 3: Rocks, Fossils and Soils

Vocabulary

Rock, soil, marble, granite, sand, stone, slate, chalk, clay, texture, absorbed, permeable, pebble, characteristic, surface, organic, impermeable, crystal, grains, crumbly, igneous, sedimentary, metamorphic, fossil

- observe the characteristics of a variety of rocks
- name and describe the characteristics of several rocks
- identify fossils in rocks
- classify rocks from the evidence of investigations
- explain that rocks are used for different purposes dependent on their physical properties
- explain that different types of rock react differently to physical forces (e.g. water, rubbing)
- **compare and group together different kinds of rocks on the basis of their appearance and simple physical properties**
- understand that there are rocks under the Earths' surface
- *relate the simple physical properties of some rocks to their formation*
- *explain why certain rocks are used for different purposes and why some rocks could be used for these jobs for example: Marble- kitchen worktops or statues; Slate roof tiles; Granite walls*
- *explain how a model (e.g. biscuits, chocolate bars) can be used to represent sedimentary, metamorphic and igneous rocks*
- *explain why we might find lots of the same types of rock in one place*
- **describe in simple terms how fossils are formed when things that have lived are trapped within rock**
- *describe how Mary Anning discovered fossils*
- *explain why we do not see the soft parts of animals in fossils*
- recognise that soil is a mixture of different materials and living things
- recognise that soil contains dead plants and animals
- recognise that there is rock under all surfaces and that soils come from rocks
- **recognise that soils are made from rocks and organic matter**

Year 4: Solids, Liquids and Gasses

Vocabulary

Water, air, ice, milk, lemonade, juice, metal, solid, liquid, gas, pour, flow, change shape, squash, heat, cool, grain/granular, temperature, thermometer, freeze, melt, boil, evaporate, condense, steam, smoke, sea water, properties, melting point, degrees Celsius

- name some solids and liquids
- state that air is a gas
- state some differences between solids, liquids and gases
- recognise everyday substances as mixtures of solids, liquids and/or gases
- recognise that air is a material and that it is one of a range of gases which have important uses
- recognise that gases flow from place to place
- know that gases can be easily compressed
- describe the differences between solids and liquids
- *describe the behaviour and properties of gases*
- compares simple solids and liquids (e.g. in terms of ease of squashing or pouring)
- **compare & group materials together, according to whether they are solids, liquids or gases**
- *make clear distinctions between the properties of solids, liquids and gases*
- *explain why granular solids have some of the properties associated with liquids*
- *explain why some substances are hard to classify as solids, liquids and gases (e.g. whipped cream, mousse, mayonnaise, muddy water, fizzy drinks, cornflour and water)*
- observe what happens to a variety of materials when they are heated (e.g. chocolate, ice)
- identify a wide range of contexts in which changes of state take place describe a few examples where these changes occur

- recognise that for a substance to be detected by smell, some of it must be in the gas state
- **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)**
- *compare the boiling point of different liquids*
- state that ice, water and steam are the same material
- identify the processes of melting, freezing, evaporation and condensation
- describe what happens to water when it is heated and cooled
- recognise that these processes can be reversed
- describe how when ice melts it turns to liquid and how when water freezes it becomes ice
- describe how these processes can be reversed
- describe how liquids evaporate to form gases and how gases condense to form liquids
- sequence the changes that happen in the water cycle
- describe the water cycle in terms of these processes
- explain the relationship between liquids and solids in terms of melting and freezing
- explain the relationship between liquids and gases in terms of evaporation and condensation
- **identify the part played by evaporation & condensation in the water cycle & associate the rate of evaporation with temp.**
- know that temperature can affect the rate of evaporation or condensation
- describe the effect of temperature on evaporation
- explain how changing conditions affects processes such as evaporation and condensation
- identify a range of contexts in which changes take place (e.g. evaporation of puddles in the school playground or from clothes on a washing line, condensation in the bathroom)
- *explore the effect of salt on ice and explain why salt is put on the roads in winter*

