Astrea Academy Trust

Greengate Lane Academy

Science Policy including PKC

Name of school	Greengate Lane Academy
Date of policy	September 2022
Member of staff responsible	Rachelle Keir
Link Governor	Simon Merrywest (Curriculum)
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Introduction

Our Science curriculum enables children to learn the important knowledge and concepts to describe and question the materiality of the world. They will learn the important role that science plays in the sustainability of life on earth and have knowledge and skills to question, and investigate scientific theories. We aim that children following this curriculum will be equipped to go onto their secondary education with curiosity, passion and a desire for further discovery and study of the subject.

This fits with our school ethos of children respecting and understanding the world around them and others that live in it. Learning at Greengate Lane fosters curiosity, develops key life skills, promotes enquiring minds and encourages a love of learning. Children are encouraged to explore with confidence and strive for excellence through effort, practise and perseverance.

The aims of our Science, using PKC

At Greengate Lane Academy, we follow the PKC Science curriculum which aims to equip children with the foundations for understanding the world through a scientific lens. Our pupils will be taught units of work that cover and go beyond the requirements of the National Curriculum in the specific disciplines of biology, chemistry and physics. Our children will encounter people who have made significant contributions to the field of science over time, understanding that science has been a quest for understanding for many years, and will continue to be so in the future. They will build a body of key foundational science knowledge as they work through the curriculum, asking questions and developing a sense of curiosity about the world around us. Following the PKC Science curriculum will give children an introduction to fascinating content such as the inner workings of the human body, animals and the environments they live in, plants and their features, forces in nature, what lies beyond the visible and what lies beyond the planet we live on. Over time their knowledge will deepen moving from recognising and naming parts of the human body to understanding how our muscles work, how our blood moves around our body and how our nervous system helps us to interact with the world. Pupils will be encouraged to use the knowledge they learn in Science and apply it to investigations that test a theory or set out to answer a question. Importantly, substantive scientific knowledge is taught first, before our pupils are asked to undertake enquiry. This helps them to fully understand the elements of the enquiry first, and to make informed observations about the processes they see.

Gathering information, recording data, graphing data and interpreting findings are all essential skills that pupils will apply to new contexts as they work through the curriculum. We make explicit links with our mathematical skills and knowledge.

Enquiries include observing over time, pattern seeking, identifying, classifying and grouping, comparative and fair testing and researching using secondary sources. Scientific enquiries provide children with a wealth of opportunities, but first and foremost they will help to deepen understanding of the nature, processes and methods of science as a discipline and how it differs from other subjects they are studying. Our pupils will gain an understanding of the purpose and uses of science both today and in the future. Throughout the science curriculum, they are taught that scientific discoveries have been made since time began around the world. The children learn about the work of scientists such as Lewis Howard Latimer, who invented the carbon filament that allowed Edison's lightbulb to light up the world. In Year 5 children learn about Jabir ibn Hayyan who is thought to have invented a

crucial tool for the distillation process: the alembic. In Year 1, children learn about their senses and reflect upon the challenges faced by Helen Keller who achieved a university degree despite being blind and deaf from her early childhood. Importantly in Science, over time, children learn about scientists and their search for the truth. They learn that the people who have contributed to science, from Ancient Baghdad to Ancient Rome and beyond, are diverse and many voices make up the story of science.

PKC Science Content

PKC Science covers all the content for the primary phase. The grid below:

Science Long Term Plan

	Autumn		Spring		Summer	
EYFS	**All about Me** The human body: Facial features, body parts, the senses Seasons of the year; Autumn. Deciduous and evergreen trees. Observing leaves using magnifying glasses, leaves changing colour.	**Journeys** Forces: push, pull, twist Air transport Water transport Seasons of the year: Winter. Animal hibernation, why do some animals hibernate? How do other animals survive winter? Transport in the winter; snow ploughs, gritting roads, snow tyres. Changing state of matter; frost and ice- looking closely at ice, what happens when it warms? Why can we see our breath when it is cold?	**Space** Our planet Earth, land and sea, plants and animals, weather, gravity. The moon, the sun, the planets in our solar system, space travel, astronauts. Seasons of the year: Spring. The first signs of spring; snowdrops, cherry blossom, buds and flowers, birds nesting, bees, lighter evenings.	**Growing and Changing** Growing and changing; how people change as they grow, how animals change as they grow. Life cycles of a butterfly and/or frog. Identify and draw the following animals and their babies including but not limited to: Sheep and Lamb Cows and Calf Horse and foal Butterfly and Caterpillar Frog and tadpole Dog and puppy Cat and kitten Plants; how they grow from seeds and bulbs. What plants need to grow. Identify parts of plants including roots, stem and leaves. Identify trees and plants growing locally on the school grounds or in local parks. Draw pictures of local plants.	**Kings and Queens** Seasons of the Year: Summer. Signs of summer; flowers, warmer days, light evenings, butterflies, bees, birds. Design a garden for the Queen; what could we grow? What would we include? Sketch some ideas and write about the design.	**Stories from the Past** Seasons of the Year: Summer. How we stay safe in the sun; sunscreen, hats, sunglasses. Safety around water. Changing state of matter; Why do our ice lollies melt?
Year 1	**The Human Body** Naming parts of the body, the five senses and associated body parts, understanding sensory impairment.	**Animals and their Needs** Living things, naming animals, grouping animals, describing animals, how plants and animals obtain food, offspring, caring for animal babies, caring for pets.	**Seasons and Weather** The four seasons, tools to record the weather, daily weather and weather forecasts, weather symbols, weather around the world, floods and hurricanes.	**Taking Care of the Earth** The Earth's natural resources, conservation of natural resources, logging, recycling, how pollution is caused and can be prevented.	**Plants** What plants need to grow, the parts and functions of plants, food production, flowers and seeds, deciduous and evergreen.	**Materials and Magnets** Classification of materials, magnets, magnetic attraction.
Year 2	**The Human Body** The skeletal and muscular systems, exercise, digestive system and healthy eating, circulatory system, preventing illness, germs and disease, animals and their offspring.	**Living Things in their Environments** Habitats: rainforest, desert, meadow and underground habitats. Food chains, oceans and undersea habitats, deep ocean habitats and habitat destruction and damage.	**Electricity** Circuits, conductive and non-conductive materials, safety rules.	**Plants** Seeds and bulbs, plants and water, light, temperature, healthy plants.	**Materials and Matter** Comparing materials, changing materials, concepts of atoms, matter, solids, liquids, gases, measurements.	**Astronomy** Our solar system, orbit and rotation, sun, moon, planets, stars, constellations.
Year 3	**The Human Body** The digestive system, teeth and senses, a healthy diet, nutrition, vitamins and minerals, skeletons and muscles for support, protection and movement.	**Cycles in Nature** Seasonal cycles and plants, animal migration. Life cycles of a plant and a frog.	**Light** How light travels, shadows, transparent and opaque objects, reflection, mirrors: plane, concave, convex, how shadows change throughout the day.	**Plants** Functions of plants: roots, stem/trunk, leaves and flowers, Life and growth, variety of plants, water transportation, seed formation and dispersal.	**Rocks** Sorting rocks, how rocks are formed, hardness and permeability, fossils, soil.	**Forces and Magnets** Forces, friction, magnets, magnetic poles, magnetic fields, law of magnetic attraction, compasses.
Year 4	**The Human Body** The muscular system, the skeletal system, the nervous system, the digestive system, teeth.	**Classification of Plants and Animals** Cold-blooded or warm-blooded, vertebrates or invertebrates, characteristics of animal classes, classification of plants.	**Ecology** Habitats, interdependence of organisms and their environment, producers, consumers and decomposers, food webs, producers, predators and prey, human threats to the environment.	**Sound** How sound is created, how sound travels, sound waves, speed of sound, pitch, intensity, the human voice, hearing, the human ear.	**States of Matter and the Water Cycle** Change of state, evaporation, condensation, precipitation, humidity, groundwater.	**Electricity** Electric current, circuits, switches, conductors and insulators.

Year 5	**The Human Body:** Human growth stages, adolescence and puberty, The human reproductive system, The endocrine system.	**Materials** Properties- solubility, conductivity, flexibility, fair testing, solubility, separation of mixtures, reversible changes- dissolving, mixing, change of state.	**Forces** Gravity, friction, air resistance, water resistance, pulleys, gears and levers.	**Living Things** Life cycles of a mammal, an amphibian, an insect and a bird, life process of reproduction in some plants and animals, Photosynthesis, vascular and non-vascular plants.	**Astronomy** The Big Bang theory, gravity, the Universe, our Solar System, the moon and our galactic neighbourhood.	**Meteorology** Weather and climate, the atmosphere, the Ozone layer, air movement and wind direction, cold and warm fronts, thunder and lightning.
Year 6	**The Human Body** The circulatory system, the heart, the blood vessels, the blood, blood pressure and heart rate, changes to humans as we get older	**Classification of Living Things** Classifying organisms, plant and animal cells, fungi, protists, monera, taxonomy, Latin names, vertebrates.	**Electricity** Brightness, buzzers, voltage, switches, simple circuits and symbols	**Light** How light travels, Our eyes, light sources, shadows, periscopes	**Reproduction** Asexual reproduction, sexual reproduction in non-flowering and flowering plants, pollination, fertilisation, reproduction in animals, growth stages.	**Evolution** Fossils, adaptation, characteristics passing through generations, Mary Anning, Alfred Wallace, Charles Darwin, Darwin's sketches of finches.

