Science Policy

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Intent of our curriculum

Curriculum design

A high-quality science education will help pupils gain a coherent knowledge and understanding of the world. It should inspire pupils' curiosity about natural phenomena to know more and remember more about the world in which they live. Teaching should equip pupils to ask perceptive questions, think critically, weigh evidence, sift arguments, and develop perspective and judgement. Our intent is to build systematically on their knowledge acquisition and retrieval giving them insights, ready for the next stage in their learning journey. Children must be able to talk about what they have learned in a knowledgeable and articulate way, using their 'public voice'.

Our science curriculum aims to ensure that all pupils:

- ✓ Develop scientific knowledge and conceptual understanding through the disciplines of biology, chemistry and physics
- ✓ Develop understanding of the nature, processes and methods of science through different types of science enquiries that help them to answer scientific questions about the world around them
- ✓ Are equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future

We provide our children with a curriculum which is engaging and stimulating and develops not just their **scientific knowledge**, but builds on prior learning of concepts and the processes of scientific investigation.

At our school we see the Y1 to Y6 curriculum as a body of **subject specific knowledge** defined by our school and the National Curriculum and so we take a **knowledge led approach**. Skills are an outcome of the curriculum, not its purpose. When children are 'fluent' in knowledge they can then apply that knowledge as part of skill acquisition.

We have a **clear focus on subjects** as units to deliver the curriculum. Our **Curriculum Map** and units of work in every subject contain the knowledge that we have identified as essential in our school.

Our **Units of Work** in each subject have been carefully crafted by expert teachers across our school partnership, identifying **composite tasks** and breaking them down in to **component tasks** to ensure **sequential, layered knowledge acquisition**. These Units of Work also support our particular **'instructional'** style of teaching and help with the speedy and effective induction of new staff. This is particularly important in an inner London environment where the cost of accommodation prevents most of our staff from being able to stay with us long term.

We use **Knowledge Organisers** in order to help children with **knowledge retention** and issues around **working memory** to ensure that children **know more and remember more**. Our teaching style has a strong focus on the effective retention and use of **subject specific vocabulary** using "Walk The Word" techniques.

Concept Cartoons will be used as aids to stimulating discussion around the scientific knowledge being studied (examples are attached to this document).

All classrooms (where space allows) should have a high quality science display in place similar to the photographs in this policy.

Visits and Visitors are detailed on the Whole School Curriculum Map. Teachers will record evidence of visits and visitors as a photo page (with an explanation) in children's science books. It is the teacher's responsibility to book visits and visitors according to school policy. Teachers are also responsible for booking transport and completing a preliminary visit for the risk assessment prior to the visit.

Quizzing
Teachers will quiz the children on their science knowledge and understanding, including key vocabulary weekly. This is to enable the children to remember more as they recall it frequently and also to give the teacher a fuller understanding of what the children have learnt and remembered.

Working scientifically: carrying out science investigations

Science investigations in KS2 should be recorded by children individually and photos added if appropriate. Where possible children should be recording data in line with the appropriate skills in maths e.g. drawing graphs/tables etc. to represent their findings. Carrying out investigations in KS1 will be different to KS2 and will be age appropriate.

It is important that teachers are modelling and using the correct scientific vocabulary to describe the different parts of an investigation throughout KS1 and KS2 e.g. prediction, method. This helps the children to constantly practise using the correct vocabulary and embed it in their longer term memory so that they can use the correct vocabulary in the right way.

Years 1 and 2
In years 1 and 2 pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the Units of Work.
It is important to note that children should not be carrying out full investigations in KS1, i.e. they will not be carrying out a prediction, method and conclusion in each investigation that they do, but they may be recording a smaller part of it.
They **will be**:

- asking simple questions and recognising that they can be answered in different ways
- observing closely and using simple equipment e.g. magnifying glass, measuring jug
- performing simple tests
- identifying and classifying
- using their own observations and ideas to suggest answers to questions
- gathering and recording data to help answer questions
- introduced to the words prediction, method and conclusion (in Y2)

Years 3 and 4
During years 3 and 4 pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the Units of Work.
It is important to note that the children should be carrying out full investigations in KS2, i.e. carrying out an investigations that involves: prediction, method, results and conclusion.
They **will be:**

- asking relevant questions and using different tpes of scientific enquiries to answer them
- setting up simple practical experiments using comparative and fair tests
- making systematic and careful observations, where appropriate taking accurate measurements using standard units, using a range of equipment e.g. thermometers.
- Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions

- Recording findings suing simple scientific language, drawings, labelled diagrams, keys, graphs, bar charts and appropriate tables.
- Reporting on their findings, including oral and written explanations, displays of results
- Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions
- Identifying differences, similarities or changes related to simple scientific ideas and processes
- Using scientific evidence to answer questions or to support their findings

Years 5 and 6

During years 5 and 6, pupils should be taught to use practical, scientific methods, processes and skills through the teaching of the Units of Work.

It is important to note that the children should be carrying out full investigations in KS2, i.e. carrying out an investigations that involves: prediction, method, results and conclusion for each investigation.

They **will be:**

- Planning different types of scientific enquiry to answer questions, including recognising and controlling variables where necessary
- Taking measurements, using a range of scientific equipment, with increasing accuracy and precisions, taking repeat readings where appropriate
- Recording data and results of increasing complexity using scientific diagrams, labels, classification keys, graphs, tables, scatter, bar and line graphs as appropriate
- Using test results to make predictions, setting up further and comparative tests where appropriate
- Reporting and presenting findings, including conclusions, causal relationships and explanations of their findings including a degree of trust in the results, in oral and written forms e.g. write up of an investigation, presentation of investigation to peers
- Identifying scientific evidence that has been used to support of refute ideas or arguments

They will not be:

- Expected to cover each aspect as stated above for every area of study. For some areas the children may be learning about and discussing areas of well-respected scientific research e.g. to study “Evolution”. In other areas the children may have a mix of practical investigation and observation of another’s investigation e.g. observing dissolving of solids in high temperature liquids. The opportunities for working individual and paired scientific practical work should be provided across years 5 and 6, so that the expectations of the programme of study can by met by the end of Year 6.

Implementation of our curriculum

The implementation of our curriculum is greatly supported by **carefully structured unit plans, leading pupils through component knowledge and skills to composite knowledge and skills** in all subjects.

Our pedagogical approach is based on **Rosenshine’s Principles of Direct Instruction**. The brilliant clarity and simplicity of this approach supports teachers to engage with cognitive science and the wider world of educational research.

The Principles of Direct Instruction

1. Daily Review
2. Present new material using small steps
3. Ask questions

4. Provide models
5. Guide student practice
6. Check for student understanding
7. Obtain a high success rate
8. Provide scaffolds for difficult tasks
9. Independent practice
10. Weekly and monthly review

Resources

Science resources related to each year group should be stored in classrooms. Depending on the size of equipment, some items may be stored in a resources room e.g. large skeleton when not in use. The Library Loan Service is ordered to supplement the books and artefacts and are ordered by the Science Leader. Teachers ascertain that they have all of the practical resources that they need for experiments in advance of the lesson.

Assessment

From Y1- Y6 children are assessed individually against the statutory outcomes for each year group. Working towards Expected Standard, Expected Standard or Greater Depth within Expected Standard. The science assessment statements can be found at the end of this policy document. The teacher will use his/her professional judgement and look at a range of evidence from the children's work and their own observations to come to a judgement on the attainment of each child. Weekly quizzing will be used to aid the children's knowledge acquisition, but will also form part of the assessment of the child and check the child's understanding.

Staff training

Staff receive termly support and training in their pedagogy and subject specific scientific knowledge through a programme of PDMs and 1-1 coaching opportunities, keeping their knowledge, skills and understanding up to date and relevant for delivering the curriculum. New staff are given a coaching mentor for 12 months.

Parent involvement

Through parents' meetings, the school newsletter and the school website parents are encouraged to support their children's learning in science.

The role of the subject coordinator

Subject leaders

- provide continuous professional development for staff where needed
- monitor the quality of provision in the science curriculum and report to senior leaders
- monitor pupil outcomes in science and report to senior leaders

Impact, monitoring and evaluation

The quality of provision in computing is monitored and evaluated according to the annual school monitoring and evaluation plan. This monitoring and evaluation is carried out by the Science Leader, who then supports/coaches staff if necessary and reports to the SLT.