Year 5: Changes of materials

Vocabulary

Hardness, solubility, transparency, conductivity, thermal, insulation, dissolve, solution, separation, polymers, reversible, irreversible, evaporating, melting, evaporation, filtering, sieving, , dissolving, burning, rusting, vinegar, bicarbonate of soda, magnetism, insulators, conductors, soluble/insoluble

- observe and explore the properties of materials (e.g. hardness, transparency, magnetism, electrical and thermal conductivity)
- identify some materials that are good thermal insulators and everyday uses of these
- recognise that metals are both good thermal and good electrical conductors
- suggest why particular materials are used for different jobs depending on their 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**
- *describe the properties of new materials (e.g. aerogel, silly putty, wrinkle-free cotton)*
- *explain why some materials are good thermal insulators*

- recognise that salt or sugar dissolves in water but sand won't
- name some materials that will and some that will not dissolve in water
- recognise that although it is not possible to see a dissolved solid, it remains in the solution
- describe melting and dissolving and give everyday examples of each
- *describe the difference between melting and dissolving*
- identify and explore factors that affect the rate at which a solid dissolves
- recognise that an undissolved solid can be separated from a liquid by filtering
- recognise that a solid can be recovered from a solution by evaporation
- describe the properties of mixtures which can be separated by filtration
- describe some methods that are used to separate simple mixtures
- explain that when solids dissolve they break up so small they can pass through the holes in the filter paper
- **know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution**
- use knowledge about how a specific mixture can be separated to suggest ways in which similar mixtures might be separated
- **use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating**
- *recognise that inks and dyes are often mixtures of different colours and these can be separated by chromatography*
- *explain why ink or dye moves up the paper in chromatography*
- recognise that dissolving is a reversible change
- recognise that some changes can be reversed and some cannot
- recognise that changes of state are reversible
- **demonstrate that dissolving, mixing and changes of state are reversible changes**
- observe and explore a variety of chemical changes (e.g. burning)
- identify whether some changes are reversible or not
- recognise dissolving as reversible
- classify some changes as reversible (e.g. dissolving) and others as irreversible (e.g. burning)
- recognise that irreversible changes often make new and useful materials
- recognise the hazards of burning materials
- describe what happens when acid and bicarbonate of soda are mixed
- **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**
- explain that in some cases the new materials made are gases and identify some evidence for the production of gases (e.g. vigorous bubbling)

Science

- Materials — R
- Everyday Materials — 1
- Use of Everyday Materials — 2
- Rocks, Fossils and Soils — 3
- Solids, Liquids and Gasses — 4
- Changes Of Materials — 5
- 6

POK: Light and sound

Light and Sound

Future Learning:
Year 3: Light and Shadows
Year 4: Sound and Vibrations
Year 6: Light

- know that it is dangerous to look at the sun
- relate their sense of sight to their eyes
- relate their sense of hearing to their ears

Year 3: Light and Shadow

Vocabulary
Shadow, light, flames, opaque, block, direction, light, travels, shortest, longest, highest, torch, shape, similar, transparent, translucent, light source, sun, object, daytime, night-time, reflect, shine, shiny, absorb, reflective surface, surface, mirror, sundial, block, lamp

