

Science Progression of skills and knowledge

Year 1 National Curriculum objectives: In this unit, children will be taught to:

KS1 Scientific Investigation skills

Pupils will be taught to use the following practical scientific methods, processes and skills:

- Asking simple questions linked to science areas
- observing closely, using simple equipment and measurement
- performing simple tests
- identifying and classifying
- using their observations and ideas to suggest answers to questions that may be provided
- to begin gathering and recording data and findings to help in answering questions.
- Communicating their ideas through class and peer discussions
- use scientific language and read and spell age-appropriate scientific vocabulary
- begin to notice patterns and relationships.

**Study of a significant scientist linked to the topics covered (liaise with other classes)*

Plants

Title: How does our garden grow?

Assessment focus: Observe closely, using simple equipment and measurement – grow seeds over time

Other links: English – writing instructions and a recipe for planting/growing seeds

- identify and name a variety of common wild and garden plants, including deciduous and evergreen trees
- identify and describe the basic structure of a variety of common flowering plants, including trees.
- observe and describe how seeds and bulbs grow into mature plants
- find out and describe how plants need water, light and a suitable temperature to grow and stay healthy.

Animals, including Humans

Title: What are animals like on land, air and sea?

Assessment focus: Scientific language, communicate ideas and computing - Create planet earth episode

Other links: Scientist – Rachel Carson, ocean focus. English – ‘Who am I?’ poems

- identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals
- identify and name a variety of common animals that are carnivores, herbivores and omnivores
- describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets)
- identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense.

Seasonal Changes

Title: How do the seasons change?

Assessment focus: identifying and classifying, using their observations and ideas to suggest answers to questions that may be provided – end of year – present with images to be sorted into seasons, extension to explain how we know they belong to certain seasons

Other links: Art – piece of artwork for presentation books to be built up throughout the year

- observe changes across the four seasons
- observe and describe weather associated with the seasons and how day length varies

Everyday Materials

Title: What in the world is it made of?

Assessment focus: identifying and classifying – sort objects by materials’ names and properties

Other links: Lego inventor – Ole Kirk Christiansen. Writing labels for toys/objects describing properties of materials.

- distinguish between an object and the material from which it is made
- identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock
- describe the simple physical properties of a variety of everyday materials (bendy or not, hard or soft, textures – rough/smooth)
- compare and group together a variety of everyday materials on the basis of their simple physical properties.

Science Progression of skills and knowledge

Year 2 National Curriculum objectives: In this unit, children will be taught to:

KS1 Scientific Investigation skills

Pupils will be taught to use the following practical scientific methods, processes and skills:

- asking questions and recognising that they can be answered in different ways
- observing closely, using equipment and measurement and make comparisons between changes observed
- carry out investigation - make own predictions and begin to reflect what happened linked to what was expected
- identifying and classifying
- using their observations and ideas to suggest answers to their own questions commenting on patterns observed
- gathering, recording and verbally communicating data and findings to help in answering questions. Presenting this in tables and charts with support
- use scientific language and read and spell age-appropriate scientific vocabulary

**Study of a significant scientist linked to the topics covered (liaise with other classes)*

Living things in their habitats

Title: Why do they live there?

Assessment focus: Willaston habitat study – do all habitats support all creatures? Present as poster presentation/pictograms – minibeasts, use scientific vocabulary and write conclusion, explaining why.

Other links: English: - Non chronological report about particular plants found locally or in the rainforest.

- Delayers food chain labelling - Recount of building a tumble trap

- explore and compare the differences between things that are living, dead, and things that have never been alive
- identify that most living things live in habitats to which they are suited and describe
- how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other
- identify and name a variety of plants and animals in their habitats, including micro-habitats
- describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food

Animals including humans

Title: What do animals need?

Assessment focus: asking questions that can be answered in different ways – what does it need to survive?

Other links: beach and coast focus

English - Exercise routine, healthy menu for the seaside, life cycle of a penguin

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

Materials

Title: What material and why?

Assessment focus: Carry out an investigation/ask a question, e.g. escape from the tower.

Other links: English – Explanation/persuasive writing - The best material for a knights costume

- identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses (flexible, transparent/opaque/translucent, waterproof or not)
- find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.

Science Progression of skills and knowledge

Year 3 Curriculum objectives: In this unit, children will be taught to:

KS2 Scientific Investigation skills

Pupils will be taught to use the following practical scientific methods, processes and skills

- asking relevant questions and using different types of scientific enquiries to answer them with guidance
- setting up simple practical enquiries, comparative and fair tests with support
- 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 appropriate ways using templates provided 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 if the variables were changed next time 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.
- use scientific language and read and spell age-appropriate scientific vocabulary

**Study of a significant scientist linked to the topics covered (liaise with other classes)*

Plants

Title: Plants and Growth How do plants grow, thrive and reproduce?

