

## Year Three Science Objectives

### Working Scientifically

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.

### National Curriculum Objectives

#### Skills Development and Breadth of Study

##### **Rocks**

*Pupils should be taught to:*

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

##### **Plants**

*Pupils should be taught to:*

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

##### **Light**

*Pupils should be taught to:*

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

##### **Forces and magnets**

*Pupils should be taught to:*

- compare how things move on different surfaces
- notice that some forces need contact between 2 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 2 poles
- predict whether 2 magnets will attract or repel each other, depending on which poles are facing

##### **Animals, including humans**

*Pupils should be taught to:*

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

### Key Skills

#### Communication skills

- I describe my observations, using scientific vocabulary
- I recount what I have done
- I use bulleted lists to describe the equipment I used and the steps I took
- I can explain why a test is fair and set up a simple fair test
- I can make a prediction before testing
- I can describe what I have found using scientific language

#### **Challenge objective:**

**Can they record and present what they have found using scientific language, drawings, labelled diagrams, bar charts and tables?**

#### Application of Mathematics

- In my observations I measure:
  - Length (cm, metres) Time (min, sec), and Capacity (ml, l)
- I record my results on tables, charts, graphs, pictograms

#### Information Technology

- I use the computer to record my results on a table, chart or pictogram

#### Working with Others

- I work with a partner to explore whether a test or comparison is unfair and work safely

#### Improving Our Own Learning and Performance

- I review my work and explain to others what I did
- I keep a mind map of what I have learned
- I review my work and compare my predictions with my results explaining whether my measurements help answer the question

#### **Challenge Objective:**

**Can they suggest how to improve their work if they did it again?**

#### Problem Solving

- I make suggestions about how to collect data to answer a question (with help)
- I use equipment the teacher has given me to make observations
- I can explain why I need to collect data to answer a scientific question
- I give answers to the teacher's suggestions

#### **Challenge objectives:**

- Can they use their findings to draw a simple conclusion?
- Can they suggest improvements and predictions for further tests?

## Year Four Science Objectives

### Working Scientifically

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.

### National Curriculum Objectives

#### Skills Development and Breadth of Study

##### **States of matter**

*Pupils should be taught to:*

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

##### **Electricity**

*Pupils should be taught to:*

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

##### **Living things and their habitats**

*Pupils should be taught to:*

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

##### **Animals, including humans**

*Pupils should be taught to:*

- describe the simple functions of the basic parts of the digestive system in humans
- identify the different types of teeth in humans and their simple functions
- construct and interpret a variety of food chains, identifying producers, predators and prey
- Sound (using musical instruments from around the world to investigate)

##### **Sound**

*Pupils should be taught to:*

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

### Key Skills

#### Communication skills

- I use scientific vocabulary in my explanations
  - I record and write about my observations using:
    - Annotated sketches, Labelled diagrams, Text, Bulleted lists, Explanations, Other writing styles I know
  - I can make a prediction based on something I have found out
- Challenge objective: Can they record more complex data and results using scientific diagrams, classification keys, tables, bar charts, line graphs and models?**

#### Application of Mathematics

- I make careful observations and measure:
    - Length, Mass, Capacity using standard units
  - I look for patterns in my recorded measurements and try to explain them in a simple conclusion
- Challenge Objective: Can they use a graph or diagram to answer scientific questions?**

#### Information Technology

- I use a spread sheet to collect data and use this to draw charts or graphs

#### Working with Others

- I work with a partner to plan, think of questions and to find equipment to carry out an investigation

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#### Improving Our Own Learning and Performance

- I know why it is important to collect data to answer questions
- I explain observations, linking them to other things I know in Science
- Can they evaluate what they have found using scientific language, drawings, labelled diagrams, bar charts and tables?

**Challenge objective: Can they report findings from investigations through written explanations and conclusions?**

#### Problem Solving

- I give my own ideas on how to find the answer to a question
- I can decide which information needs to be collected and how
- I can carry out a fair test and make comparisons
- Can they isolate variables, explaining why this made it fair?
- I think of the equipment I will use to carry out an investigation

**Challenge objective: Can they plan and carry out an investigation by controlling variables fairly and accurately?**

## Year Five Science Objectives

### Working Scientifically

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 a degree of trust in results, in oral and written forms such as displays and other presentations.
- Identifying scientific evidence that has been used to support or refute ideas or arguments.