Progression through the science curriculum in our school

	Rec	Y1	Y2	Y3	Y4	Y5	Y6	Y7 (KS3)
Biology **Life Processes**								
Plants	We are learning that plants and animals grow and change We are learning that there are lots of living things We are learning to look at and describe and name living things	We are learning that flowering plants have different parts	We are learning that plants need water, light and warmth We are learning that some things are living, some dead and some have never been alive	We are learning that to stay healthy plants need water, light nutrients and room to grow. We are learning that different parts of plants have different functions		We are learning that plants reproduce		We are learning that plants need energy from sunlight to make food (photosynthesis) We are learning about cells and cell organisation
Animals **Humans**		We are learning that animals, including humans have different body parts, which have special functions	We are learning that animals need water, food and air We are learning that different animals need different diets We are learning about keeping healthy	We are learning that animals cannot make their own food We are learning that many animals, including humans have skeletons (function)	We are learning that some animals, including humans have teeth to help them eat We are learning about the digestive system	We are learning that animals reproduce	We are learning that some substances and lifestyle choices can have a negative impact on health We are learning about oxygen and how it is used in the human body (blood circulation)	We are learning about the skeletal and muscular systems We are learning about nutrition and digestion We are learning about the effects of recreational drugs We are learning about gas exchange systems
Classification	We are learning the names of living things and to name some groups e.g. fruits/vegetables	We are learning that plants and animals can be grouped (e.g. plants deciduous and evergreen)	We are learning that plants and animals can be identified and grouped (linked to habitat)		We are learning that plants and animals can be identified and grouped according to keys and characteristics		We are learning that a wider range of living things can be identified e.g. microorganisms	We are learning about detailed grouping and classification of organisms

Life Cycles	Plants and animals grow and change over their lives (caterpillar to butterfly)		We are learning that seeds and bulbs grow into plants We are learning that animals, including humans reproduce offspring which grow into adults	We are learning that plants make seeds, which grow into plants		We are learning that lifecycles differ for different species We are learning that humans have different stages of development between life and death	We are learning that living things produce offspring of the same kind, but are not identical	We are learning about human reproduction (as a mammal) We are learning about reproduction in plants
Interdependence	We are learning that living things need each other e.g. caterpillar needs leaves to eat		We are learning that different plants and animals live in different places We are learning that animals get their food from plants and other animals and are in turn consumed by other animals		We are learning that plants and animals are part of a food chain		We are learning that plants and animals are adapted to their environment We are learning that adaptation may lead to evolution	We are learning about relationships in an ecosystem We are learning about genetics and evolution (inheritance, chromosomes, DNA and genes)
Chemistry								
Materials: using and describing materials		We are learning that different materials are used to make different objects	We are learning that different materials are suitable for different uses (that can been seen)	We are learning that different materials have different properties (rocks)	We are learning that materials can be solids, liquids or gases	We are learning that different properties make different materials suitable for different uses (that can be measured) We are learning that materials can be sorted according to property		We are learning about the particulate nature of matter We are learning that all materials have mass We are learning about the Periodic Table
Materials: changing materials	We are learning that materials can be changed		We are learning that the shape of some materials can be changed by force or contact (push, squeeze)		We are learning that materials change state when heated or cooled	We are learning that some materials will dissolve in a liquid and that changes of state are usually reversible changes We are learning that changes including baking		We are learning about atoms elements and compounds We are learning about pure and impure substances, chemical properties / PH

						and burning (heat) will result in a new material, this is not usually a reversible change		scales
Materials: mixing and separating materials	We are learning that materials can be mixed together			We are learning that soils are a mixture of rocks and other matter (organic matter) We are learning that fossils are formed when trapped in rock		We are learning that mixtures may be separated by filtering, sieving and evaporating (reversible changes)		We are learning about chemical reactions and energetics We are learning about the composition and structure of the Earth
Physics								
Light	We are learning about seeing (senses)	We are learning that we see with our eyes		We are learning that we need light to see things We are learning that light is reflected off materials, blocks and makes a shadow (shadows can change shape) We are learning that sunlight can be harmful			We are learning that light travels in straight lines We are learning that shadows have the same shape as the object casting them We are learning that we see objects when the light from a source reflects off them to our eyes	We are learning about light waves
Sound	We are learning about hearing (senses)	We are learning that we hear with our ears			We are learning that sounds are made when something vibrates We are learning that the volume and pitch of a sound can be changed			We are learning about sound waves
Electricity					We are learning that electrical appliances need electricity from a source to work We are learning		We are learning that an increase in voltage will cause an increase in current We are learning that some	We are learning about energy in a domestic context (fuels) We are learning about current electricity, static

					that a complete circuit is needed (conductors, components of circuit and symbols)		components in a circuit resist current more than others	electricity and magnetism
Forces	As part of continuous provision we are exploring how things move, can be joined, can be built with etc.		We are learning about pushing and pulling making things move	We are learning that forces pushing and pulling can make things start moving stop or go faster/slower We are learning about magnets We are learning that when one object moves over another there is friction		We are learning about drag forces and resist movement We are learning atht the force of gravity caused by the Earth causes objects to fall towards the centre We are learning that some mechanisms allow a smaller force to have a greater effect		We are learning about energy changes and transfers We are learning about motion and forces (describing motion e.g. speed= distance divided by time) We are learning about forces We are learning about pressure in fluids We are learning about conservation of matter
Earth in space	We are learning that the sun appears to move across the sky We are learning the names of the planets, Moon, Sun and Earth	We are learning that the sun appears to move across the sky (geography – We are learning about the seasons)				We are learning that the Earth, Sun and Moon are approximately spherical We are learning that the Earth is one of eight planets that orbit the Sun (once every year) We are learning that the Earth rotates once every 24 hours, Moon orbits the Earth and appears differently		We are learning about space physics (gravity, mass) the motions of the Sun, Moon, Earth, stars and planets

Science National Curriculum

Purpose of study

A high-quality science education provides the foundations for understanding the world through the specific disciplines of biology, chemistry and physics. Science has changed our lives and is vital to the world's future prosperity, and all pupils should be taught essential aspects of the knowledge, methods, processes and uses of science. Through building up a body of key foundational knowledge and concepts, pupils should be encouraged to recognise the power of rational explanation and develop a sense of excitement and curiosity about natural phenomena. They should be encouraged to understand how science can be used to explain what is occurring, predict how things will behave, and analyse causes.

Aims

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

- develop **scientific knowledge and conceptual understanding** through the specific disciplines of biology, chemistry and physics
- develop understanding of the **nature, processes and methods of science** through different types of science enquiries that help them to answer scientific questions about the world around them
- are equipped with the scientific knowledge required to understand the **uses and implications** of science, today and for the future.

Scientific knowledge and conceptual understanding

The programmes of study describe a sequence of knowledge and concepts. While it is important that pupils make progress, it is also vitally important that they develop secure understanding of each key block of knowledge and concepts in order to progress to the next stage. Insecure, superficial understanding will not allow genuine progression: pupils may struggle at key points of transition (such as between primary and secondary school), build up serious misconceptions, and/or have significant difficulties in understanding higher-order content.

Pupils should be able to describe associated processes and key characteristics in common language, but they should also be familiar with, and use, technical terminology accurately and precisely. They should build up an extended specialist vocabulary. They should also apply their mathematical knowledge to their understanding of science, including collecting, presenting and analysing data. The social and economic implications of science are important but, generally, they are taught most appropriately within the wider school curriculum: teachers will wish to use different contexts to maximise their pupils' engagement with and motivation to study science.

The nature, processes and methods of science

'Working scientifically' specifies the understanding of the nature, processes and methods of science for each year group. It should not be taught as a separate strand. The notes and guidance give examples of how 'working scientifically' might be embedded within the content of

biology, chemistry and physics, focusing on the key features of scientific enquiry, so that pupils learn to use a variety of approaches to answer relevant scientific questions. These types of scientific enquiry should include: observing over time; pattern seeking; identifying, classifying and grouping; comparative and fair testing (controlled investigations); and researching using secondary sources. Pupils should seek answers to questions through collecting, analysing and presenting data. 'Working scientifically' will be developed further at key stages 3 and 4, once pupils have built up sufficient understanding of science to engage meaningfully in more sophisticated discussion of experimental design and control.

Spoken language

The national curriculum for science reflects the importance of spoken language in pupils' development across the whole curriculum – cognitively, socially and linguistically. The quality and variety of language that pupils hear and speak are key factors in developing their scientific vocabulary and articulating scientific concepts clearly and precisely. They must be assisted in making their thinking clear, both to themselves and others, and teachers should ensure that pupils build secure foundations by using discussion to probe and remedy their misconceptions.

School curriculum

The programmes of study for science are set out year-by-year for key stages 1 and 2. Schools are, however, only required to teach the relevant programme of study by the end of the key stage. Within each key stage, schools therefore have the flexibility to introduce content earlier or later than set out in the programme of study. In addition, schools can introduce key stage content during an earlier key stage if appropriate. All schools are also required to set out their school curriculum for science on a year-by-year basis and make this information available online.

Attainment targets

By the end of each key stage, pupils are expected to know, apply and understand the matters, skills and processes specified in the relevant programme of study.
Schools are not required by law to teach the content indicated as being 'non-statutory'.

Key stage 1

The principal focus of science teaching in key stage 1 is to enable pupils to experience and observe phenomena, looking more closely at the natural and humanly-constructed world around them. They should be encouraged to be curious and ask questions about what they notice. They should be helped to develop their understanding of scientific ideas by using different types of scientific enquiry to answer their own questions, including observing changes over a period of time, noticing patterns, grouping and classifying things, carrying out simple comparative tests, and finding things out using secondary sources of information. They should begin to use simple scientific language to talk about what they have found out and communicate their ideas to a range of audiences in a variety of ways. Most of the learning about science should be done through the use of first-hand practical experiences, but there should also be some use of appropriate secondary sources, such as books, photographs and videos.

'Working scientifically' is described separately in the programme of study, but must **always** be taught through and clearly related to the teaching of substantive science content in the programme of study. Throughout the notes and guidance, examples show how scientific methods and skills might be linked to specific elements of the content.

Pupils should read and spell scientific vocabulary at a level consistent with their increasing word reading and spelling knowledge at key stage 1.

Key stage 1 programme of study – years 1 and 2

Working scientifically

Statutory requirements

During years 1 and 2, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:

- asking simple questions and recognising that they can be answered in different ways
- observing closely, using simple equipment
- performing simple tests
- identifying and classifying
- using their observations and ideas to suggest answers to questions
- gathering and recording data to help in answering questions.

Notes and guidance (non-statutory)

Pupils in years 1 and 2 should explore the world around them and raise their own questions. They should experience different types of scientific enquiries, including practical activities, and begin to recognise ways in which they might answer scientific questions. They should use simple features to compare objects, materials and living things and, with help, decide how to sort and group them, observe changes over time, and, with guidance, they should begin to notice patterns and relationships. They should ask people questions and use simple secondary sources to find answers. They should use simple measurements and equipment (for example, hand lenses, egg timers) to gather data, carry out simple tests, record simple data, and talk about what they have found out and how they found it out. With help, they should record and communicate their findings in a range of ways and begin to use simple scientific language.

