SCIENCE

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PROGRESSION OF SKILLS AND KNOWLEDGE IN SCIENCE

WORKING SCIENTIFICALLY STRANDS			
1.Knowledge of methods that scientists use to answer questions: **Observing Over Time** **Pattern-Seeking** **Grouping and Classifying** **Researching using Secondary Sources**	**2. Knowledge of the apparatus and techniques, including measurement:**	**3. Knowledge of data analysis:**	**4. Knowledge of how science uses evidence to develop explanations:**

GOLDEN THREADS OF DEVELOPMENT IN SCIENCE

STRAND	The Human Body and Animals		Space		Materials		Weather	
	Knowledge	Skills	Knowledge	Skills	Knowledge	Skills	Knowledge	Skills
FS2	Beginning in Nursery and Reception, pupils gain an understanding of basic body parts and the essential roles of bones, muscles, and skin in facilitating bodily actions. They learn that physical or sensory impairments can lead to variations in how body parts function, and they begin to grasp the concept of human development from infancy to adulthood. By the end of Autumn 1, pupils deepen their understanding by learning that all living things, including humans, undergo growth and change throughout their lives.	**1. Knowledge of methods that scientists use to answer questions** **2. Knowledge of the apparatus and techniques, including measurement** **3. Knowledge of data analysis** **4. Knowledge of how science uses evidence to develop explanations**	In Nursery, pupils are introduced to the fundamental concept of Earth's changing seasons, providing an introductory glimpse into natural patterns and celestial occurrences. As they step into Reception, pupils first grasp the notion of Earth as their home and are introduced to the idea of space exploration. They learn about astronauts, the individuals who venture beyond our planet, and understand the significance of the International Space Station. They become aware of the planets within our solar system, appreciating their unique characteristics, and become aware of distant stars. Additionally, they learn about iconic lunar landings and contemporary missions such as the Mars Rover. In Reception, learning circles back to Earth's seasons, reinforcing their connection to the natural world.	**1. Knowledge of methods that scientists use to answer questions** **2. Knowledge of the apparatus and techniques, including measurement** **3. Knowledge of data analysis** **4. Knowledge of how science uses evidence to develop explanations**	In Reception, pupils learn the fundamental idea that the Earth and other celestial bodies, such as planets, are composed of various materials, including rock, ice, and gases.	**1. Knowledge of methods that scientists use to answer questions** **2. Knowledge of the apparatus and techniques, including measurement** **3. Knowledge of data analysis** **4. Knowledge of how science uses evidence to develop explanations**	During Nursery and Reception, pupils grasp the basic concept of seasons and changing weather patterns (e.g. warmer springtime).	**1. Knowledge of methods that scientists use to answer questions** **2. Knowledge of the apparatus and techniques, including measurement** **3. Knowledge of data analysis** **4. Knowledge of how science uses evidence to develop explanations**
	Knowledge	Skills	Knowledge	Skills	Knowledge	Skills	Knowledge	Skills

