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# **Cornerstone Academy Trust**

## **Science Policy**

**Revised: December 2021**

# Cornerstone Academy Trust

## Science Policy Guidance

### **MISSION STATEMENT**

We strive for excellence in education by providing a safe, secure, caring family environment, where all are valued and respected as individuals, enabling them to reach their full potential.

### **AIMS OF SCIENCE POLICY**

Our Science Policy follows The National Curriculum 2014 for Science Guidelines and 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, in the context of **working scientifically**;
- are equipped with the scientific knowledge required to understand the **uses and implications** of Science, today and for the future, alongside the opportunities and challenges within STEM careers.

### **PURPOSE OF STUDY-WHY TEACH SCIENCE?**

A high-quality Science education provides foundations for understanding the world. Science has changed our lives and is vital to the world's future prosperity. Through building 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 and man-made phenomena. They should be encouraged to understand how key knowledge and concepts can be used to explain what is occurring, predict how things will behave, and analyse causes. This understanding should be consolidated through their appreciation of applications of Science in society and the economy through a focus on each child's Science Capital – the experiences, knowledge and people they interact with.

### **In teaching Science we are developing in our children:**

- a positive attitude towards Science and an awareness of its fascination;
- an understanding of Science through a process of enquiry and investigation;
- confidence and competence in scientific knowledge, concepts and skills;
- an ability to reason, predict, think logically and to work systematically and accurately;
- an ability to communicate scientifically;
- the initiative to work both independently and in co-operation with others;
- the ability and meaning to use and apply science across the curriculum and real life.

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## **PLANNING**

### **School curriculum**

The programmes of study for Science are set out year-by-year for Key Stages 1 and 2. We are however, only required to teach the relevant programme of study by the end of the key stage. Within each key stage, School has the flexibility to introduce content earlier or later than set out in the programme of study and may introduce key stage content during an earlier key stage if appropriate. Teachers will base their planning on the programmes of study for their relevant year groups.

### **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.

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 nature, processes and methods of science**

‘Working scientifically’ specifies the understanding of the nature, processes and methods of Science for each year group. It is not taught as a separate strand and should be evident and monitored in all Science lessons.

### **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.

### **Key Stage 1**

The main 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,

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photographs and videos. Visitors should also be used regularly, including parent volunteers from Science backgrounds or STEM ambassadors.

Pupils should read and spell scientific vocabulary at a level consistent with their reading and spelling knowledge at Key Stage 1. This vocabulary is available to teachers through the STEM Team and OneNote Notebook.

### **Lower Key Stage 2 – Years 3 and 4**

The main 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 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’ must **always** be taught through and clearly related to substantive Science content in the programme of study.

Pupils should read and spell scientific vocabulary correctly and with confidence, using their growing reading and spelling knowledge. They should be increasingly able to explain these concepts and use them in context with accuracy.

### **Upper Key Stage 2 – Years 5-6**

The main 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 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

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ideas, and use their scientific knowledge and understanding to explain their findings. Pupils should read, spell and pronounce scientific vocabulary correctly.

‘Working and thinking scientifically’ must **always** be taught through and clearly related to substantive Science content in the programme of study.

## **ASSESSMENT**

**This is achieved through:**

- discussion with pupils;
- observation of pupils;
- marking work;
- capturing evidence of practical enquiry through EvidenceMe
- twice yearly online testing of curriculum knowledge from KS2 through GL Assessments

## **MONITORING AND EVALUATION**

The Subject Leader follows the School Self Evaluation for Subject Leaders’ Guidelines and is achieved through:

- monitoring and evaluation of pupils’ work;
- a lesson study project with each year group
- monitoring of planning
- planning and development of trips
- teacher subject support

## **SAFETY**

Pupils will be taught to use scientific equipment safely when using it during practical activities. Class Teachers, Teaching Assistants and the Subject Leader will check equipment regularly and report any damage, taking defective equipment out of action. A simple risk assessment will be carried out for all practical activities, making reference to CLEAPPS Guidance. The Subject Leader, together with the Senior Leadership Team will review risk assessments annually.

## **PARENTAL INVOLVEMENT**

Following the guidelines in the whole School Policy on Parental Involvement in their Children’s Education, parents may be involved in class based work if they can offer a particular skill or extend and compliment the class teacher’s skills and knowledge.

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## **RESOURCING**

Pupils will be taught to use scientific equipment safely when using it during practical activities. Class Teachers, Teaching Assistants and the Subject Leader will check equipment regularly and report any damage, taking defective equipment out of action. A simple risk assessment will be carried out for all practical activities. The Subject Leader, together with the Senior Leadership Team will review risk assessments annually.

Each school within the trust will have different local opportunities (Such as the MET Office or Norman Lockyear Observatory) and should seek to make use of them. However, the trust will ensure that wherever possible there will be equity in the opportunities given to children across the trust and that children are given the same or equivalent experiences through what is locally available and applicable.

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## **CURRICULUM OBJECTIVES**

### **Year 1 Science**

#### **Working Scientifically**

Children will be taught to . . .

##### **Plan**

☐ ask simple questions and recognise that they can be answered in different ways

Children will be taught to . . .

##### **Do**

- ☐ observe closely, using simple equipment
- ☐ perform simple tests
- ☐ identify and classify
- ☐ gather and record data to help in answering questions

Children will be taught to . . .

##### **Review**

☐ use their observations and ideas to suggest answers to questions

#### **Biology**

##### **Plants**

Children will be taught . . .

