



Emmaville Primary School

Science Policy

Science Co-ordinator: Sophie Thompson

Rationale

Science is an important core subject in our school as it provides the foundations for understanding the world. Through building key knowledge, concepts and skills, pupils should be encouraged to develop a sense of excitement and curiosity about natural phenomena. They should be encouraged to explain what is occurring through conceptual models and practical activities that progressively build a deep understanding of the science curriculum and 'Working Scientifically'.

Through the teaching of science, we aim to encourage our children to develop inquisitive and enquiring minds through the use of scientific investigations. We want the children to understand how science has changed our lives and is vital to the world's future prosperity. We aim to develop 'Science Capital' within the school - the measure of the school's engagement with science; how much we value it and how much it connects to our lives. This in turn supports our 'STEM Capital', and how our children will engage with, and aspire to careers within, Science, Technology, Engineering and Maths as they grow older. This, of course, directly helps to build our 'Cultural Capital', giving our children the greatest possible knowledge, experiences and aspirations within the world around them.

Children will study a number of different scientific topics; science will often take them outdoors into the local environment where they will be able to develop and practice investigational and observational skills. They will record and interpret findings and form and test hypotheses. Emmaville's Science Curriculum is built on National Curriculum coverage, and throughout their time at our school, pupils will acquire knowledge and understanding of the world around them.

Aims and Objectives - Intent

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

- develop scientific knowledge and conceptual understanding of science
- develop understanding of the nature, processes and methods of science through different types of science enquiries that help them to answer scientific questions about the world around them

- are equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future

At Emmaville Primary School, our aim is to enthuse, develop and challenge pupils through an engaging and progressively structured science curriculum and teaching approaches where pupils:

- Develop lively and enquiring minds through their ability to question and argue rationally and to apply themselves to tasks
- Attain competency and confidence in science that will enable them to contribute to our local and global communities
- Acquire the knowledge and skills relevant to subsequent stages in their education, adult life and employment

Approaches to learning - Implementation

At Emmaville, teachers provide balance in teaching approaches, and the planned sequence of work throughout the school encourages pupils to use prior knowledge when approaching new work. The National Curriculum for Science is used as a framework for science content, skills and pupil expectations at our school. To support our key principles, we will deliver this curriculum through:

- A skills-focussed approach to teaching that ensures an appropriate and flexible challenge within the classroom. This approach is called '**dual objective planning**' in which the key scientific skills are taught alongside the contextual content of lessons. The Science National Curriculum states that "*Working and thinking scientifically ... must always be taught through the substantive science content*". This is supported by the explicit use of dual objective planning.
- Conceptual threads called 'science models' that link topics and support progressively deeper learning. There are four science models that span the curriculum: Energy Transfer, Force Arrows, Particles and 'Big Picture' models (Advanced Organisers)
- Five key science skills that support both knowledge / conceptual development and Working Scientifically to match pupil performance to national Key Stage expectations -
 - Explaining Science (the language, information and key scientific models used to explain ideas and thinking in science)
 - Classification (the sorting, grouping and categorising of the world around us, in order to make links in our scientific thinking)
 - Designing experiments (the skills needed in order to make predictions, select equipment and design suitable ways to test our ideas)
 - Data, Table & Graphs (making sense of our observations through organising data in tables and graphs)
 - Making Conclusions (the ability to see patterns and use them to describe and explain what have observed, and suggest ways to improve)

(See Appendices 1-4)

In order to help children to organise their thinking and to introduce the key vocabulary, concepts, scientific models and ideas behind each Science unit, each child will have access

to a **topic cover sheet**, detailing the relevant information. A more detailed teacher version of this will aid planning, as will a topic break-down of each unit, together with relevant dual objectives and possible ideas for practical investigations.

(See Appendix 5 for a Year 1 example)

The children will be able to work independently, in mixed ability pairs, and in groups, allowing all children access to the curriculum. A variety of teaching methods best suited to activities and interests of the pupils will be used, including teacher demonstrations, whole-class/group/paired discussions, role-play activities, video clips and animations, focused investigations and experiments, close observations and many practical experiences.