These opportunities for working scientifically should be provided across years 1 and 2 so that the expectations in the programme of study can be met by the end of year 2. Pupils are not expected to cover each aspect for every area of study.

Year 1 programme of study

Plants

Statutory requirements

Pupils should be taught to:

- identify and name a variety of common wild and garden plants, including deciduous and evergreen trees **Autumn 1**
- identify and describe the basic structure of a variety of common flowering plants, including trees. **Autumn 1**

Notes and guidance (non-statutory)

Pupils should use the local environment throughout the year to explore and answer questions about plants growing in their habitat. Where possible, they should observe the growth of flowers and vegetables that they have planted.

They should become familiar with common names of flowers, examples of deciduous and evergreen trees, and plant structures (including leaves, flowers (blossom), petals, fruit, roots, bulb, seed, trunk, branches, stem).

Pupils might work scientifically by: observing closely, perhaps using magnifying glasses, and comparing and contrasting familiar plants; describing how they were able to identify and group them, and drawing diagrams showing the parts of different plants including trees. Pupils might keep records of how plants have changed over time, for example the leaves falling off trees and buds opening; and compare and contrast what they have found out about different plants.

Animals, including humans

Statutory requirements

Pupils should be taught to:

- identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals **Autumn 2**
- identify and name a variety of common animals that are carnivores, herbivores and omnivores **Autumn 2**

- describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets) **Autumn 2**
- identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. **Summer 1, Summer 2**

Notes and guidance (non-statutory)

Pupils should use the local environment throughout the year to explore and answer questions about animals in their habitat. They should understand how to take care of animals taken from their local environment and the need to return them safely after study. Pupils should become familiar with the common names of some fish, amphibians, reptiles, birds and mammals, including those that are kept as pets.

Pupils should have plenty of opportunities to learn the names of the main body parts (including head, neck, arms, elbows, legs, knees, face, ears, eyes, hair, mouth, teeth) through games, actions, songs and rhymes.

Pupils might work scientifically by: using their observations to compare and contrast animals at first hand or through videos and photographs, describing how they identify and group them; grouping animals according to what they eat; and using their senses to compare different textures, sounds and smells.

Everyday materials

Statutory requirements

Pupils should be taught to:

- distinguish between an object and the material from which it is made **Spring 1 & 2**
- identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock **Spring 1 & 2**
- describe the simple physical properties of a variety of everyday materials **Spring 1 & 2**
- compare and group together a variety of everyday materials on the basis of their simple physical properties. **Spring 1 & 2**

Notes and guidance (non-statutory)

Pupils should explore, name, discuss and raise and answer questions about everyday materials so that they become familiar with the names of materials and properties such as: hard/soft; stretchy/stiff; shiny/dull; rough/smooth; bendy/not bendy; waterproof/not waterproof; absorbent/not absorbent; opaque/transparent. Pupils should explore and experiment with a wide variety of materials, not only those listed in the programme of study, but including for example: brick, paper, fabrics, elastic, foil.

Pupils might work scientifically by: performing simple tests to explore questions, for example: 'What is the best material for an umbrella? ...for lining a dog basket? ...for curtains? ...for a bookshelf? ...for a gymnast's leotard?'

Seasonal changes

Statutory requirements

Pupils should be taught to:

Statutory requirements

- observe changes across the four seasons **Autumn 1, Autumn 2, Spring 1, Summer 1, Summer 2**
- observe and describe weather associated with the seasons and how day length varies. **Autumn 1, Autumn 2, Spring 1, Summer 1, Summer 2**

Notes and guidance (non-statutory)

Pupils should observe and talk about changes in the weather and the seasons.

Note: Pupils should be warned that it is not safe to look directly at the Sun, even when wearing dark glasses.

Pupils might work scientifically by: making tables and charts about the weather; and making displays of what happens in the world around them, including day length, as the seasons change.

Year 2 programme of study

Living things and their habitats

Statutory requirements

Pupils should be taught to:

- explore and compare the differences between things that are living, dead, and things that have never been alive **Autumn 2**
- 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 **Autumn 2**
- identify and name a variety of plants and animals in their habitats, including micro-habitats **Autumn 2**
- 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. **Autumn 2**

Notes and guidance (non-statutory)

Pupils should be introduced to the idea that all living things have certain characteristics that are essential for keeping them alive and healthy. They should raise and answer questions that help them to become familiar with the life processes that are common to all living things. Pupils should be introduced to the terms 'habitat' (a natural environment or home of a variety of plants and animals) and 'micro-habitat' (a very small habitat, for example for woodlice under stones, logs or leaf litter). They should raise and answer questions about the local environment that help them to identify and study a variety of plants and animals within their habitat and observe how living things depend on each other, for example, plants serving as a source of food and shelter for animals. Pupils should compare animals in familiar habitats with animals found in less familiar habitats, for example, on the seashore, in woodland, in the ocean, in the rainforest.

Pupils might work scientifically by: sorting and classifying things according to whether they are living, dead or were never alive, and recording their findings using charts. They should describe how they decided where to place things, exploring questions for example: 'Is a flame alive? Is a deciduous tree dead in winter?' and talk about ways of answering their questions. They could construct a simple food chain that includes humans (e.g. grass, cow, human). They could describe the conditions in different habitats and micro-habitats (under log, on stony path, under bushes) and find out how the conditions affect the number and type(s) of plants and animals that live there.

Plants

Statutory requirements

Pupils should be taught to:

Statutory requirements

- observe and describe how seeds and bulbs grow into mature plants **Autumn 1 and Summer 2**
- find out and describe how plants need water, light and a suitable temperature to grow and stay healthy. **Autumn 1 and Summer 2**

Notes and guidance (non-statutory)

Pupils should use the local environment throughout the year to observe how different plants grow. Pupils should be introduced to the requirements of plants for germination, growth and survival, as well as to the processes of reproduction and growth in plants.

Note: Seeds and bulbs need water to grow but most do not need light; seeds and bulbs have a store of food inside them.

Pupils might work scientifically by: observing and recording, with some accuracy, the growth of a variety of plants as they change over time from a seed or bulb, or observing similar plants at different stages of growth; setting up a comparative test to show that plants need light and water to stay healthy.

Animals, including humans

Statutory requirements

Pupils should be taught to:

- notice that animals, including humans, have offspring which grow into adults **Spring 2**
- find out about and describe the basic needs of animals, including humans, for survival (water, food and air) **Spring 2**
- describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene. **Summer 1**

Notes and guidance (non-statutory)

Pupils should be introduced to the basic needs of animals for survival, as well as the importance of exercise and nutrition for humans. They should also be introduced to the processes of reproduction and growth in animals. The focus at this stage should be on questions that help pupils to recognise growth; they should not be expected to understand how reproduction occurs.

The following examples might be used: egg, chick, chicken; egg, caterpillar, pupa, butterfly; spawn, tadpole, frog; lamb, sheep. Growing into adults can include reference to baby, toddler, child, teenager, adult.

Pupils might work scientifically by: observing, through video or first-hand observation and measurement, how different animals, including humans, grow; asking questions about what things animals need for survival and what humans need to stay healthy; and suggesting ways to find answers to their questions.

Uses of everyday materials

Statutory requirements

Pupils should be taught to:

- identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses **Spring 1**
- find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. **Spring 1**

Notes and guidance (non-statutory)

Pupils should identify and discuss the uses of different everyday materials so that they become familiar with how some materials are used for more than one thing (metal can be used for coins, cans, cars and table legs; wood can be used for matches, floors, and telegraph poles) or different materials are used for the same thing (spoons can be made from plastic, wood, metal, but not normally from glass). They should think about the properties of materials that make them suitable or unsuitable for particular purposes and they should be encouraged to think about unusual and creative uses for everyday materials. Pupils might find out about people who have developed useful new materials, for example John Dunlop, Charles Macintosh or John McAdam.

Pupils might work scientifically by: comparing the uses of everyday materials in and around the school with materials found in other places (at home, the journey to school, on visits, and in stories, rhymes and songs); observing closely, identifying and classifying the uses of different materials, and recording their observations.

Lower key stage 2 – years 3 and 4

The principal focus of science teaching in lower key stage 2 is to enable pupils to broaden their scientific view of the world around them. They should do this through exploring, talking about, testing and developing ideas about everyday phenomena and the relationships between living things and familiar environments, and by beginning to develop their ideas about functions, relationships and interactions. They should ask their own questions about what they observe and make some decisions about which types of scientific enquiry are likely to be the best ways of answering them, including observing changes over time, noticing patterns, grouping and classifying things, carrying out simple comparative and fair tests and finding things out using secondary sources of information. They should draw simple conclusions and use some scientific language, first, to talk about and, later, to write about what they have found out.

'Working scientifically' is described separately at the beginning of the programme of study, but must **always** be taught through and clearly related to substantive science content in the programme of study. Throughout the notes and guidance, examples show how scientific methods and skills might be linked to specific elements of the content.

Pupils should read and spell scientific vocabulary correctly and with confidence, using their growing word reading and spelling knowledge.

Lower key stage 2 programme of study

Working scientifically

Statutory requirements

During years 3 and 4, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:

- asking relevant questions and using different types of scientific enquiries to answer them
- setting up simple practical enquiries, comparative and fair tests
- making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers
- gathering, recording, classifying and presenting data in a variety of ways to help in answering questions
- recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables
- reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions
- using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions
- identifying differences, similarities or changes related to simple scientific ideas and processes
- using straightforward scientific evidence to answer questions or to support their findings.