- name a number of light sources, including the sun
- describe and compare some light sources
- state that light sources are seen when light from them enters the eyes
- **recognise that light from the sun can be dangerous and that there are ways to protect their eyes**
- recognise that they cannot see in the dark
- recognise that light travels from a source
- **recognise that they need light in order to see things and that dark is the absence of light**
- explain that places are dark because there is no light and a light source is needed to help us see in such places
- **notice that light is reflected from surfaces**
- state that reflections can be seen in shiny surfaces
- makes generalisations about shiny surfaces (e.g. smooth)
- demonstrate light travelling using a torch and record light bouncing off a mirror
- identify suitable reflective clothing for travelling in the dark
- explain that they cannot see shiny objects in the dark because there are no light sources
- recognise that when light is blocked, a shadow is formed
- **recognise that shadows are formed when the light from a light source is blocked by a solid object**
- recognise that shadows are similar in shape to the objects forming them
- make observations of changes in shadows
- explain that shadows are formed when light from a source is blocked
- state that even transparent objects block some light and form shadows
- describe the difference in shadows cast by opaque, translucent and transparent materials
- explore how to make shadows of different shapes and sizes
- **find patterns in the way that the size of shadows change**
- *use ideas about shadows to make predictions about the shadows formed by different objects or materials*
- *describe how the length of a shadow changes throughout the day as the sun moves across the sky*
- *describe how nocturnal animals are adapted to use what little light there is or their other senses in the dark (e.g. cats, aye-aye, lemurs)*
- *describe how Percy Shaw invented cat's eyes and explain their importance to road safety*

Year 4: Sound and Vibrations

Vocabulary
Sound, pitch, volume, vibrations, medium, insulation, travel, instrument

- recognise and describe many sounds and sound sources
- state that they hear sounds through their ears
- recognise that when sounds are generated by objects, something moves or vibrates
- **identify how sounds are made, associating some of them with something vibrating**
- identify what is vibrating in a range of musical instruments
- generalise that sounds are produced when objects vibrate
- describe how sounds are generated by specific objects
- suggest ways of producing sounds
- **recognise that vibrations from sounds travel through a medium to the ear**
- *recognise that sounds travel through solids, water and air*
- *explore how sound travels through a variety of materials*
- distinguish between pitch and volume (loudness)
- describe differences in pitch and volume
- **find patterns between the pitch of a sound and features of the object that produced it**
- know that altering vibrations alters the pitch or volume
- *describe ways in which the pitch of a sound made by a particular instrument or vibrating object can be raised or lowered*
- *generalise the effects of changes on sound (e.g. the tighter the tension the higher the pitch)*
- explore how to vary the pitch and volume of sounds from a variety of objects or instruments
- **find patterns between the volume of a sound and the strength of the vibrations that produced it**
- suggest how to change the loudness of the sounds produced by a range of musical instruments
- **recognise that sounds get fainter as the distance from the sound source increases**
- describe what they observe when they move further away from a source of sound
- *group instruments independently by the way sounds are produced*
- *identify suitable materials to use for sound insulation*
- *recognise that sound can be reflected from a surface which can cause an echo*
- *describe how some animals use echo-location*

Year 6: Light

Vocabulary
Reflection, transparent, translucent, opaque, periscope, luminous, absorb, direction

- explore how light travels using torches and periscopes
- **recognise that light appears to travel in straight lines**
- describe reflection as light 'bouncing off' objects
- understand that in order to be seen, all non-luminous objects must reflect light
- diagrammatically represent light from sources and bouncing off reflective surface using arrows
- **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**
- draw diagrams to illustrate how light is travelling from the source to the eye
- **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**
- describe a variety of ways of changing the size of the shadow produced by an object
- describe the relationship between the size of a shadow and the distance between the light source and an object
- diagrammatically represent the formation of shadows using arrow convention
- **use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them**
- *know that, when sunlight passes through some objects, coloured light is produced (for example in rainbows, soup bubbles and prisms)*
- *describe how curved mirrors distort a reflection*

Light and Sound — R
1
2
Light and Shadows — 3
Sound and Vibrations — 4
5
Light — 6

POK: Plants

EYFS: Plants

Vocabulary

Root, stem, tree, leaf, flower, water, seed, plant, growth, decay

- identify something as a plant
- name some common plants, identify leaf, root, stem and flower
- recognise that plants need water to grow
- name some places plants live
- identify the seeds in some fruit