- **At Foundation Stage**, children experience rich opportunities to explore the natural world, notice patterns, ask questions, use language for comparison and change and engage in active learning experiences to ensure that they develop skills and knowledge that will later be useful in the study of Science.
- **At Key Stage 1**, pupils observe, explore and ask questions about living things, materials and physical phenomena. They begin to work together to collect evidence to help them answer questions and to link this to simple scientific ideas. They begin to evaluate evidence and consider whether tests or comparisons are fair. They use reference materials to find out more about scientific ideas. They share ideas and communicate them using scientific language, drawings, charts and tables with the help of ICT if it is appropriate.
- **At Key Stage 2**, pupils learn about a wider range of living things, materials and physical phenomena. They make links between ideas and explain things using simple models and theories. They apply their knowledge and understanding of scientific ideas to familiar phenomena, everyday things and their personal health. They think about the effects of scientific and technological developments on the environment and in other contexts. They carry out more systematic investigations, working on their own and with others. They use a range of reference sources in their work. They talk about their work and its significance, using a wide range of scientific language, conventional diagrams, charts, graphs and ICT to communicate their ideas.

Curriculum Coverage

Science in the primary phase provides a broad foundation in the three main scientific disciplines:

- **Biology**
 - living things and their habitats
 - animals, including humans
 - plants
 - evolution and inheritance
 - life processes, classification and the diversity of living organisms
- **Chemistry**
 - materials and their properties
 - changes of state
 - mixtures and separations

- rocks and soils
- practical understanding of how materials behave and are used
- **Physics**
 - light
 - sound
 - electricity
 - forces and magnets
 - forces and motion
 - Earth and space
 - seasonal and environmental change

Across the primary phase, pupils also learn to:

- observe closely and ask relevant questions
- carry out simple tests, comparative tests and fair tests
- use equipment appropriately and safely
- measure, record and present data
- identify patterns, draw conclusions and evaluate evidence
- communicate findings using speaking, writing, diagrams, tables, charts and graphs
- use scientific models to explain what they observe
- revisit key ideas in increasing depth and complexity

Science Across the Curriculum

- English – the skill of Explaining Science links very closely to English curriculum: speaking and listening to learn, discuss and explain; reading scientific information and vocabulary; writing coherently and with confidence to describe, predict and explain
- Mathematics – observations within science lessons often result in the collection of data, and the formulation of graphs and charts
- Computing – data logging and graphing programmes are used from the creation of simple pictograms to more complex scatter graphs.
- Foundation subjects – History is integral to understanding how our scientific perception has changed in many topics, including Forces, Micro-organisms and the Solar System. It also underpins the work done by pioneering scientists, such as Isaac Newton and Jane Goodall. Geography is supported by science in many ways too – the water cycle, rocks and soil, comparing habitats in different locations, etc. Art has links via the exploration of light, colour and shadows, while Technology draws from scientific understanding of electricity and materials, and Music has close links to our understanding of sound.

Assessment – Impact

Science assessment is on-going and formative. It happens in the classroom as part of the normal teaching process. It informs lesson pitch, differentiated intervention and future planning. The key document to support this process is the Science Assessment Boards which provide criteria matched to year group expectation (see Appendices 1-4).

Topic based oral/activity/classwork/homework are used to inform on science knowledge and areas of individual/group misconception. Marking should comply with the school policy and should include:

- 'short-term' topic-specific comments to correct misconceptions/errors and to drive progress within that topic. Work should then show short-term improved knowledge and accuracy within that topic.
- 'long-term' skill-specific comments to match work to skill criteria (see Assessment Board) and to drive progress between topics. Work should then show improved skill/model development, matched to expectations, over time. Progress will be recorded using '*Science Rockets*' (see Appendix 6).