Assessment focus: Drawing and labelling the lifecycle of a plant - recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables

Other links: Writing - Informative leaflet – how to care for plants

- identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers
- explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant
- investigate the way in which water is transported within plants
- explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.

Animals including humans

Title: Skeletons, muscles and nutrition What is nutrition and why is it important?

Assessment focus: Planning a nutritional meal for a human – food groups

Other links: Writing – a menu for a healthy meal

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

Rocks

Title: Rocks and Fossils What are rocks and fossils?

Assessment focus: Sorting/grouping rocks/fossils by properties – identifying differences, similarities or changes.

Other links: Writing – a quiz about rocks

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

Light

Title: Let there be Light! How are shadows formed and change?

Assessment focus: Planning and carrying out a fair test to investigate reflectivity of materials

Other links: Writing – a postcard about sun safety (from a hot climate)

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

Forces and magnets

Title: What is magnetism?

Assessment focus: Ordering magnets according to their strength - setting up simple practical enquiries, comparative and fair tests with support

Other links: Sir Isaac Newton Writing – a fact file about Sir Isaac Newton (double page spread)

compare how things move on different surfaces

- notice that some forces need contact between two objects, but magnetic forces can act at a distance
- observe how magnets attract or repel each other and attract some materials and not others
- compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials
- describe magnets as having two poles
- predict whether two magnets will attract or repel each other, depending on which poles are facing.

Science Progression of skills and knowledge

Year 4 Curriculum objectives: In this unit, children will be taught to:

KS2 Scientific Investigation skills

Pupils will be taught to use the following practical scientific methods, processes and skills

- asking relevant questions and decide on the most appropriate type of scientific enquiry to answer them
- setting up practical enquiries and comparative investigation recognise the need for carrying out a fair test approach
- 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, independently where appropriate to help in answering questions
- recording findings using challenging scientific language, labelled diagrams, keys
- construct a variety of tables, bar charts and graphs, using ICT where appropriate to record observations, measurement and data unaided
- reporting on findings from enquiries referring to the results specifically, including oral and written explanations, displays or presentations of results and conclusions
- using results to make informed conclusions, make predictions for new values, suggest improvements to improve reliability of results and raise further questions
- identifying and describing differences, similarities or changes related to scientific ideas and processes in discussions and begin to put this in written form

**Study of a significant scientist linked to the topics covered (liaise with other classes)*

Living things and their habitats

Title: Why should we save the rainforests?

Assessment focus:

- Other links:** English and Topic – Persuasive write, how can we convince a government to save their rainforest over economic gain? Linked to rainforest topic
- Scientist- Charles Darwin write a biography
 - debate and discuss why the rainforests are being destroyed; what and why people need to do something about it
- recognise that living things can be grouped in a variety of ways
 - explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment ([use of ICT databases](#))
 - recognise that environments can change and that this can sometimes pose dangers to living things. ([Graphs ICT data](#))
 - **raise questions about their local environment throughout the year.** – [link to bird watch study](#)
 - **find out about the work of naturalists and animal behaviourists**

Animals including humans

Title: What happens to the food we eat?

Assessment focus: Poster to explain the digestive system; labelling, describing the functions and basic facts.

Other links: English - write a diary entry as a piece of food travelling through the body

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

States of Matter

Title: What's the matter? A gas, liquid or solid?

Assessment focus: Sorting/grouping gasses, liquids or solids by properties – identifying differences, similarities or changes.

Other links: English-write a detailed response to a science experiment including hypothesis and conclusion

- compare and group materials together, according to whether they are solids, liquids or gases
- observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C)
- identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.

Sound

Title: What can you hear?

Assessment focus: STEM design your own ear defenders

Other links: English - write a detailed account of how sound travels

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

Electricity

Title: How can we protect a building from lightning?

Assessment focus:

Other links: Scientist – Benjamin Franklin, research and write a fact file about him

- identify common appliances that run on electricity
- construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers
- identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery
- recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit
- recognise some common conductors and insulators, and associate metals with being good conductors.

Science Progression of skills and knowledge

Year 5 Curriculum objectives: In this unit, children will be taught to:

KS2 Scientific Investigation skills

Pupils will be taught to use the following practical scientific methods, processes and skills

- 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 with the aid of ICT where necessary
- using test results to make informed predictions and suggest further comparative and fair tests
- reporting and presenting findings from enquiries, including conclusions, causal relationships and offer explanations for differences in results, in oral and written forms such as displays and other presentations
- research scientific evidence that has been used to support or refute ideas or arguments.
- use scientific language and read and spell age-appropriate scientific vocabulary

**Study of a significant scientist linked to the topics covered (liaise with other classes)*

Living things and their habitats

Title: Our natural world - How does our natural world work?