Notes and guidance (non-statutory)

Pupils in years 3 and 4 should be given a range of scientific experiences to enable them to raise their own questions about the world around them. They should start to make their own decisions about the most appropriate type of scientific enquiry they might use to answer questions; recognise when a simple fair test is necessary and help to decide how to set it up; talk about criteria for grouping, sorting and classifying; and use simple keys. They should begin to look for naturally occurring patterns and relationships and decide what data to collect to identify them. They should help to make decisions about what observations to make, how long to make them for and the type of simple equipment that might be used.

They should learn how to use new equipment, such as data loggers, appropriately. They should collect data from their own observations and measurements, using notes, simple tables and standard units, and help to make decisions about how to record and analyse

Notes and guidance (non-statutory)

this data. With help, pupils should look for changes, patterns, similarities and differences in their data in order to draw simple conclusions and answer questions. With support, they should identify new questions arising from the data, making predictions for new values within or beyond the data they have collected and finding ways of improving what they have already done. They should also recognise when and how secondary sources might help them to answer questions that cannot be answered through practical investigations. Pupils should use relevant scientific language to discuss their ideas and communicate their findings in ways that are appropriate for different audiences.

These opportunities for working scientifically should be provided across years 3 and 4 so that the expectations in the programme of study can be met by the end of year 4. Pupils are not expected to cover each aspect for every area of study.

Year 3 programme of study

Plants

Statutory requirements

Pupils should be taught to:

- identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers **Summer 1**
- 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 **Summer 1**
- investigate the way in which water is transported within plants **Summer 1**
- explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. **Summer 2**

Notes and guidance (non-statutory)

Pupils should be introduced to the relationship between structure and function: the idea that every part has a job to do. They should explore questions that focus on the role of the roots and stem in nutrition and support, leaves for nutrition and flowers for reproduction.

Note: Pupils can be introduced to the idea that plants can make their own food, but at this stage they do not need to understand how this happens.

Pupils might work scientifically by: comparing the effect of different factors on plant growth, for example, the amount of light, the amount of fertiliser; discovering how seeds are formed by observing the different stages of plant life cycles over a period of time; looking for patterns in the structure of fruits that relate to how the seeds are dispersed. They might observe how water is transported in plants, for example, by putting cut, white carnations into coloured water and observing how water travels up the stem to the flowers.

Animals, including humans

Statutory requirements

Pupils should be taught to:

- identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat **Spring 2**
- identify that humans and some other animals have skeletons and muscles for support, protection and movement. **Spring 2**

Notes and guidance (non-statutory)

Pupils should continue to learn about the importance of nutrition and should be introduced to the main body parts associated with the skeleton and muscles, finding out how different parts of the body have special functions.

Pupils might work scientifically by: identifying and grouping animals with and without skeletons and observing and comparing their movement; exploring ideas about what would happen if humans did not have skeletons. They might compare and contrast the diets of different animals (including their pets) and decide ways of grouping them according to what they eat. They might research different food groups and how they keep us healthy and design meals based on what they find out.

Rocks

Statutory requirements

Pupils should be taught to:

- compare and group together different kinds of rocks on the basis of their appearance and simple physical properties **Autumn 1**
- describe in simple terms how fossils are formed when things that have lived are trapped within rock **Autumn 1**
- recognise that soils are made from rocks and organic matter. **Autumn 1**

Notes and guidance (non-statutory)

Linked with work in geography, pupils should explore different kinds of rocks and soils, including those in the local environment.

Notes and guidance (non-statutory)

Pupils might work scientifically by: observing rocks, including those used in buildings and gravestones, and exploring how and why they might have changed over time; using a hand lens or microscope to help them to identify and classify rocks according to whether they have grains or crystals, and whether they have fossils in them. Pupils might research and discuss the different kinds of living things whose fossils are found in sedimentary rock and explore how fossils are formed. Pupils could explore different soils and identify similarities and differences between them and investigate what happens when rocks are rubbed together or what changes occur when they are in water. They can raise and answer questions about the way soils are formed.

Light

Statutory requirements

Pupils should be taught to:

- recognise that they need light in order to see things and that dark is the absence of light **Spring 1**
- notice that light is reflected from surfaces **Spring 1**
- recognise that light from the sun can be dangerous and that there are ways to protect their eyes **Spring 1**
- recognise that shadows are formed when the light from a light source is blocked by an opaque object **Spring 1**
- find patterns in the way that the size of shadows change. **Spring 1**

Notes and guidance (non-statutory)

Pupils should explore what happens when light reflects off a mirror or other reflective surfaces, including playing mirror games to help them to answer questions about how light behaves. They should think about why it is important to protect their eyes from bright lights. They should look for, and measure, shadows, and find out how they are formed and what might cause the shadows to change.

Note: Pupils should be warned that it is not safe to look directly at the Sun, even when wearing dark glasses.

Pupils might work scientifically by: looking for patterns in what happens to shadows when the light source moves or the distance between the light source and the object changes.

Forces and magnets

Statutory requirements

Pupils should be taught to:

Statutory requirements

- compare how things move on different surfaces **Autumn 2**
- notice that some forces need contact between two objects, but magnetic forces can act at a distance **Autumn 2**
- observe how magnets attract or repel each other and attract some materials and not others **Autumn 2**
- 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 **Autumn 2**
- describe magnets as having two poles **Autumn 2**
- predict whether two magnets will attract or repel each other, depending on which poles are facing. **Autumn 2**

Notes and guidance (non-statutory)

Pupils should observe that magnetic forces can act without direct contact, unlike most forces, where direct contact is necessary (for example, opening a door, pushing a swing). They should explore the behaviour and everyday uses of different magnets (for example, bar, ring, button and horseshoe).

Pupils might work scientifically by: comparing how different things move and grouping them; raising questions and carrying out tests to find out how far things move on different surfaces and gathering and recording data to find answers their questions; exploring the strengths of different magnets and finding a fair way to compare them; sorting materials into those that are magnetic and those that are not; looking for patterns in the way that magnets behave in relation to each other and what might affect this, for example, the strength of the magnet or which pole faces another; identifying how these properties make magnets useful in everyday items and suggesting creative uses for different magnets.

Year 4 programme of study

Living things and their habitats

Statutory requirements

Pupils should be taught to:

- recognise that living things can be grouped in a variety of ways **Autumn 2 & Summer 1**
- explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment **Autumn 2 & Summer 1**
- recognise that environments can change and that this can sometimes pose dangers to living things. **Autumn 2 & Summer 1**

Notes and guidance (non-statutory)

Pupils should use the local environment throughout the year to raise and answer questions that help them to identify and study plants and animals in their habitat. They should identify how the habitat changes throughout the year. Pupils should explore possible ways of grouping a wide selection of living things that include animals and flowering plants and non-flowering plants. Pupils could begin to put vertebrate animals into groups such as fish, amphibians, reptiles, birds, and mammals; and invertebrates into snails and slugs, worms, spiders, and insects.

Note: Plants can be grouped into categories such as flowering plants (including grasses) and non-flowering plants, such as ferns and mosses.

Pupils should explore examples of human impact (both positive and negative) on environments, for example, the positive effects of nature reserves, ecologically planned parks, or garden ponds, and the negative effects of population and development, litter or deforestation.

Pupils might work scientifically by: using and making simple guides or keys to explore and identify local plants and animals; making a guide to local living things; raising and answering questions based on their observations of animals and what they have found out about other animals that they have researched.

Animals, including humans

Statutory requirements

Pupils should be taught to:

- describe the simple functions of the basic parts of the digestive system in humans **Autumn 1**
- identify the different types of teeth in humans and their simple functions **Autumn 1**
- construct and interpret a variety of food chains, identifying producers, predators and prey. **Autumn 1**

Notes and guidance (non-statutory)

Pupils should be introduced to the main body parts associated with the digestive system, for example, mouth, tongue, teeth, oesophagus, stomach and small and large intestine and explore questions that help them to understand their special functions.

Pupils might work scientifically by: comparing the teeth of carnivores and herbivores, and suggesting reasons for differences; finding out what damages teeth and how to look after them. They might draw and discuss their ideas about the digestive system and compare them with models or images.

States of matter

Statutory requirements

Pupils should be taught to:

- compare and group materials together, according to whether they are solids, liquids or gases **Spring 1**
- 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) **Spring 1**
- identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature. **Spring 1**

Notes and guidance (non-statutory)

Pupils should explore a variety of everyday materials and develop simple descriptions of the states of matter (solids hold their shape; liquids form a pool not a pile; gases escape from an unsealed container). Pupils should observe water as a solid, a liquid and a gas and should note the changes to water when it is heated or cooled.

Notes and guidance (non-statutory)

Note: Teachers should avoid using materials where heating is associated with chemical change, for example, through baking or burning.

Pupils might work scientifically by: grouping and classifying a variety of different materials; exploring the effect of temperature on substances such as chocolate, butter, cream (for example, to make food such as chocolate crispy cakes and ice-cream for a party). They could research the temperature at which materials change state, for example, when iron melts or when oxygen condenses into a liquid. They might observe and record evaporation over a period of time, for example, a puddle in the playground or washing on a line, and investigate the effect of temperature on washing drying or snowmen melting.

Sound

Statutory requirements

Pupils should be taught to:

- identify how sounds are made, associating some of them with something vibrating **Spring 2**
- recognise that vibrations from sounds travel through a medium to the ear **Spring 2**
- find patterns between the pitch of a sound and features of the object that produced it **Spring 2**
- find patterns between the volume of a sound and the strength of the vibrations that produced it **Spring 2**
- recognise that sounds get fainter as the distance from the sound source increases. **Spring 2**

Notes and guidance (non-statutory)

Pupils should explore and identify the way sound is made through vibration in a range of different musical instruments from around the world; and find out how the pitch and volume of sounds can be changed in a variety of ways.