- ☐ to identify and name a variety of common wild and garden plants, including deciduous and evergreen trees
- ☐ to identify and describe the basic structure of a variety of common flowering plants, including trees
- ☐ about animals, including humans
- ☐ to identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals
- ☐ to identify and name a variety of common animals that are carnivores, herbivores and omnivores
- ☐ to describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets)
- ☐ to identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense.

#### **Chemistry**

##### **Everyday Materials**

Children will be taught to . . .

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- ☐ 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
- ☐ compare and group together a variety of everyday materials on the basis of their simple physical properties

## **Physics**

### **Seasonal Changes**

Children will be taught to . . .

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



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## **Year 2 Science**

### **Working Scientifically**

Children will be taught to . . .

#### **Plan**

☒ ask simple questions and recognise that they can be answered in different ways

#### **Do**

☒ observe closely, using simple equipment

☒ perform simple tests

☒ identify and classify

☒ gather and record data to help in answering questions

#### **Review**

☒ use their observations and ideas to suggest answers to questions

### **Biology**

#### **Plants**

Children will be taught to . . .

☒ 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

☒ find out about animals, including humans

☒ 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, air)

☒ describe the importance for humans of exercise, eating the right amounts of different types of food and hygiene

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

Children will be taught to . . .

☒ 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

☒ 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

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## **Chemistry**

### **Uses of everyday materials**

Children will 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
- ☐ find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching

## **Physics**

### **Forces**

Children will be taught to . . .

- ☐ describe the changes in light, sound or movements, which result from actions such as switching on a simple electrical circuit, or pushing and pulling
- ☐ build a simple series circuit and 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
- ☐ compare the movement of different objects in terms of speed or direction

## **Year 3 Science:**

### **Working Scientifically**

#### **Plan**

Children will be taught to . . .

- ☑ ask relevant questions and use different types of scientific enquiries to answer them
- ☑ set up simple practical enquiries, comparative and fair tests

#### **Do**

Children will be taught to . . .

- ☑ make systematic and careful observations and where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers
- ☑ gather, record, classify and present data in a variety of ways to help in answering questions
- ☑ record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables

#### **Review**

Children will be taught to . . .

- ☑ report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions
- ☑ identify differences, similarities or changes related to simple scientific ideas and processes
- ☑ use straightforward scientific evidence to answer questions or to support their findings
- ☑ use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions

### **Biology**

#### **Plants**

Children will 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

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

Children will be taught to . . .

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- ☒ identify that animals, including humans, need the right types of 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

## **Chemistry**

### **Rocks**

Children will 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

## **Physics**

### **Light**

Children will 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 a solid object
- ☒ find patterns in the way that the size of shadows change

### **Forces and Magnets**

Children will be taught to . . .

- ☒ 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.

## **Year 4 Science**

### **Working Scientifically**

#### **Plan**

Children will be taught to . . .

- ☑ ask relevant questions and use different types of scientific enquiries to answer them
- ☑ set up simple practical enquiries, comparative and fair tests

#### **Do**

Children will be taught to . . .

- ☑ make systematic and careful observations and where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers
- ☑ gather, record, classify and present data in a variety of ways to help in answering questions
- ☑ record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables

#### **Review**

Children will be taught to . . .

- ☑ report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions
- ☑ identify differences, similarities or changes related to simple scientific ideas and processes
- ☑ use straightforward scientific evidence to answer questions or to support their findings
- ☑ use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions

### **Biology**

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

Children will 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

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

Children will be taught to . . .

- ☑ recognise that living things can be grouped in a variety of ways

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☒ 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

## **Chemistry**

### **States of Matter**

Children will 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

## **Physics**

### **Sound**

Children will 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 strength of the vibrations that produce it

☒ recognise that sounds get fainter as the distance from the sound source increases

### **Electricity**

Children will be taught to . . .

☒ identify common appliances that run on electricity

☒ construct a simple series circuit identifying and naming its basic parts and their purposes, including cells, wires, bulbs, switches and buzzers

☒ 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

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## **Year 5 Science:**

### **Working Scientifically**

#### **Plan**

Children will be taught to . . .

- ☐ plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary

#### **Do**

Children will be taught to . . .

- ☐ take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings where appropriate
- ☐ record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs

#### **Review**

Children will be taught to . . .

- ☐ 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
- ☐ use test results to make predictions to set up further comparative and fair tests
- ☐ identifying scientific evidence that has been used to support or refute ideas or arguments

### **Biology**

#### **Animals including humans**

Children will be taught to . . .

- ☐ describe the changes as humans develop to old age
- ☐ use scientific names for major organs of body systems, including the circulatory system and identify these organs in the human body

#### **Living things in their environment**

Children will 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
- ☐ use keys based on observable external features to help them identify and group living things systematically
- ☐ recognise that feeding relationships exist between plants and animals in a habitat, and describe these relationships, using food chains

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## **Chemistry**

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

Children will 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

## **Physics**

### **Forces**

Children will 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**

Children will 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 that apparent movement of the sun across the sky



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## **Year 6 Science: Working Scientifically**

### **Plan**

Children will be taught to . . .

- ☐ plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary

### **Do**

Children will be taught to . . .

- ☐ take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings where appropriate
- ☐ record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs

### **Review**

Children will be taught to . . .

- ☐ 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
- ☐ use test results to make predictions to set up further comparative and fair tests
- ☐ identifying scientific evidence that has been used to support or refute ideas or arguments

### **Biology**

Children will be taught to . . .

Animals, including humans

- ☐ 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

### **Physics**

Children will be taught to . . .

#### **Light**

- ☐ 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

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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**

Children will 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.

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

Children will 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**

Children will 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