### National Curriculum Objectives

#### Skills Development and breadth of study

##### **Animals, including humans (link to PSHE and puberty).**

*Pupils should be taught to:*

- describe the changes as humans develop to old age

##### **Properties and changes of materials**

*Pupils should be taught to:*

- compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets
- know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution
- use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating
- give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic
- demonstrate that dissolving, mixing and changes of state are reversible changes
- explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda

##### **Forces**

*Pupils should be taught to:*

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

##### **Earth and space**

*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

##### **Living things and their habitats**

*Pupils should be taught to:*

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

### Key Skills

#### Communication skills

- I communicate my findings, pointing to solid evidence to support any conclusions
- I use precise scientific language
- I use reports and recounts to good effect

**Challenge objective: Can they explain, in simple terms, a scientific idea and what evidence supports it?**

#### Application of Mathematics

- I make a series of observations and measurements, using tables, bar charts and line graphs
- I use graphs to form conclusions about my findings
- Can they take measurements using a range of scientific equipment with increasing accuracy and precision?
- Can they take repeat readings when appropriate?
- Can they record more complex data and results using scientific diagrams, labels, classification keys, tables, scatter graphs, bar and line graphs?

#### Information Technology

- I use multimedia to present my ideas and findings
- I use the internet to carry out scientific research

#### Working with Others

- I work with a partner to plan, think of questions and to find equipment to carry out an investigation

#### Improving Our Own Learning and Performance

- I know that scientific ideas are based on evidence
- I suggest improvements to my work, giving clear reasons

**Challenge objective: Can they suggest how to improve their work and say why they think this?**

#### Problem Solving

- I decide on the best approach to finding the answer to a question
- Can they plan and carry out a scientific enquiry to answer questions, including recognising and controlling variables where necessary?
- I make predictions with reasons

**Challenge Objective: Can they explore different ways to test an idea, choose the best way and give reasons?**

**Can they find a pattern from their data and explain what it shows?**

**Can they link what they have found out to other science?**

## Year Six Science Objectives

### Working Scientifically

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 a degree of trust in results, in oral and written forms such as displays and other presentations.
- Identifying scientific evidence that has been used to support or refute ideas or arguments.

### National Curriculum Objectives

#### Skills Development and Breadth of study

##### **Living things and their habitats**

*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

##### **Evolution and inheritance**

*Pupils should be taught to:*

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

##### **Animals including humans**

*Pupils should be taught to:*

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

##### **Electricity**

*Pupils should be taught to:*

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

##### **Light**

*Pupils should be taught to:*

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

### Key Skills

#### Communication skills

- I use explanation text to good effect, catering for a wide range of readers

Challenge objective: Can they choose the best way to answer a question?

Can they explain how a scientist has used their scientific understanding plus good ideas to have a breakthrough?

Can they draw conclusions from their work?

Can they link their conclusions to other scientific knowledge?

#### Application of Mathematics

- I make a series of measurements and record them, explaining why they might need to be repeated
- I confidently present appropriate data in a range of graphs to explain my findings

Challenge objectives: Can they make precise measurements?

Can they collect information in different ways?

Can they record their measurements and observations systematically?

Can they explain qualitative and quantitative data?

#### Information Technology

- I use the computer to present graphs, tables and charts to explain my findings

#### Working with Others

- I question the work of others and repeat their investigations, offering explanations for any differences I encounter
- I work as part of a team to answer scientific questions

#### Improving Our Own Learning and Performance

- I relate my findings to my knowledge and understanding of science
- I make prediction based on with reasons and offer further predictions as result of testing
- I repeat my observations and offer explanations for any differences I encounter
- I draw conclusions and make comparisons consistent with the evidence I have collected

Challenge objectives: Can they link their conclusions to other scientific knowledge?

Can they explain how they could improve their way of working?

#### Problem Solving

- I select suitable equipment and can explain why I have chosen it
- When carrying out a fair test, I identify variables that need to change, or stay the same