Pupils might work scientifically by: finding patterns in the sounds that are made by different objects such as saucepan lids of different sizes or elastic bands of different thicknesses. They might make earmuffs from a variety of different materials to investigate which provides the best insulation against sound. They could make and play their own instruments by using what they have found out about pitch and volume.

Electricity

Statutory requirements

Pupils should be taught to:

- identify common appliances that run on electricity **Summer 2**
- construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers **Summer 2**
- 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 **Summer 2**
- recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit **Summer 2**
- recognise some common conductors and insulators, and associate metals with being good conductors. **Summer 2**

Notes and guidance (non-statutory)

Pupils should construct simple series circuits, trying different components, for example, bulbs, buzzers and motors, and including switches, and use their circuits to create simple devices. Pupils should draw the circuit as a pictorial representation, not necessarily using conventional circuit symbols at this stage; these will be introduced in year 6.

Note: Pupils might use the terms current and voltage, but these should not be introduced or defined formally at this stage. Pupils should be taught about precautions for working safely with electricity.

Pupils might work scientifically by: observing patterns, for example, that bulbs get brighter if more cells are added, that metals tend to be conductors of electricity, and that some materials can and some cannot be used to connect across a gap in a circuit.

Upper key stage 2 – years 5 and 6

The principal focus of science teaching in upper key stage 2 is to enable pupils to develop a deeper understanding of a wide range of scientific ideas. They should do this through exploring and talking about their ideas; asking their own questions about scientific phenomena; and analysing functions, relationships and interactions more systematically. At upper key stage 2, they should encounter more abstract ideas and begin to recognise how these ideas help them to understand and predict how the world operates. They should also begin to recognise that scientific ideas change and develop over time. They should select the most appropriate ways to answer science questions using different types of scientific enquiry, including observing changes over different periods of time, noticing patterns, grouping and classifying things, carrying out comparative and fair tests and finding things out using a wide range of secondary sources of information. Pupils should draw conclusions based on their data and observations, use evidence to justify their ideas, and use their scientific knowledge and understanding to explain their findings.

'Working and thinking scientifically' is described separately at the beginning of the programme of study, but must **always** be taught through and clearly related to substantive science content in the programme of study. Throughout the notes and guidance, examples show how scientific methods and skills might be linked to specific elements of the content.

Pupils should read, spell and pronounce scientific vocabulary correctly.

Upper key stage 2 programme of study

Working scientifically

Statutory requirements

During years 5 and 6, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:

- planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary
- taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate
- recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
- using test results to make predictions to set up further comparative and fair tests
- reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations
- identifying scientific evidence that has been used to support or refute ideas or arguments.

Notes and guidance (non-statutory)

Pupils in years 5 and 6 should use their science experiences to: explore ideas and raise different kinds of questions; select and plan the most appropriate type of scientific enquiry to use to answer scientific questions; recognise when and how to set up comparative and fair tests and explain which variables need to be controlled and why. They should use and develop keys and other information records to identify, classify and describe living things and materials, and identify patterns that might be found in the natural environment. They should make their own decisions about what observations to make, what measurements to use and how long to make them for, and whether to repeat them; choose the most appropriate equipment to make measurements and explain how to use it accurately. They should decide how to record data from a choice of familiar approaches; look for different causal relationships in their data and identify evidence that refutes or supports their ideas. They should use their results to identify when further tests and observations might be needed; recognise which secondary sources will be most useful to research their ideas and begin to separate opinion from fact. They should use relevant scientific language and illustrations to discuss, communicate and justify their scientific ideas and should talk about how scientific ideas have developed over time.

These opportunities for working scientifically should be provided across years 5 and 6 so that the expectations in the programme of study can be met by the end of year 6. Pupils are not expected to cover each aspect for every area of study.

Year 5 programme of study

Living things and their habitats

Statutory requirements

Pupils should be taught to:

- describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird **Spring 2**
- describe the life process of reproduction in some plants and animals. **Summer 1**

Notes and guidance (non-statutory)

Pupils should study and raise questions about their local environment throughout the year. They should observe life-cycle changes in a variety of living things, for example, plants in the vegetable garden or flower border, and animals in the local environment. They should find out about the work of naturalists and animal behaviourists, for example, David Attenborough and Jane Goodall.

Pupils should find out about different types of reproduction, including sexual and asexual reproduction in plants, and sexual reproduction in animals.

Pupils might work scientifically by: observing and comparing the life cycles of plants and animals in their local environment with other plants and animals around the world (in the rainforest, in the oceans, in desert areas and in prehistoric times), asking pertinent questions and suggesting reasons for similarities and differences. They might try to grow new plants from different parts of the parent plant, for example, seeds, stem and root cuttings, tubers, bulbs. They might observe changes in an animal over a period of time (for example, by hatching and rearing chicks), comparing how different animals reproduce and grow.

Animals, including humans

Statutory requirements

Pupils should be taught to:

- describe the changes as humans develop to old age. **Summer 1**

Notes and guidance (non-statutory)

Pupils should draw a timeline to indicate stages in the growth and development of humans. They should learn about the changes experienced in puberty.

Pupils could work scientifically by researching the gestation periods of other animals and comparing them with humans; by finding out and recording the length and mass of a baby as it grows.

Properties and changes of materials

Statutory requirements

Pupils should be taught to:

- compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets **Autumn 1 & 2**
- know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution **Autumn 1 & 2**
- use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating **Autumn 1 & 2**
- give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic **Autumn 1 & 2**
- demonstrate that dissolving, mixing and changes of state are reversible changes **Autumn 1 & 2**
- 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. **Autumn 1 & 2**

Notes and guidance (non-statutory)

Pupils should build a more systematic understanding of materials by exploring and comparing the properties of a broad range of materials, including relating these to what they learnt about magnetism in year 3 and about electricity in year 4. They should explore reversible changes, including, evaporating, filtering, sieving, melting and dissolving, recognising that melting and dissolving are different processes. Pupils should explore changes that are difficult to reverse, for example, burning, rusting and other reactions, for example, vinegar with bicarbonate of soda. They should find out about how chemists create new materials, for example, Spencer Silver, who invented the glue for sticky notes or Ruth Benerito, who invented wrinkle-free cotton.

Note: Pupils are not required to make quantitative measurements about conductivity and insulation at this stage. It is sufficient for them to observe that some conductors will produce a brighter bulb in a circuit than others and that some materials will feel hotter than others when a heat source is placed against them. Safety guidelines should be followed when burning materials.

Pupils might work scientifically by: carrying out tests to answer questions, for example, ‘Which materials would be the most effective for making a warm jacket, for wrapping ice cream to stop it melting, or for making blackout curtains?’ They might compare materials in order to make a switch in a circuit. They could observe and compare the changes that take place, for example, when burning different materials or baking bread or cakes. They might research and discuss how chemical changes have an impact on our lives, for example, cooking, and discuss the creative use of new materials such as polymers, super-sticky and super-thin materials.

Earth and space

Statutory requirements

Pupils should be taught to:

- describe the movement of the Earth, and other planets, relative to the Sun in the solar system **Summer 1 & 2**
- describe the movement of the Moon relative to the Earth **Summer 1 & 2**
- describe the Sun, Earth and Moon as approximately spherical bodies **Summer 1 & 2**
- use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky. **Summer 1 & 2**

Notes and guidance (non-statutory)

Pupils should be introduced to a model of the Sun and Earth that enables them to explain day and night. Pupils should learn that the Sun is a star at the centre of our solar system and that it has eight planets: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune (Pluto was reclassified as a 'dwarf planet' in 2006). They should understand that a moon is a celestial body that orbits a planet (Earth has one moon; Jupiter has four large moons and numerous smaller ones).

Note: Pupils should be warned that it is not safe to look directly at the Sun, even when wearing dark glasses.

Pupils should find out about the way that ideas about the solar system have developed, understanding how the geocentric model of the solar system gave way to the heliocentric model by considering the work of scientists such as Ptolemy, Alhazen and Copernicus.

Pupils might work scientifically by: comparing the time of day at different places on the Earth through internet links and direct communication; creating simple models of the solar system; constructing simple shadow clocks and sundials, calibrated to show midday and the start and end of the school day; finding out why some people think that structures such as Stonehenge might have been used as astronomical clocks.

Forces

Statutory requirements

Pupils should be taught to:

- explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object **Spring 1**
- identify the effects of air resistance, water resistance and friction, that act between moving surfaces **Spring 1**
- recognise that some mechanisms, including levers, pulleys and gears, allow a

Statutory requirements

smaller force to have a greater effect. **Spring 1**

Notes and guidance (non-statutory)

Pupils should explore falling objects and raise questions about the effects of air resistance. They should explore the effects of air resistance by observing how different objects such as parachutes and sycamore seeds fall. They should experience forces that make things begin to move, get faster or slow down. Pupils should explore the effects of friction on movement and find out how it slows or stops moving objects, for example, by observing the effects of a brake on a bicycle wheel. Pupils should explore the effects of levers, pulleys and simple machines on movement. Pupils might find out how scientists, for example, Galileo Galilei and Isaac Newton helped to develop the theory of gravitation.

Pupils might work scientifically by: exploring falling paper cones or cup-cake cases, and designing and making a variety of parachutes and carrying out fair tests to determine which designs are the most effective. They might explore resistance in water by making and testing boats of different shapes. They might design and make products that use levers, pulleys, gears and/or springs and explore their effects.

Year 6 programme of study

Living things and their habitats

Statutory requirements

Pupils should be taught to:

- describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals
- give reasons for classifying plants and animals based on specific characteristics.