Year 1: In the Garden

Vocabulary

petal, tall, taller, tallest, wild, trunk, similar, different, within, under, next to, soil, blossom, fruit, leaves, branch, bulbs, shrub, alive, vegetables, grass, garden, habitat, deciduous, earth, evergreen, compost, non-living, living, not alive, dead, artificial
Names e.g. daffodil, daisy, sunflower, rose, lavender, tulip, snowdrop, holly, dandelion, oak, beech, chestnut, pine

- make observations of plants, including flowers and vegetables they have planted
- identify the leaf, root, stem and flower of a plant
- identify the trunk, branch, roots and leaves of a tree
- know that plants produce seeds
- identify differences between plants
- **identify and describe the basic structure of a variety of common flowering plants, including trees**
- name some common plants
- name some plants that live in the garden
- name some plants that live in the wild
- name some trees in the local environment
- recognise that different plants live in the local environment
- use simple identification guides to name plants in the local environment
- **identify and name a variety of common wild and garden plants, including deciduous and evergreen trees**
- *compare and contrast different plants*
- *sequence pictures of how plants changes over time*
- *describe how deciduous trees changes throughout the year*
- *explain why some plants are only seen at certain times of the year*

Year 2: Growing Plants

Vocabulary

seedling, bulb, buds, shoot, water, sun light, seeds, nuts, fruit stones, warm, grow, temperature, germinate

- know that flowering plants produce seeds which grow into new plants
- know that some plants have bulbs from which they grow
- make observations of plants over time
- explore how plants from seeds and bulbs grow
- describe what happens to bulbs during the plant cycle as they grow
- describe what happens to a seed as it grows and develops
- describe what they observe as new plants grow
- **observe and describe how seeds and bulbs grow into mature plants**
- *compare the plant cycle for a plant from a seed with that from a bulb*
- suggest how to find out about what plants need in order to grow well
- recognise that plants are living and need water, light and warmth to grow
- describe differences between plants grown in the light and in the dark
- **find out and describe how plants need water, light and a suitable temperature to grow and stay healthy**
- *explain how to look after a variety of plants*
- *know that a seed and bulb both contain everything a plant needs to grow*
- *explain that seeds and bulbs do not need light to germinate and identify how this is different to the needs of a plant*
- *explain how plants in the desert survive with little water and plants in the rainforest survive with little light*

Year 3: Investigating Plants

Vocabulary

Ground, transport, attract bees, catch sunshine, green, air, nutrients, growth, pollen, pollination, seed formation, seed dispersal, nutrition, support, anchor, reproduction

- identify parts of flowering plants
- **identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers**
- describe why healthy roots and a healthy stem are needed for plants to grow
- recognise that the leaves of a plant are associated with healthy growth and more specifically nutrition
- recognise that plants need light, water and warmth and healthy leaves, roots and stems in order to grow well
- know that water travels from the roots up the stem
- **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**
- know that plants make their own food
- know that fertilisers contain minerals
- understand that plants absorb minerals from the soil (Teacher Note: plants create their own food using sunlight, water and carbon dioxide, they do not absorb food from the soil)
- describe how changes to light and fertiliser affect plant growth
- *explain that differences in plant growth are due to the amount of light and/or water*
- **investigate the way in which water is transported within plants**
- describe how the stem has a role in support and nutrition (transport of water)
- *explain why healthy roots and a healthy stem are needed for plants to grow*
- **explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal**
- describe why plants need flowers
- sequence pictures to show the life cycle of a plant
- describe how pollen and seeds are dispersed
- explain the role of bees and insects in pollination
- *describe the processes of pollination, seed formation and seed dispersal*
- *compare the roots of different plants (e.g. desert plants or rainforest trees (Teacher Note: rainforest trees have very shallow roots as the quality of the soil is poor and most of the nutrients are near the surface)*

Further Plants work links to Living things and their habitats:
Year 4: Classification and Interdependence Inc. Food Chains
Year 5: Life Cycles
Year 6: Classification, Evolution and Inheritance