Roles and Responsibilities

Headteacher

- ensure Science is given appropriate curriculum time, status and resources
- support the Science lead in monitoring quality and standards
- ensure statutory requirements and safety duties are met

Science Co-ordinator

Sophie Thompson is responsible for:

- leading curriculum development in consultation with the headteacher, staff and governors
- monitoring the teaching of Science to ensure coverage and progression
- leading curriculum meetings
- attending science network meetings and relevant courses, including links with cluster schools
- supporting staff through information, training and advice
- ensuring appropriate resources are available to support the curriculum
- reviewing subject improvement priorities and monitoring impact

Class teachers

- plan and teach Science in line with curriculum expectations and school policy
- ensure scientific vocabulary, models and enquiry opportunities are explicitly taught
- assess pupils' understanding and adapt teaching accordingly
- maintain safe practice during practical work and outdoor learning
- ensure inclusion and accessibility for all pupils
- provide accurate records of pupil progress where required

Support staff

- support pupils' access to practical work, discussion and recording
- reinforce key vocabulary and routines
- follow teacher guidance for safe and effective participation

Governors

- hold leaders to account for the quality of Science education
- review curriculum implementation, resources, safety and standards
- support the school's ambition for science capital and curriculum breadth

Inclusion

Inclusive practice will include:

- clear, chunked instructions and well-structured learning steps
- pre-teaching and revisiting of key vocabulary
- visual supports, models and practical resources
- mixed grouping, paired talk and guided collaboration where appropriate
- alternative ways to record learning, including oral response, diagrams, sorting, annotation and practical demonstration
- scaffolding for reading, writing, reasoning and explanation
- appropriate challenge for the most able pupils
- careful adaptation for pupils with SEND, including support with attention, language, memory, motor skills and recording demands

Additional expectations

- practical work must be accessible and safe for all pupils
- examples and role models in Science should promote equality and challenge stereotypes
- pupils should be given opportunities to succeed through participation, explanation, investigation and problem-solving
- teachers should assume that all pupils can think scientifically and should not lower expectations unnecessarily

Professional Development

The school will ensure that staff are supported to teach Science confidently and effectively.

Professional development will include:

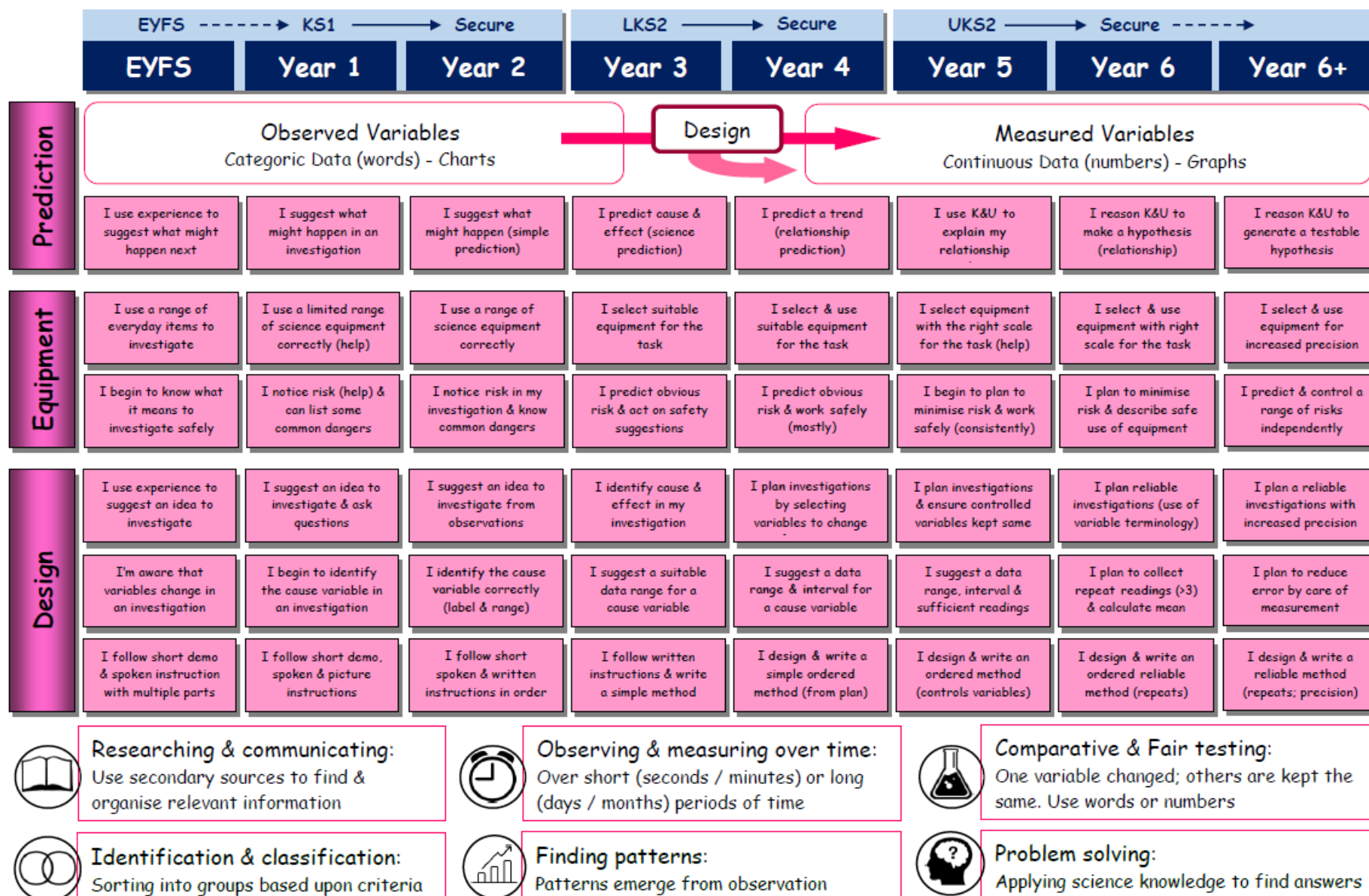
- subject knowledge development linked to curriculum units
- discussion of common misconceptions and effective explanations
- training in practical work, enquiry and safe use of equipment
- support with vocabulary teaching, modelling and representation
- sharing of strong practice in retrieval, assessment and inclusion
- collaborative planning and review of curriculum sequencing
- updates from subject networks, external courses and relevant professional learning