Notes and guidance (non-statutory)

Pupils should build on their learning about grouping living things in year 4 by looking at the classification system in more detail. They should be introduced to the idea that broad groupings, such as micro-organisms, plants and animals can be subdivided. Through direct observations where possible, they should classify animals into commonly found invertebrates (such as insects, spiders, snails, worms) and vertebrates (fish, amphibians, reptiles, birds and mammals). They should discuss reasons why living things are placed in one group and not another.

Pupils might find out about the significance of the work of scientists such as Carl Linnaeus, a pioneer of classification.

Pupils might work scientifically by: using classification systems and keys to identify some animals and plants in the immediate environment. They could research unfamiliar animals and plants from a broad range of other habitats and decide where they belong in the classification system.

Animals including humans

Statutory requirements

Pupils should be taught to:

- identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood **Spring 1**
- recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function **Spring 2**
- describe the ways in which nutrients and water are transported within animals, including humans. **Spring 1**

Notes and guidance (non-statutory)

Pupils should build on their learning from years 3 and 4 about the main body parts and internal organs (skeletal, muscular and digestive system) to explore and answer

Notes and guidance (non-statutory)

questions that help them to understand how the circulatory system enables the body to function.

Pupils should learn how to keep their bodies healthy and how their bodies might be damaged – including how some drugs and other substances can be harmful to the human body.

Pupils might work scientifically by: exploring the work of scientists and scientific research about the relationship between diet, exercise, drugs, lifestyle and health.

Evolution and inheritance

Statutory requirements

Pupils should be taught to:

- recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago **Autumn 2**
- recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents **Autumn 2**
- identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution. **Autumn 2**

Notes and guidance (non-statutory)

Building on what they learned about fossils in the topic on rocks in year 3, pupils should find out more about how living things on earth have changed over time. They should be introduced to the idea that characteristics are passed from parents to their offspring, for instance by considering different breeds of dogs, and what happens when, for example, labradors are crossed with poodles. They should also appreciate that variation in offspring over time can make animals more or less able to survive in particular environments, for example, by exploring how giraffes' necks got longer, or the development of insulating fur on the arctic fox. Pupils might find out about the work of palaeontologists such as Mary Anning and about how Charles Darwin and Alfred Wallace developed their ideas on evolution.

Note: At this stage, pupils are not expected to understand how genes and chromosomes work.

Pupils might work scientifically by: observing and raising questions about local animals and how they are adapted to their environment; comparing how some living things are adapted to survive in extreme conditions, for example, cactuses, penguins and camels. They might analyse the advantages and disadvantages of specific adaptations, such as being on two feet rather than four, having a long or a short beak, having gills or lungs, tendrils on climbing plants, brightly coloured and scented flowers.

Light

Statutory requirements

Pupils should be taught to:

- recognise that light appears to travel in straight lines **Summer 1**
- 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 **Summer 1**
- 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 **Summer 1**
- use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them. **Summer 1**

Notes and guidance (non-statutory)

Pupils should build on the work on light in year 3, exploring the way that light behaves, including light sources, reflection and shadows. They should talk about what happens and make predictions.

Pupils might work scientifically by: deciding where to place rear-view mirrors on cars; designing and making a periscope and using the idea that light appears to travel in straight lines to explain how it works. They might investigate the relationship between light sources, objects and shadows by using shadow puppets. They could extend their experience of light by looking a range of phenomena including rainbows, colours on soap bubbles, objects looking bent in water and coloured filters (they do not need to explain why these phenomena occur).

Electricity

Statutory requirements

Pupils should be taught to:

- associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit **Summer 2**
- 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 **Summer 2**
- use recognised symbols when representing a simple circuit in a diagram. **Summer 2**

Notes and guidance (non-statutory)

Building on their work in year 4, pupils should construct simple series circuits, to help them to answer questions about what happens when they try different components, for example, switches, bulbs, buzzers and motors. They should learn how to represent a

Notes and guidance (non-statutory)

simple circuit in a diagram using recognised symbols.

Note: Pupils are expected to learn only about series circuits, not parallel circuits. Pupils should be taught to take the necessary precautions for working safely with electricity.

Pupils might work scientifically by: systematically identifying the effect of changing one component at a time in a circuit; designing and making a set of traffic lights, a burglar alarm or some other useful circuit.

Science Assessment Statements
Year 1 **Name:**

Expected standard Year 1

Statements of assessment	February	July
Disciplinary knowledge		
I can ask simple questions and recognise that they can be answered in different ways. *For example, about differences between my body parts and another's - length of hands, size of heads, feet.*		
I can observe closely, using simple equipment. *For example: the differences between the bark of different trees / the differences between fabrics using a magnifying glass.*		
I can perform simple tests. *For example: a fair test when making cress grow / testing different types of paper for painting, writing and mopping.*		
I can explain how to classify items I have learnt about. *For example*: *deciduous and evergreen trees, groups of animals, materials.*		
I can gather and record data to help in answering questions. *For example: I can explain my results table for grouping objects according to their name and what they are used for, I can explain my results table for testing different types of paper.*		
Substantive knowledge		
Plants I can identify and describe the basic structure of a variety of common flowering plants *(including leaves, flowers (blossom), petals, fruit, roots, bulb, seed, stem).*		
I can identify and name deciduous and evergreen trees.		
I can identify and describe the basic structure of a tree (bark, trunk, branches, root and leaves).		
Animals including humans I can identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals.		
I can identify and name common animals that are carnivores, herbivores and omnivores.		
I can describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets) *For example, how different animals move.*		
I can identify, name, draw outside body parts. *For example: head, neck, arms, elbows, legs, knees, face, ears, eyes, hair, mouth, teeth.*		
I can identify, name, draw inside body parts. *For example*: skeleton, muscles heart, lungs, brain.		
I can say which part of the body is associated with each sense.		
Everyday Materials I can distinguish between an object and the material from which it is made. *For example a table is made from wood.*		
I can explain the difference between an object and the material from which it is made, and that most objects are made from more than one material. *For example, windows are made from glass and plastic/wood/metal.*		
I can identify and name a variety of everyday materials, including wood,		

plastic, glass, metal, water, and rock.		
I can describe the simple physical properties of a variety of everyday materials. *For example the best paper to use for writing, painting, wrapping and mopping, the most suitable fabrics for different clothing.*		
Seasonal Changes I can explain about the four seasons.		
I can explain changes across the four seasons *For example: the weather, the trees, the clothes I need and the length of the days.*		

February assessment point **On track to** _____

July assessment point _____

Science Assessment Statements
Year 2 **Name:**

Expected standard Year 2

Statements of assessment	February	July
Disciplinary knowledge		
I can ask simple questions and recognise that they can be answered in different ways. *For example*: *turning my predictions into questions – how tall will this bulb grow? Drawing predictions of what will happen to plants in sunlight, shade and the dark.*		
I can observe closely, using simple equipment. *For example; describing the feel, colour, shape, size of a seed under a microscope, observing incubation and hatching of chicken egg.*		
I can perform simple tests. *For example*: *investigating and observing what seeds / bulbs look like when they germinate underground, set up a fair test to find out how much light plants need, investigating what keeps polar bears warm, carrying out the fair 'rub' test for toddle dungarees.*		
I can identify and classify. *For example: different seeds, sorting living things into producer, predator and prey (grass, zebra, lion), sorting things into groups of alive/dead/never alive (tiger, oak tree, pebble), sorting objects in different ways and write explanations of methodology, sorting foods into groups protein, carbohydrate, dairy, fruit, vegetable, grouping hygiene cards.*		
I can gather and record data to help in answering questions. *For example*: *dated and labelled observational drawings of kidney bean growing to describe process of germination, making a tally chart to answer question about what happens to plants if they don't have enough light, recording toddler dungaree rub test on results table, completing a table of results to show whether items can be squashed, bent, twisted, stretched*.		
Substantive knowledge		
All living things and their habitats I can compare the differences between things that are living, dead, and things that have never been alive. *For example: tiger, oak tree, pebble.*		
I can identify and name a variety of plants and animals in their habitats, including micro-habitats. *For example: cacti in the desert, camels in the desert, polar bears in icy water, insects living in tree bark.*		
I can 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. *For example*: sun → grass→ zebra →lion		
Plants I can explain how seeds and bulbs grow into mature plants.		
I can find out and describe how plants need water, light and a suitable temperature to grow and stay healthy.		
Animals, including humans I can explain that animals, including humans, have offspring which grow into adults.		

For example: ordering pictures and names of human life cycle, chicks growing into hens activity, explaining how baby animals change as they grow into adults (mammals, birds, amphibians, reptiles).		
I can find out about and describe the basic needs of animals, including humans, for survival (water, food and air). *For example: human babies needing food, water, air, warmth and safety / chicks needing right food, water, warmth, clean place to live.*		
I can describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene. *For example: design a healthy packed lunch box, exercise stations.*		
Uses of everyday materials I can identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. *For example: scissors with metal cutting blades and plastic handles, spinner activity to select material and object, materials for toddler dungarees.*		