UTW: Plants R
In the Garden 1
Growing Plants 2
Investigating Plants 3
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5
6

POK: Forces

EYFS: Push and Pull

Vocabulary
Push, pull, twist, squash, stretch

- observe and describe movements they and objects make

Year 3: Forces and Magnets

Vocabulary
Force, push, pull, speed up, slow down, change shape, change direction, movement, direction, friction, magnets, magnetic, surface, magnetism, north pole, south pole, repel, attract,

- recognise that pushes and pulls are forces
- recognise that a force acts in a particular direction
- observe the movements, shape and direction of objects when forces act on them
- describe how to make a familiar object start moving by pushing or pulling
- describe how to use pushes and pulls to make familiar objects speed up, slow down, change direction or shape
- produce annotated drawings showing the direction of force needed to make an object move
- identify friction as a force
- observe and explore how friction affects the movement of objects
- describe some ways in which friction between solid surfaces can be increased or decreased
- compare how things move on different surfaces
- observe how magnets attract or repel each other and attract some materials and not others
- classify materials as magnetic or non-magnetic
- 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 the difference between a magnet and a magnetic material
- notice that some forces need contact between two objects, but magnetic forces can act at a distance
- describe what happens when some materials are put near a magnet
- recall that magnets have a north and a south pole
- describe magnets as having two poles
- describe the direction of forces between magnets
- predict whether two magnets will attract or repel each other, depending on which poles are facing
- describe some everyday uses of magnets
- explain that a compass works by lining up with the Earth's magnetic field
- describe how lodestone was found to be a naturally occurring magnet and was used as the first compass for navigation

Year 5: Forces

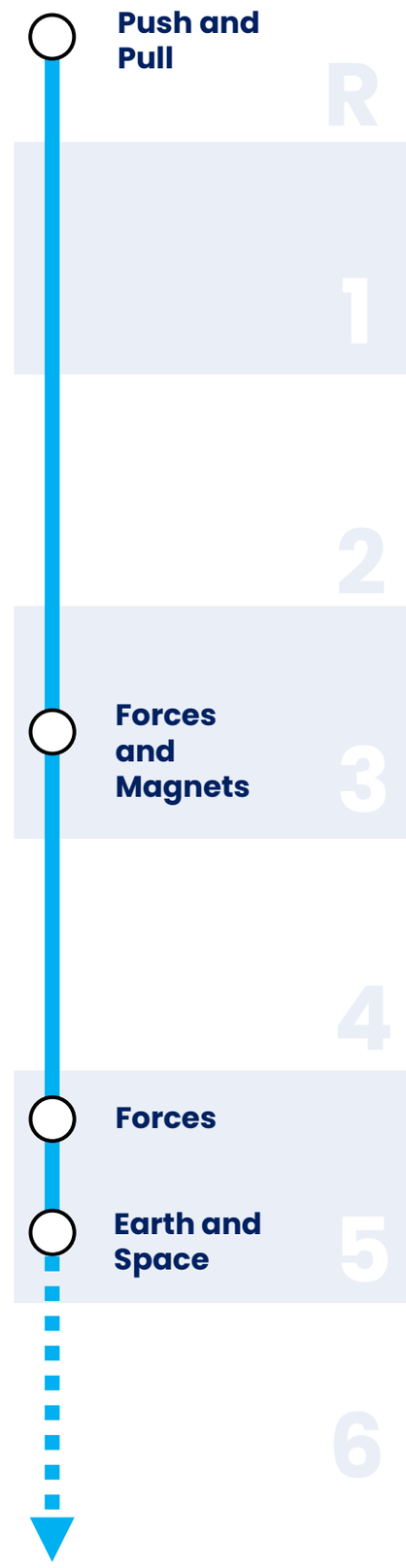
Vocabulary
force, air resistance, water resistance, magnetic attraction, gravitational attraction, direction, force, motion, weight, upthrust, Newton, forcemeter, stationary, surface area, force applied, pulley, lever, gear