The Science Co-ordinator , Sophie Thompson, will identify development needs through monitoring and will support staff through guidance, resources and curriculum meetings.

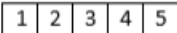
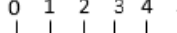
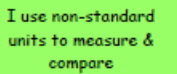
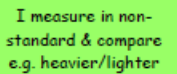
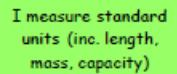
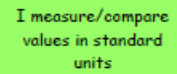
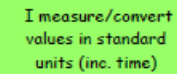
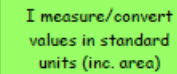
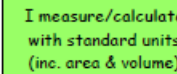
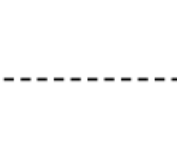
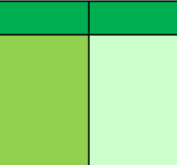
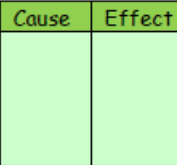
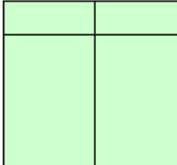
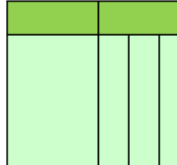
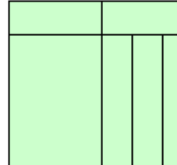
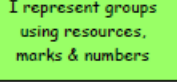
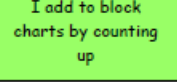
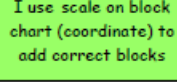
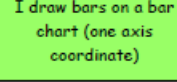
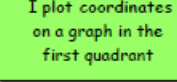
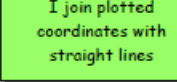
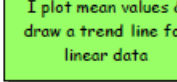
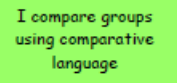
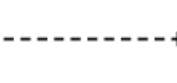
Date policy reviewed: September 2026