February assessment point **On track to**_____

July assessment point _____

Science Assessment Statements
Year 3 **Name:**

Expected standard Year 3

Statements of assessment	February	July
Disciplinary knowledge		
I can ask relevant questions and use different types of scientific enquiries to answer them. *For example: creating questions about rocks for branching trees and completing branching key to sort the rocks.*		
I can set up simple practical enquiries, including comparative and fair tests. *For example: fair test investigating what happens if plants do not have enough light or water / planning a six step (plan, predict, carry out, observe, record, reflect) investigation into which rocks absorb water.*		
I can make systematic and careful observations and, where appropriate, taking accurate measurements using standard units. *For example: table and bar graph – sugar consumption, magnifiers to identify and record fossils.*		
I can gather, record, classify and present data in a variety of ways to help in answering questions. *For example: drawing, classifying leaves, dissecting flowers, shadow diagrams.*		
I can report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions. *For example, writing / presenting a description of how an object moves.*		
Substantive knowledge		
Plants I can identify and explain the functions of different parts of flowering plants: roots *(anchor a plant to the ground and draw up water and nutrients from the soil),* stem/trunk *(holds plant up, take water/nutrients from roots to flower and leaves)*, leaves *(make food for the plant using sunlight,* flowers *(for reproduction).*		
I can 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. *For example: investigating what happens if plants do not have enough light or water, explaining some plants' needs differ depending on their environment e.g. cacti.*		
I can explore the part that flowers play in the life cycle of flowering plants, including: • pollination and seed formation (*e.g. I can explain the process of insect pollination through role play)* • seed dispersal (*e.g. I can explain different methods of seed dispersal)*		
Animals, including humans I can identify that animals, including humans, need the right types and amount of nutrition. *For example: carbohydrate, protein, fat, fibre, dairy, fruit, vitamins, minerals, water.*		
I can identify and explain that humans have skeletons and muscles for support, protection and movement.		
I can identify and explain that some other animals have skeletons and muscles for support, protection and movement. *For example: I can sort animals into vertebrate and invertebrate groups.*		

Rocks I can compare and group together different kinds of rocks on the basis of their appearance and simple physical properties. *For example*: *using a table and branching keys.*		
I can describe in simple terms how fossils are formed when things that have lived are trapped within rock.		
Light I can recognise that we need light in order to see things and that dark is the absence of light. *For example: investigating how hard or easy it is to see objects in different amounts of light.*		
I can notice that light is reflected from surfaces. *For example: shiny objects that reflect light (tinsel, spoons, silver coins, metallic card) and describing how a mirror works and how images and words look different in mirrors.*		
I can recognise that shadows are formed when the light from a light source is blocked by a solid object. *For example, shadow investigation.*		
I can find patterns in the way that the size of shadows change. *For example, describing how the shadow shape changes as the light source moves.*		
Forces and magnets I can compare how things move on different surfaces. *For example: investigating how materials change the speed of cars going down a ramp*		
I can observe how magnets attract or repel each other and attract some materials and not others describe magnets as having two poles.		
I can 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.		

February assessment point **On track to** _____

July assessment point _____

Science Assessment Statements
Year 4 **Name:**

Expected standard Year 4

Statements of assessment	February	July
Disciplinary knowledge		
I can ask relevant questions and use different types of scientific enquiries to answer them. *For example*: *what happens when a food chain is broken 'thought map'.*		
I can set up simple practical enquiries, including comparative and fair tests. *For example*, *the effect of temperature on how fast ice cubes melts.*		
I can make systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers. *For example: planning an investigation of the effect of temperature on how fast ice cubes melt / investigating how temperature affects how much time fabric takes to dry.*		
I can record findings using simple scientific language, drawings, labelled diagrams *(digestive system) (leaves*), keys, bar charts *(effect of temperature on how fast ice cubes melts)* and tables *(impact of acid on tooth enamel) (which materials are conductors/insulators).*		
I can use results to draw simple conclusions, make predictions for new values *(making predictions and test 4 different circuits)*, suggest improvements and raise further questions. *(How good is toothpaste? investigation)*		
Substantive knowledge		
Living things and their habitats I can recognise that environments can change and that this can sometimes pose dangers to living things. *For example*: *activity - what happens when a food chain is broken?*		
Animals, including humans I can describe the simple functions of the basic parts of the digestive system in humans. *For example*: *labelled diagram of the digestive system and sentences explaining the function of each part, mechanical/chemical processes in Venn diagram.*		
I can identify the different types of teeth in humans and their simple functions. *For example: colour coding teeth.*		
States of matter I can compare and group materials together, according to whether they are solids, liquids or gases.		
I can 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). *For example*: *planning an investigation of the effect of temperature on how fast ice cubes melt.*		
I can identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature. *For example*: *investigating how temperature affects how much time fabric takes to dry / observations of water boiling.*		
Sound		

I can identify how sounds are made, associating some of them with something vibrating. *For example*, *exploring different instruments.*		
I can recognise that vibrations from sounds travel through a medium to the ear. *For example*: *testing sound travelling through ear gongs / recording whether sound travels better through solids or gases.*		
I can find patterns between the volume of a sound and the strength of the vibrations that produced it. *For example*, *explaining about how changing the volume of the sound affects the candle flame*		
I can recognise that sounds get fainter as the distance from the sound source increases. *For example*: *table of results - name of sound source, distance at which I could no longer hear the sound source.*		
Electricity I can construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers.		
I can 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. *For example, making predictions and testing 4 different circuits.*		
I can explain that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit. *For example*: *making a paperclip toggle switch and writing explanation of switch.*		

February assessment point **On track to** _____

July assessment point _____

Science Assessment Statements
Year 5 **Name:**

Expected standard Year 5

Statements of assessment	February	July
Disciplinary knowledge		
I can plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary. *For example: fair test to find out which materials - wood, metal and plastic - are thermal conductors and which are insulators / investigating variables that affect the rate at which salt dissolves.*		
I can take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate *For example, using thermometers to test how long spoon handles take to heat up /* *using Newton metres to measure the force needed to move different sized matchboxes.*		
I can record data and results of increasing complexity using scientific diagrams and labels *(flower parts),* classification keys, tables, scatter graphs *(patterns in the information about length of gestation of animals)*, bar and line graphs *(line graph of parachute and rubber band results).*		
I can report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations. *For example: patterns in the information about length of gestation of animals / mixing four solids - brown sugar, salt, sand and flour into a different jar of water and observing what happens / candle investigation / how mass affects the amount that springs or rubber bands stretch.*		
I can identify scientific evidence that has been used to support or refute ideas or arguments.		
Substantive knowledge		
Living things and their habitats I can describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird.		
I can describe the life process of reproduction in some plants. *For example: sexual reproduction - drawings of flower parts to illustrate explanations of each step of pollination and fertilization / asexual reproduction - produce a how to guide about a method of propagation.*		
I can describe the life process of reproduction in some animals.		
Animals, including humans I can describe the changes as humans develop to old age.		
Properties and changes of materials I can compare and group together everyday materials on the basis of their properties, including their: • hardness / solubility / transparency *(table identifying the properties of different materials and the table comparing two materials)* • conductivity (electrical and thermal) *(fair test to find out which materials - wood, metal and plastic - are thermal conductors and which are insulators).*		
I know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution *For example: mixing brown sugar, salt, sand and flour into a different jar of*		

water - using sieve to recover sand and flour.		
I can use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through: • sieving *(see above)* / filtering *(devising a method that produces the cleanest (purest) salt possible)* • evaporating *(investigating how to get salt back from saltwater)*		
I can demonstrate that dissolving, mixing and changes of state are reversible changes.		
Earth and Space I can describe the movement of the Earth, and other planets, relative to the Sun in the solar system. *For example, playground modelling.*		
I can describe the movement of the Moon relative to the Earth *For example, annotating the phases of the Moon.*		
I can use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky. *For example, blu tac/cocktail stick and torch modelling / using an internet world clock and map to find out the time and longitude at places around the world.*		
Forces I can explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object. *For example, measuring the effect of mass on the time cupcake cases take to fall Aristotle and Galileo investigation / investigating how far a rubber band is stretched by different masses.*		
I can identify the effects of: • air resistance *(testing how the size of the parachute affects the speed that it falls)* • water resistance *(investigate the best shape for the front of a speedboat)* • friction *(toy vehicles activity)* - that act between moving surfaces		