- identify weight as a force
- identify that force is measured in Newtons
- name simple forces such as gravity, friction and air resistance
- recognise that more than one force can act on an object
- draw force diagrams with arrows showing the direction of forces acting on an object
- observe and explore the effect of several forces on objects
- recognise that air resistance slows things down
- recognise that friction can be useful or not useful **identify the effects of air resistance, water resistance and friction, that act between moving surfaces**
- describe some situations in which there is more than once force acting on an object
- describe and explain the motion of some familiar objects in terms of several forces acting on them
- identify forces on an object as either balanced or unbalanced
- use the terms 'balanced' and unbalanced' when describing several forces on an object
- explain that balanced forces on an object cause it to remain stationary or travel at the same speed
- explain that unbalanced forces on an object cause it to speed up, change shape or slow down
- **explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object**
- understand that air resistance is the frictional force of air on objects moving through it
- describe some of the factors that increase friction between solid surfaces and increase air and water resistance
- describe situations in which frictional forces are helpful as well as those in which frictional forces are unhelpful
- *compare the tread on bicycle tyres according to how much friction they need*
- *identify streamlined objects and describe why they have been designed in this way (e.g. cycling helmets, formula 1 cars, dolphins)*
- explore the effects of levers, pulleys and gears
- **recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect**
- *describe how levers, pulleys and gears are used in everyday life (e.g. describe how having gears can make it easier to pedal a bike, how a bottle opener makes it easier to open a bottle lid)*
- *explain how introducing gears onto bikes has changed cycling*

Year 5: Earth and Space

Vocabulary
Earth, Sun, planet, Mercury, Venus, Mars, Jupiter, Moon, Saturn, Uranus, Neptune, solar system, spherical, moon, day and night, celestial body, rotation, hemisphere, orbit, gravity, shadow, daylight

- identify and name the components of the solar system (i.e. Sun, Moon, Earth and other planets)
- locate the Sun, Earth and other planets in the solar system
- recognise that the Earth and other planets orbit the Sun
- recall that the Earth takes one year to orbit the Sun
- recall that the Earth rotates on its' axis and this takes one day
- **describe the movement of the Earth, and other planets, relative to the Sun in the solar system**
- *use simple physical models to explain effects that are caused by the movement of the Earth*
- *recognise that the Moon orbits the Earth*
- *explain that gravity is a force of attraction and it is what holds the planets in orbit around the Sun and the Moon in orbit around the Earth*
- **describe the movement of the Moon relative to the Earth**
- *explain that the changes in the appearance of the Moon over a period of 28 days arise from the Moon orbiting the Earth once every 28 days*
- **describe the Sun, Earth and Moon as approximately spherical bodies**
- recognise that the Earth, Sun and Moon are spherical and support this with some evidence
- recognise that it is daylight in the part of the Earth facing the Sun
- recall that a shadow from the Sun changes over the course of a day
- explore and describe how a shadow from the Sun changes over the course of a day
- explain in terms of the rotation of the Earth why shadows change and the Sun appears to move across the sky during the course of the day
- **use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky**
- explain why it is night time in Australia when it is day time in England
- *explain how ideas about the solar system have changed over time*



POK: Electricity

EYFS: Electricity and batteries

Vocabulary
Electricity, switch

- know electricity can be dangerous
- explore a range of battery powered devices

Year 4: Circuits and Components

Vocabulary
Battery, cell, wires, switch, crocodile clips, buzzer, bulb, circuit, symbols, insulator, conductor, plastic, metal, appliance, component