Next Review Date: July 2028

SLS Science Planning & Assessment Board	Knowledge & Understanding			Working Scientifically				
	Explaining Science		Classification	Designing Experiments	Data, Tables & Graphs	Making Conclusions		
	EYFS -----> KS1 -----> Secure EYFS Year 1 Year 2			LKS2 -----> Secure Year 3 Year 4		UKS2 -----> Secure -----> Year 5 Year 6 Year 6+		
Explaining Science	I remember simple science facts within an activity	I remember simple science facts within a topic	I remember a range of science facts within a topic	I am using pre-learning to build connected knowledge	I connect knowledge within a topic & from pre-learning	I connect knowledge between topics & from pre-learning	I connect knowledge across science & the wider curriculum	I connect knowledge fluently across science & curriculum
	I use science words during an activity	I use & remember relevant science words during activity	I use & remember science words over time (short term)	I remember science words I have used before (longer term)	I remember & use science words correctly (apply)	I begin to use complex science words correctly	I use complex science words correctly (fluency)	I use complex science words accurately & fluently
	I describe what is happening using words & actions	I describe what is happening using science	I use science to describe & recall what I have seen	I begin to use science models to describe (sequence)	I use science models to describe (what, where)	I use science models to describe & begin to explain (why, how)	I use science models to describe & explain (why, how, logical)	I begin to apply science models to explain new events
	I match appropriate pictures & words to label diagrams	I add science word labels to diagrams	I add science labels & information (help) to diagrams	I add science labels & information to diagrams	I annotate diagrams to help describe & explain	I begin to create & annotate my own 2D/3D diagrams	I create & annotate my own 2D/3D diagrams	I create & annotate my own complex 2D/3D diagrams
	I begin to use science facts to explain my answer	I select science facts to use in an answer	I select relevant science facts to use in an answer	I link relevant facts together in an answer	I 'cluster' related facts together into points (recalled)	I select & prioritise facts to create an argument/answer	I present a clear & logical argument / answer	I present an extended & logical argument / answer
Classification	I sort using pictures or instructions	I sort using simple yes/no statements	I use simple spider keys with obvious differences	I use large spider keys with obvious differences	I use a range of spider keys with fine differences	I construct spider & use number keys	I construct both spider & number keys	I construct both spider & number keys (complex)
	I group by familiar features (size, colour, shape, etc)	I group by difference or similarity	I group by difference, similarity or change	I create groups for sorting (create criteria)	I create appropriate groups for sorting (create criteria)	I group & sub-group by easily observation (create criteria)	I group & sub-group by fine observation (create criteria)	I group & re-group using combinations of criteria
	I use my senses to identify properties of materials	I link properties of materials to an application (help)	I link properties of materials to an application	I combine properties required for an application (help)	I describe combined properties required for an application	I explain how properties suit an application	I explain the science behind a range of properties	I describe how material properties can change



WS Skills are taught & practiced through a range of Enquiry Type investigation

EYFS -----> KS1 -----> Secure			LKS2 -----> Secure		UKS2 -----> Secure ----->		
EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 6+
Data	I position numbers on a number track to 10 & beyond	I position numbers on a number track to 20 & beyond	I measure labelled divisions on a number line (inc. in steps)	I measure unlabelled divisions on a number line (+ve values)	I measure unmarked divisions on a number line (+ve values)	I measure divisions on a number line past zero (-ve values)	I scale up/down a number line (axis) & decide on limits
							
Tables	I use non-standard units to measure & compare	I measure in non-standard & compare e.g. heavier/lighter	I measure standard units (inc. length, mass, capacity)	I measure/compare values in standard units	I measure/convert values in standard units (inc. time)	I measure/convert values in standard units (inc. area)	I measure/calculate with standard units (inc. area & volume)
							
Graphs	I use a simple table by recording in pictures & words	I use a simple table by recording in words & numbers	I use a simple table recording in words & numbers (inc. tally)	I use a frame to construct a simple table of results	I construct a simple table to compare cause & effect	I use a frame to construct a complex table of results	I construct a complex table to show repeated data
							
Graphs	I add to pictograms with help	I use a frame to add to pictograms & block charts	I construct simple pictograms & block charts	I use a frame to construct a bar chart (help)	I construct bar charts correctly (inc. numerical axis)	I use a frame to construct a graph & can scale axes (help)	I construct graphs & can scale at least one axis independently
							
Graphs	I represent groups using resources, marks & numbers	I add to block charts by counting up	I use scale on block chart (coordinate) to add correct blocks	I draw bars on a bar chart (one axis coordinate)	I plot coordinates on a graph in the first quadrant	I join plotted coordinates with straight lines	I plot mean values & draw a trend line for linear data
							