Working Scientifically KS1	Year 1							Year 2				
	Human Body	Animals and their Needs	Seasons and Weather	Taking Care of the Earth	Plants	Materials and Magnets	The Human Body	Living Things and their Environments	Electricity	Plants	Materials and Matter	Astronomy
Statutory												
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												
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		✓			✓	✓						✓
ask people questions and use simple secondary sources to find answers	✓			✓			✓		✓			
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			✓		✓					✓	✓	✓
record and communicate their findings in a range of ways and begin to use simple scientific language (with help)		✓	✓	✓	✓	✓	✓		✓	✓	✓	✓

Working Scientifically Lower KS2	Year 3							Year 4				
Statutory	The Human Body	Cycles in Nature	Plants	Light	Rocks	Forces and Magnets	The Human Body	Classification	Ecology	Sound	States of Matter and the Water cycle	Electricity
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	✓				✓	✓						
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												
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	✓		✓		✓		✓					
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 this data			✓		✓				✓			
make decisions about what observations to make, how long to make them for and the type of simple equipment that might be used	✓				✓	✓			✓	✓	✓	
how to use new equipment, including thermometers and data loggers		✓				✓					✓	✓
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 this data					✓	✓						
look for changes, patterns, similarities and differences in their data in order to draw simple conclusions and answer questions		✓			✓			✓	✓	✓	✓	✓
making predictions for new values within or beyond the data they have collected and finding ways of improving what they have already done						✓			✓	✓		
use relevant scientific language to discuss their ideas and communicate their findings		✓				✓		✓		✓	✓	✓

Working Scientifically Upper KS2	Year 5						Year 6					
Statutory	Human Body	Materials	Living Things	Forces	Astronomy	Meteorology	The Human Body	Classification	Electricity	Light	Reproduction	Evolution
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												
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	✓	✓		✓					✓			
use and develop keys and other information records to identify, classify and describe living things and materials		✓	✓					✓		✓	✓	✓
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		✓				✓	✓					
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	✓	✓		✓	✓				✓			
use their results to identify when further tests and observations might be needed	✓	✓		✓			✓		✓			
talk about how scientific ideas have developed over time	✓				✓					✓		

How is Science organised in this school?

The Science curriculum is ambitious and is in itself the progression model. It is progressively more challenging over time. Children demonstrate their scientific understanding through practical activities as well. With children's learning outcomes, teachers and leaders talk to pupils about their learning and what they have understood and remembered. Teachers make adaptations to lessons to lessons to anticipate misconceptions or gaps and leaders look at learning across year groups to inform any big decisions about curriculum adaptations. All learning is recorded in work books as a reference point to check on the quality of what is being covered and governors help the school to monitor the quality of these.

Science at Greengate Lane is taught discreetly for an hour each week; we teach Science for six weeks each half term.

Adaptation/SEN

Teachers will tailor learning to ensure all children can access the Science.

Assessment

Pupils complete mini-quizzes and end of unit essays or bigger assessments to check what has been learned and remembered.

Recording and tracking progress

To support the teacher in tracking each child's progress throughout the year, there is an overview sheet for each enquiry on which to record the progress of the whole class. This supports teacher overview and facilitates subject leader monitoring and moderation.

Reporting to Parents/Carers

The assessment process described above helps teachers report to parents/carer. PKC Science Assessment gives teachers meaningful evidence to cite in reports.

The Attainment Descriptors

At Greengate Lane we use the following language: Working Towards – not working at the age-related expectation yet, Expected – working at age expectation and Greater Depth – working beyond age expected expectation.

We use teacher assessment to give a final judgement. The end of KS2 judgement is recorded as HNM or EXS.

Monitoring and evaluation

The science leader monitors delivery of the programme through observation and discussion with teaching staff, as well as discussions with children and scrutiny of their written work to ensure consistent and coherent curriculum provision.

Evaluation of the programme's effectiveness is conducted on the basis of:

- Pupil and teacher evaluation of the content and learning processes
- Staff meetings to review and share experience
- Monitoring of assessment to ensure progression throughout the school.

External contributors

Where possible, external contributors are welcomed into school. Their input is carefully planned and monitored so as to fit into and complement the programme.

Teachers are always present during these sessions.

The Learning Environment

Science lessons are delivered within the classroom, where the establishment of a safe, open and positive environment is vital. The teacher is responsible for the management of resources and ensuring the children have 'hands-on' experience to develop their working scientifically skills.

Teaching Sensitive and Controversial Issues

Sensitive areas of the science curriculum are identified and shared with the principle and parents. These are addressed as sensitively as possible. A safe, open and positive relationships between staff and children are vital.

Involving parents and carers

The school believes that it is important to have the support of parents, carers and the wider community for the Science programme. Parents and carers are/will be given the opportunity to find out about and discuss Science through:

* Response to Science comments on reports
* Curriculum newsletters
* Displays
* Science homework, where appropriate

Links to other policies and curriculum areas

We recognise the clear link between Science and the following policies and staff are aware of the need to refer to these policies when appropriate.

- Teaching and Learning Policy
- Equal Opportunities Policy
- Child Protection Policy
- *SMSC Policy*
- *British Values*
- *Prevent Strategy*

Training and support for staff

All staff benefit from training in order to enhance their Science delivery skills. Opportunities are provided for staff to identify individual training needs on a yearly basis and relevant support is provided.

Dissemination

This policy is available on our school website where it can be accessed by the community. Training is regularly delivered to staff on the policy content. Copies are available from the school office on request from parents/carers.

Policy Review

This policy is reviewed annually.