- identify common appliances that run on electricity
- identify mains operated and battery operated devices
- describe some of the dangers associated with mains electricity
- name some components of a simple electrical circuit
- know that batteries are sources of electricity
- recognise that for a circuit to work it must be complete
- construct a working circuit
- construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers
- make drawings of simple working circuits (pictorial only circuit symbols covered in year 6)
- make circuits from drawings provided
- 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
- are methodical in tracing faults in simple circuits
- describe the effect of making and breaking one of the contacts on a circuit
- explain why some circuits work and others do not
- recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit
- describe how switches work
- construct a home-made switch
- identify materials as conductors or insulators
- construct simple circuits and use them to test whether materials are electrical conductors or insulators
- recognise some common conductors and insulators, and associate metals with being good conductors
- relate knowledge about metals and non-metals to their use in electrical appliances
- describe the use of conductors and insulators in components including connecting wires

Year 6: Electricity

Vocabulary
Voltage, current, series, component, circuit, conductor, positive/negative terminal, complete circuit, battery, cell

- know that the 'amount' of electricity (voltage) depends on the number of batteries
- construct some working series circuits with specified components
- recognise conventional circuit symbols
- **use recognised symbols when representing a simple circuit in a diagram**
- draw circuit diagrams and construct circuits from diagrams using conventional symbols
- explore how to change the brightness of bulbs and the volume of a buzzer
- describe ways of changing the brightness of a bulb in a circuit or the volume of a buzzer
- compare different circuits (e.g. for brightness of bulb)
- recall that the amount of electricity is measured in voltage
- **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**
- *explore the thickness of a wire in a circuit*
- *describe the differences between wires usually used for circuits and fuse wires*
- *describe what would happen if all the lights in a home were connected in the same circuit and one broke*
- *explain the current in circuits using simple models and analogies (e.g. piped water, bicycle chain, children and sweets)*

Science

Science

Electricity and Batteries
R

1

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3

Circuits and Components
4

5

Electricity
6

Barriers To and Solutions for Engagement, Progress and Achievement

	Barriers identified by SENCo/Class teacher	Solutions Identified by subject co-ordinator
Hearing Impairment	• Vocabulary • Difficulty in hearing instructions • Managing practical investigations / interactions	• Positioning in classroom • visuals and clarity in step-by-step progress
Visual Impairment	• Difficulty reading • Navigating classroom • Managing resources and equipment	• positioning • colour coding • adapted resources • pre-experience/pre-teach
Dyspraxia (fine/ gross motor)	• Managing physical resources particularly "fiddly bits" such as crocodile clips in circuits • Difficulty recording	• adapted equipment • alternative ways of recording
Memory/ processing	• Recall of instructions • Remembering key facts and vocab • Retaining focus	• task planner • visual representation and recording
ASC	• Noise and movement- over stimulation • sharing equipment • amount of vocab	• Own set of equipment where possible • Sufficient quiet space • Well planned transitions – i.e., between carpet and desk • Visual instruction • Now and next boards/123 boards/sequencing board
ADHD	• Waiting and frustration • Turn taking • Maintain attention • Recording	• Sufficient quiet space • Well planned transitions – i.e., between carpet and desk • Visual instruction • Worked examples • Now and next boards/123 boards/sequencing board
Cognition	• Understanding of process, lang • Retention/ application of substantive / disciplinary knowledge to task • Recording • Vocabulary	• Word/definition bank • Sufficient quiet space • Well planned transitions – i.e., between carpet and desk • Visual instruction • Sentence stems/speaking frames
SEMH	• Attitude towards science • Fear of failure	• Written/visual instructions • Computer/iPad access • Sentence stems/speaking frames • Now and next boards/123 boards/sequencing board

- **Clarity of instruction, explanations and modelling are crucial**
- **Ensure that the most important aspect of learning is made clear – cognitive load theory is relevant for all pupils with SEND both in terms of what pupils see and hear and are expected to learn. Use the teacher guides to see the essential disciplinary and substantive knowledge that all children need.**
- **For many pupils with SEND, it is the recording of the content rather than the content itself which provides the greatest level of challenge in lessons, and this should be addressed in the planning and preparation for lessons**

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