Graphs	I compare groups using comparative language						
							

Data, Tables & Graphs

Year 1**Animals Including Humans****Explaining Science**

I use science words during an activity

I use & remember science words during an activity

I use & remember science words over time

I remember simple science facts within an activity

I remember simple science facts within a topic

I remember a range of science facts within a topic

I match appropriate pictures & words to label diagrams

I add science word labels to diagrams

I add science word labels & information (help) to diagrams

Classification

I sort using pictures or instructions

I sort using simple yes/no statements

I use simple spider keys with obvious differences

I group by familiar features

I group by difference or similarity

I group by difference similarity or change

Key Knowledge

- Identify, name, describe features of and compare common vertebrates (fish, amphibians, reptiles, birds & mammals).
- Explore, identify & answer questions about animals in their habitat. (Know how to care for pets & animals in a habitat).
- Identify & name common carnivores, herbivores & omnivores (including those identified from a habitat).
- Identify, name, draw & label basic human body parts.
- Know the five senses and link these to human body parts.

Key Vocabulary

Animal, vertebrate (backbone), invertebrate (exoskeleton), fish, amphibian, , reptile, bird, mammal, scales, fins, gills, lung, scales, fur, carnivore, herbivore, omnivore, habitat, pet, head, hair, ears, eyes, nose, mouth, tongue, teeth, neck, arm, elbow, shoulder, hands, fingers, leg, knee, ankle, feet, toes, sight, hearing, touch, taste, feeling, **sort**, **group**, **classify**, **feature (criteria)**, **spider key**.

Enquiry Types

Researching

Classification

Finding

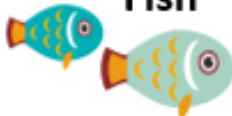
Observing

Fair

Patterns

over time

testing

Big Picture Models**Mammal****Bird****Reptile****Amphibian****Fish****Invertebrates****Carnivore****Omnivore****Herbivore****Five senses**

touch



smell



taste



hearing



sight

Prior Knowledge

Similarities and differences between themselves (e.g. senses) & others. Extends vocabulary. Looks closely at similarities, differences, patterns and change in nature. Makes observations of animals and why things occur & change (life cycles). Explores world around them, makes observations & drawings. Name & describe animals that live in different habitats. Observes living things throughout the year. (EYFS)

Important Scientists



Steve Backshall (1963-) British naturalist and TV presenter of 'Deadly 60'. He has brought wildlife awareness and science to a whole generation of children in a visual and engaging way.



Eugenie Clark (1922-2015) Japanese-American scientist known as the 'Shark Lady' for her research on shark behaviour and marine conservation. She was the first person to 'train' sharks and developed natural shark repellents.