Assessment focus: Lifecycle core task – diagrams and vocabulary
Classification core task – sorting and keys

Other links: Scientist – Jane Goodall

Writing Link: Biography of Jane Goodall

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

Animals, including humans (Rest of unit moved to Year 6)

- **Introduce children to changes associated with puberty – through PSHE**

Properties and changes of materials

Title: How can materials change?

Assessment focus: reporting and presenting findings, using scientific evidence, language - Research reversible and irreversible changes

Other links: Scientist: Spencer Silver

Writing Link: Response to question: Why do we need to test in Science? (Include fair testing, comparisons etc.)

- compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets
- know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution
- **use knowledge of solids, liquids and gases to decide how mixtures might be separated, using prior knowledge of filtering, sieving and evaporating from year 4 (water cycle)**
- give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic building upon knowledge acquired from key stage one and own experiences
- demonstrate that dissolving, mixing and changes of state can be reversible changes
- explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda.
- Explore further changes that are difficult to reverse such as rusting, burning and chemical reactions such as mixing bicarb with vinegar

Earth and space

Title: What is in the 'space' above us?

Assessment focus: Tasks: Create simple models of the solar system, construct simple clocks/sundials, compare time zones across the world, take measurements related to movement of Earth (rotation)

Other links: Famous People/Events – Neil Armstrong/Tim Peake, The First Moon Landing

Writing Link: Fact file: Choice of planet – provide a description, what, why, where, when etc. OR Recount: Visit to Jodrell Bank?

Pupils should be taught to:

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

Science Progression of skills and knowledge

Forces

Title: How do we use forces in our everyday lives?

Assessment focus: Air resistance – test parachutes, Water resistance - test boats- Testing, Recording, Reporting/Presenting of results

Other links: Topic: Victorian canal/bridge building Scientists: Isaac Newton/Galileo

Writing Link: Diary Entry: Isaac Newton and the 'apple' OR Recount: Visit to Science Museum?

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 and **find out how scientists, for example, Galileo Galilei and Isaac Newton helped to develop the theory of gravitation.**
- identify the effects of air resistance, water resistance and friction, that act between moving surfaces **expanding knowledge of friction explore the effects of friction on movement and find out how it slows or stops moving objects**
- recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.

Science Progression of skills and knowledge

Year 6 Curriculum objectives: In this unit, children will be taught to:

KS2 Scientific Investigation skills

Pupils will be taught to use the following practical scientific methods, processes and skills

- planning different types of scientific enquiries to test theories/hypothesis, including identifying and controlling dependent and independent variables
- taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings explaining the reasoning behind this to produce more reliable results
- recording data and results of increasing complexity selecting the appropriate scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs and make reasoned responses to this data with the aid of ICT if necessary
- using test results to make informed predictions to set up further comparative and fair tests to investigate their hypothesis
- 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. Through the process of evaluating their investigations.
- identifying scientific evidence that has been used to support or refute ideas or arguments and research evidence to support their own scientific observations and conclusions and evaluate the accuracy of their own predictions
- use scientific language and read and spell age-appropriate scientific vocabulary

**Study of a significant scientist linked to the topics covered (liaise with other classes)*

Animals inc humans

Title: How does my body work?

Assessment focus: Timeline – changes in the body and label circulatory system – language and vocabulary.

Other links: Explanation text – circulatory system, Poster making Healthy living

- describe the changes as humans develop to old age.
- find out about different types of reproduction, including sexual and asexual reproduction in plants, and sexual reproduction in animals.
- Recap and extend children to changes associated with puberty
- draw a timeline to indicate stages in the growth and development of humans. identify, explore questions about and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood
- recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function
- describe the ways in which nutrients and water are transported within animals, including humans
- build upon learning about puberty and functions of sexual organs in mammals/humans.

Evolution and inheritance

Title: Where do we come from?

Assessment focus: explanation text

Other links: famous scientists – Darwin, Anning Wallace- biography writing

- recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago
- recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents
- identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.
- introduced to the idea that characteristics are passed from parents to their offspring, i.e. different breeds of dogs, and what happens when, for example, labradors are crossed with poodles
- find out about the work of palaeontologists such as Mary Anning and about how Charles Darwin and Alfred Wallace developed their ideas on evolution.

Light

Title: What can you see?

Assessment focus: stem – design a periscope

Other links: WW2 – lighthouse/black out etc

- recognise that light appears to travel in straight lines
- use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye
- explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes
- use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.

Electricity

Title: Are you feeling the power? What creates the Spark? What powers society?

Assessment focus: STEM - design Christmas/traffic lights (light house)

Other links: Global learning – wind /solar power – persuasive writing

- associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit
- compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches
- use recognised symbols when representing a simple circuit in a diagram.