February assessment point **On track to** _____

July assessment point _____

Science Assessment Statements
Year 6 **Name:**

Expected standard Year 6

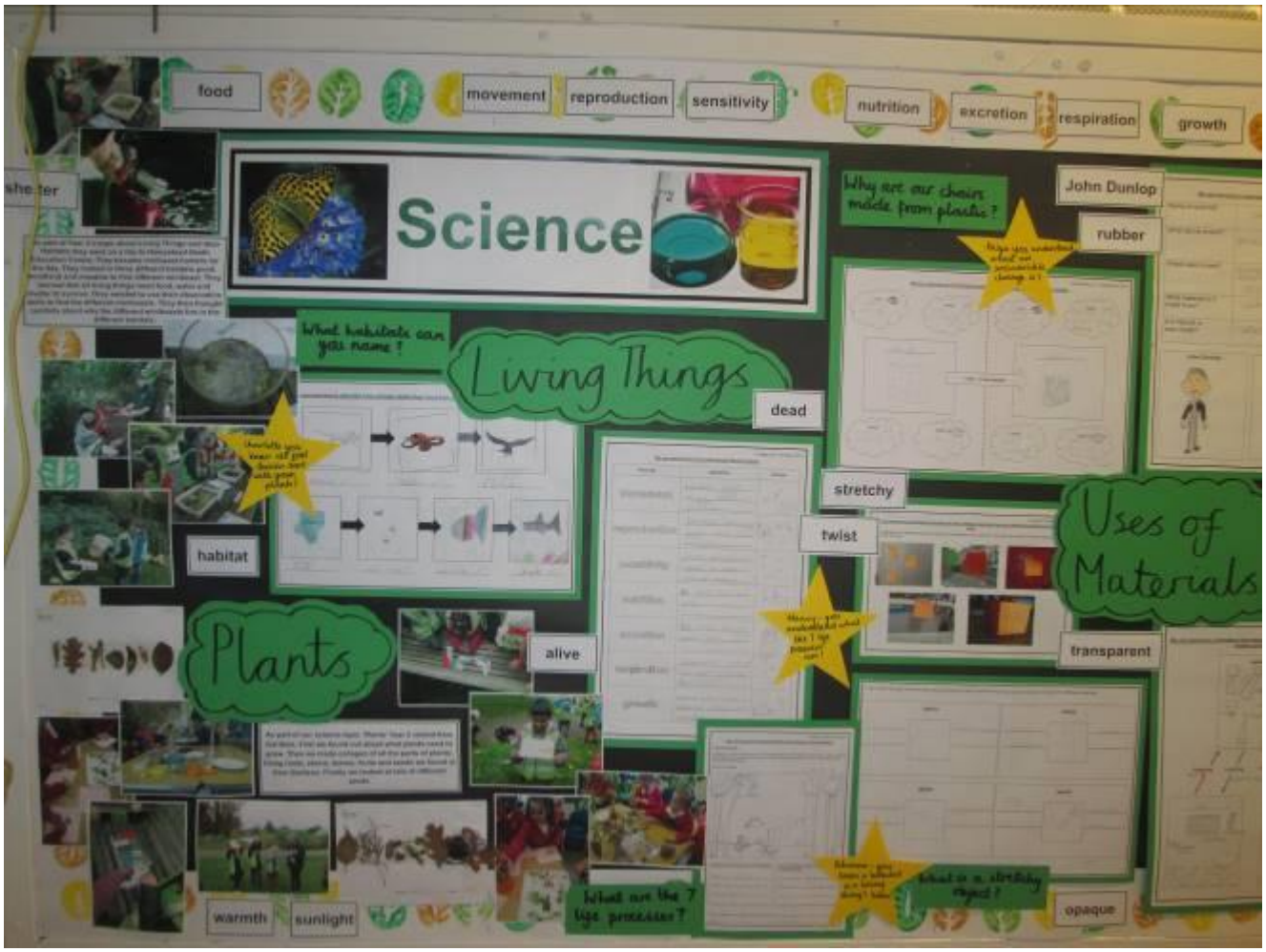
Statements of assessment	Feb	July
Disciplinary knowledge		
I can plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary. For example, *plan enquiry question, hypothesis and fair test investigating the growth of mould on bread.* *For example, plan investigation to identify variables that affect size of a shadow.* *Complete investigation into children's science books: question / prediction / method / fair testing - dependent variables (same) and independent variables (changes), recording on results table, conclusion.*		
I can take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate. *For example, results tables of repeated resting and post-exercise pulse rates.* *For example, investigation to identify the variables that affect size of a shadow - recording measurements on results table.*		
I can record data and results of increasing complexity using scientific diagrams and labels *(record changes to bread going mouldy, draw and sketch changes)*, classification keys *(vertebrates and invertebrates)*, tables, scatter graphs, bar and line graphs *(resting and post-exercise pulse rates tables and graph) (identify the variables that affect size of a shadow -recording measurements on line graph)*		
I can report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations *For example, lesson 4 Autumn 2 children reflect on results from mouldy bread investigation, discuss, write conclusions, present findings and their further questions in a presentation to the class.*		
I can identify scientific evidence that has been used to support or refute ideas or arguments.		
Substantive knowledge		
Living things and their habitats I can describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including: • micro-organisms *(monera (bacteria), protista (viruses), fungi)* *For example, children complete sorting table and short paragraphs about a range of different microbes to show their understanding of whether the microbes are helpful or harmful.* • plants / animals *For example, children copy the classification chart, colour coding each of the kingdoms, explaining how it works, starting at the top of the diagram and talking through each layer. Children classify a selection of organisms and answer the questions:* • *What is classification?* • *Why do scientists classify living organisms?*		
Animals, including humans I can identify and name the main parts of the human circulatory system *(heart, blood vessels and blood - draw figure-of-eight circulation system),* and describe the functions of the: • heart *(e.g. labelled diagram of a heart with definitions for each part).* • blood vessels *(e.g. sentences about the function of valves, veins, arteries and*		

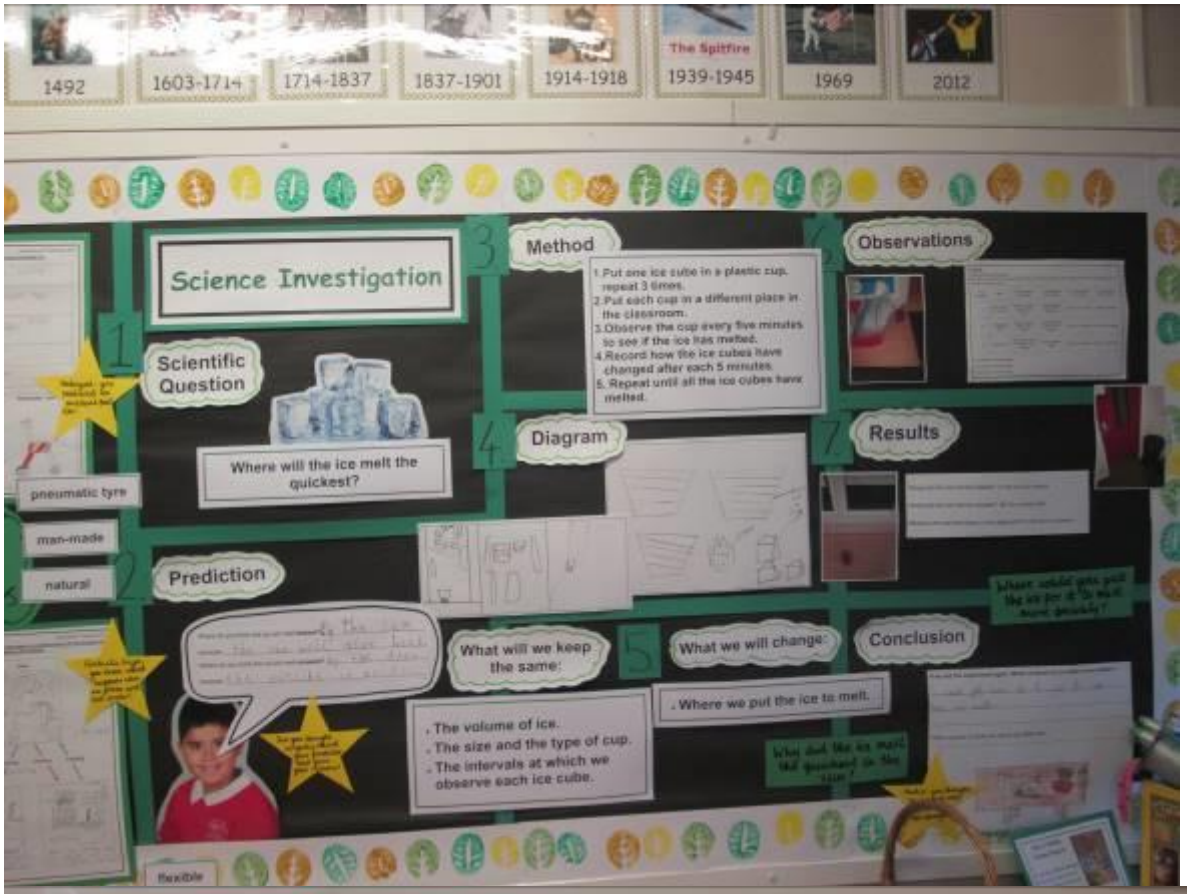
capillaries) • blood *(e.g. fact file for each component of blood: red blood cells, white blood cells, plasma and platelets)*		
I can describe the ways in which nutrients and water are transported within animals, including humans.		
Evolution and inheritance I can explain how living things have changed over time. *For example, children know that humans evolved from apes and only homo sapiens survived / that giraffes evolved in order to reach best leaves on trees. Children make a list of questions about evolution.*		
I can explain how fossils provide information about living things that inhabited the Earth millions of years ago. *For example, children stick pictures in books and answer the following questions:* *1. Which modern species do you think this animal is related to and why?* *2. How do you think it is different to its modern-day relative?*		
I can explain that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents. *For example, photo page documenting class discussion about characteristics children have inherited from relatives.*		
I can identify how <u>plants</u> are adapted to suit their environment in different ways and that adaptation may lead to evolution. *For example, children draw a diagram of a cactus and label the key adaptations, then write a paragraph explaining the ways in which a cactus is suited to arid conditions.*		
Light I can 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. *For example: light experiment - children create human model that shows how light enables us to see, using yellow wool to symbolise a ray of light, and two members of group acting as a light source and an object, holding wool to demonstrate how the light travels from source to object and then eyes.* *For example, completed information sheet demonstrating core knowledge about light.*		
Electricity I can 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 *For example: Investigation 2 - children investigate effects on components in a circuit of using higher voltage cells than 1.5V cells.*		
I can use recognised symbols when representing a simple circuit in a diagram. *For example, photo page in children's books showing constructing four simple circuits and completed labelled diagrams of each circuit they make, using electrical symbols.*		

February assessment point **On track to** _____

July assessment point _____

Examples of science displays/working walls




1492
1603-1714
1714-1837
1837-1901
1914-1918
The Spitfire
1939-1945
1969
2012
Science Investigation
Scientific Question
Where will the ice melt the quickest?
Prediction
Method
1. Put one ice cube in a plastic cup, repeat 3 times.
2. Put each cup in a different place in the classroom.
3. Observe the cup every five minutes so see if the ice has melted.
4. Record how the ice cubes have changed after each 5 minutes.
5. Repeat until all the ice cubes have melted.
Diagram
Observations
Results
Conclusion
What will we keep the same:
. The volume of ice.
. The size and the type of cup.
. The intervals at which we observe each ice cube.
What we will change:
. Where we put the ice to melt.
pneumatic tyre
man-made
natural
flexible


transparent
light source
shadow
How are shadows formed?
Year 6 have been investigating how light travels.
Prediction
Method
Fair testing
Conclusion
translucent
opaque
reflect

Examples of Concept Cartoons (to stimulate discussion of scientific concepts and/or explanation and discussion during quizzing)