Lesson	Knowledge Objective	Skill Objective	Enquiry Opportunities	Extension Opportunities
1	What are the parts of our body? - Can identify and name parts of our body. <i>Big Picture</i>. (Can begin to describe what each part does) - Begins to describe if other example animals have the same parts or if they are different.		Put together cut-out body. Playdough body. Draw around body on wallpaper. Verbally name parts. Match label cards. Fitness games exploring what parts of body can do (begin to include muscles/bones). Photos, models & real animals – compare. Games e.g. 'Simon says', songs & rhymes.	Begin to describe what each part of the body does (e.g. knee helps leg to bend, etc.).
2	What are our senses? - Know our five senses (sight, hearing, smell, taste & touch). Can investigate. - Can describe our receptors (eyes, ears, nose, tongue & skin). Links body parts to each sense. <i>Big Picture</i>. - Our senses help us to survive and experience the world.		Is our smell better when we can't see? Is our taste better when we can't smell? Senses walk (outside, city, kitchen, etc). Flavoured milk taste test. How does it taste? 'Feely bag'. Describe texture. Name object. Paper clip game ('U' shape). Can you feel one/two points on different parts of body? Blind spot. Pupil constriction. Explore lenses (binoculars, magnifier, kaleidoscope, colours). Point to sound shaker. Make string telephone.	Make a list of favourite smells. Five types of taste test. Extend senses vocabulary. Who has the fastest reactions (reaction stick/ruler)? Explore senses in other animals.
3	Can you sort animals by their features? - Classification (classify) = sort living things into groups based upon observable features (criteria). - Can sort a range of animals by similarity or difference. - Know that certain features (criteria) are common to groups of animals (e.g. fish or mammals).		What is the same/different about us? Sort. (Develop features / 'criteria' for sorting). Sort a range of animals (models/photos/real) using agreed criteria (scaffold towards recognising that e.g. fish all have fins, etc). Play odd-one-out, find the feature, top trumps, 20 questions, match sound to animal.	Can sort less obvious differences. Sees similar features (e.g. fur) even when different colours, etc.
4	What are the features of vertebrates? - Vertebrate = has a backbone (includes humans). - Knows the groups of vertebrates (fish, amphibians, reptiles, birds & mammals) by criteria. - Can sort vertebrates by criteria.		How can we sort zoo/farm/pet animals? Use photos, video, models and/or real animals. Look at vertebrate skeletons (backbone). Feel your/live vertebrate backbone. Sort vertebrate groups using comparative key features/criteria. Matching activities.	Visit vets. Knows how to care for pets. Visit zoo. 'Adopt' zoo animal. Research. Keep & look after animals.
5	Can you name some invertebrates? - Know how to collect invertebrates safely in a habitat. - Able to use a range of collection equipment. - Able to identify collected animals to basic level (e.g. snail, spider, worm) within a habitat. - Can identify some collected common invertebrates to species (common name) by sight.		Use safe (no touching) methods to collect invertebrates in a habitat. Use equipment such as nets, pots, trays, pooters & catchers. Use picture guides to name (common animals named by sight). Improve over time. Which invertebrates are common in this habitat? Use pictures of invertebrate to name by sight. Do the (number of) invertebrates we catch change over time (month/year)?	Begin to organise invertebrates into groups by similarity and difference. Keep woodlice, worms, butterflies, etc, in classroom.
6	Do animals feed in different ways? - Herbivore = eats plants (examples) - Carnivore = eats other animals (avoid 'meat' examples) - Omnivore = eats both plants & animals (examples) - Can sort animals into feeding groups. - Can identify collected invertebrates into feeding groups.		Watch videos / photos of animals eating. What do they eat? Observe live animals. Sort animals into carnivores & herbivores. Keep a food diary. We are omnivores. Sort a range of animals into feeding groups using 'Top Trumps' style cards. Play sorting & matching games. Animal (zoo/pet) diets.	Compare plastic skulls of carnivore, herbivore & omnivore (jaw structure & teeth). Sort with Venn & Carroll diagrams.

Useful Texts, Websites & Resources

Common Misconceptions

You only feel things with your hands. The sense of smell & taste are unrelated. Everyone experiences their senses in the same way. Whales and dolphins are fish. Bats are birds. Snakes and tortoises are invertebrates. We are not animals/mammals. Carnivores only eat herbivores. Carnivores must be big. We are herbivores if we are vegan.

Enquiry Skills

Enquiry Types



**Explaining
Science**

Classification



Research



Classify

Finding
patternsObserving
over timeFair
testing

Key Knowledge

- Know types of vertebrate. Know examples of invertebrates in a habitat.
- Know examples of carnivore, herbivore and omnivore. Know what they mean.
- Know human body parts and our 5 senses.

Big Picture Models

Mammal



Amphibian



Bird



Reptile



Fish



Invertebrates



Carnivore



Omnivore



Herbivore



Five senses



Key Words

sort

group

classify feature (criteria)

vertebrate

bird

gills

touch

invertebrate

mammal

lungs

smell

fish

scales

carnivore

taste

amphibian

skin

herbivore

hearing

reptile

fur (hair)

omnivore

sight

Name

Science Rockets



Explaining
Science

Classification

Designing
Experiments

Data, Tables &
Graphs

Making Conclusions

**

*

The assessment template consists of five vertical ovals, each representing a science skill. Each oval is divided into three horizontal sections by dashed lines, corresponding to the star ratings (***, **, *) on the left. The bottom of each oval features a set of three colored shapes: a triangle, a rectangle, and another triangle. The colors for the five ovals are yellow, orange, pink, green, and blue, respectively. The shapes are arranged in a way that they appear to be part of the rocket's base, with the triangle on the left, the rectangle in the middle, and the triangle on the right.