YEAR 1	Y1 children delve into the five senses and their corresponding body parts. They learn how sensory information is processed by the brain. They become more aware of sensory challenges faced by some individuals, like blindness or deafness.	**1. Knowledge of methods that scientists use to answer questions** Observing how the size of the pupil changes in reaction to darkness and light Fair testing of how cress seeds grow in different conditions **2. Knowledge of the apparatus and techniques, including measurement** **3. Knowledge of data analysis** Children use or produce diagrams, labelling and written explanations and Venn diagrams **4. Knowledge of how science uses evidence to develop explanations**	Year 1 children learn the intricacies of seasons and weather, enabling pupils to name and describe the four seasons, thereby connecting classroom knowledge to real-life experiences.	**1. Knowledge of methods that scientists use to answer questions** linking weather, plant growth and animal behaviour to seasons Researching weather data from Met Office **2. Knowledge of the apparatus and techniques, including measurement** Measurements of rainfall **3. Knowledge of data analysis** Children use or produce a wall chart, graph, table, diagrams and written explanations **4. Knowledge of how science uses evidence to develop explanations** Y1 Seasons and Weather – meteorologists convey information about the weather	In Year 1, pupils learn about the resources found on Earth. They distinguish between natural and manufactured resources, understanding that natural resources, like wood and metals, originate from the environment, while manufactured resources, such as plastics, are products of human creation. This insight into the origins of materials lays the groundwork for better comprehension of the world around them.	**1. Knowledge of methods that scientists use to answer questions** Group different materials by their properties **2. Knowledge of the apparatus and techniques, including measurement** **3. Knowledge of data analysis** Children use or produce a wall chart, graph, table, diagrams and written explanations **4. Knowledge of how science uses evidence to develop explanations**	In year 1, pupils learn the different characteristics of autumn, winter, spring, and summer. They learn that we anticipate colder weather in autumn and winter, alongside the longer days of sunlight in the summer. Pupils explore the tools used to measure and predict weather, such as rain gauges, weather vanes, thermometers, as well as learning about the cloud types, which expands their understanding of meteorology. They come to appreciate that scientists (called meteorologists) study the weather, utilising computer technology to make weather forecasts, underscoring the significance of this learning for daily life.	**1. Knowledge of methods that scientists use to answer questions** **2. Knowledge of the apparatus and techniques, including measurement** **3. Knowledge of data analysis** Children use or produce a wall chart, graph, table, diagrams and written explanations **4. Knowledge of how science uses evidence to develop explanations**
	Knowledge	Skills	Knowledge	Skills	Knowledge	Skills	Knowledge	Skills
YEAR 2	In Autumn 1 children learn the fundamental needs of animals, including humans, such as water, food, and air. They discover the significance of the skeletal and muscular systems in enabling movement and begin to understand how the body processes food. They learn the role of the heart in pumping blood throughout the body and the importance of maintaining a healthy lifestyle.	**1. Knowledge of methods that scientists use to answer questions** Researching pasteurisation and cowpox to fight off smallpox **2. Knowledge of the apparatus and techniques, including measurement** **3. Knowledge of data analysis** Children use or produce a survey diagrams, labelling and written explanations and Venn diagrams **4. Knowledge of how science uses evidence to develop explanations**	In Year 2, their knowledge of astronomy develops further as they learn more about the eight planets in our solar system, Earth's orbital journey around the Sun, and the mechanisms behind day and night. They also discover the Moon's orbit around Earth and its role in reflecting the Sun's light. The concept of constellations and the collaborative nature of scientific discovery in this unit further enrich their understanding of space.	**1. Knowledge of methods that scientists use to answer questions** Group things that are living, dead and never alive **2. Knowledge of the apparatus and techniques, including measurement** **3. Knowledge of data analysis** Children use or produce a wall chart, graph, table, diagrams and written explanations **4. Knowledge of how science uses evidence to develop explanations**	In Year 2, pupils expand their knowledge by recognising common materials like wood, plastic, glass, and metal. They discern the unique properties of these materials, such as hardness, opacity, and flexibility, and appreciate how these properties influence the purpose for which these materials are employed. Pupils learn that inventors carefully select materials according to their specific properties when designing inventions. They begin to grasp the idea that particles make up materials and understand the differences between solids and liquids, paving the way for a more nuanced understanding of the underlying structure of matter.	**1. Knowledge of methods that scientists use to answer questions** Observe how water can change from solid to liquid Fair test to compare the speed at which ice cubes melt in different conditions **2. Knowledge of the apparatus and techniques, including measurement** **3. Knowledge of data analysis** Children use or produce a wall chart, graph, table, diagrams and written explanations **4. Knowledge of how science uses evidence to develop explanations**	Building on the foundation in year 1, pupils broaden their knowledge of environments by studying the weather conditions of diverse ecosystems like deserts and rainforests.	**1. Knowledge of methods that scientists use to answer questions** what is needed to construct a working electrical circuit **2. Knowledge of the apparatus and techniques, including measurement** comparing the measurement of cress growth in different conditions over time **3. Knowledge of data analysis** Children produce a table, diagrams, labelling and written explanations **4. Knowledge of how science uses evidence to develop explanations** Y2 Plants – botanists use botanical sketches
	Knowledge	Skills	Knowledge	Skills	Knowledge	Skills	Knowledge	Skills

YEAR 3	In Year 3, pupils learn to distinguish between voluntary and involuntary muscles, appreciating their role in mobility, while also understanding the protective function of bones and the brain as the centre of the nervous system. They further their grasp of nutrition's role in sustaining the body and the basic components and functions of the digestive system.	**1. Knowledge of methods that scientists use to answer questions** **2. Knowledge of the apparatus and techniques, including measurement** **3. Knowledge of data analysis** Children use or produce diagrams, labelling and written explanations and Venn diagrams **4. Knowledge of how science uses evidence to develop explanations**	In Year 3, pupils explore the relationship between Earth's tilt and the changing seasons, deepening their understanding of the natural world's cyclical patterns. Additionally, Year 3 introduces them to the fundamental role of the Sun as Earth's primary source of light and the apparent movement of the Sun in the sky due to Earth's rotation.	**1. Knowledge of methods that scientists use to answer questions** Observing how light reflects off different types of mirrors Group light sources into natural or artificial **2. Knowledge of the apparatus and techniques, including measurement** **3. Knowledge of data analysis** Children use or produce diagrams, labelling and written explanations and Venn diagrams **4. Knowledge of how science uses evidence to develop explanations**	In year 3, children learn about rocks: their formation, classifications, and their ability to allow or block the passage of water. The introduction of permeability provides pupils with valuable insights into Earth's geological processes. Also, contributing to this knowledge is their learning of how fossils are formed.	**1. Knowledge of methods that scientists use to answer questions** understanding patterns in the ways rocks can be formed Fair test to compare the permeability of different rocks **2. Knowledge of the apparatus and techniques, including measurement** **3. Knowledge of data analysis** Children use or produce diagrams, labelling and written explanations and Venn diagrams **4. Knowledge of how science uses evidence to develop explanations**	In Year 3, pupils extend their knowledge on seasons, understanding Earth's axial tilt and its influence on weather changes throughout the year. They also explore animal migration, which enhances their knowledge of the interplay between weather conditions and where animals may choose to live. This progression in knowledge sets the stage for the exploration of ecology in Year 4, as pupils delve into the roles of producers, which make their own food from sunlight	**1. Knowledge of methods that scientists use to answer questions** Researching migration patterns **2. Knowledge of the apparatus and techniques, including measurement** keeping the variables the same for both plants in a growth investigation **3. Knowledge of data analysis** Children use or produce diagrams, labelling and written explanations and Venn diagrams **4. Knowledge of how science uses evidence to develop explanations** Y3 Plants – agricultural scientist George Washington Carver encouraging farmers to rotate crops
	Knowledge	Skills	Knowledge	Skills	Knowledge	SKills	Knowledge	Skills
YEAR 4	Year 4 introduces the concept of cells as the building blocks of the human body and emphasises the importance of nutrition in maintaining overall health. Pupils explore different types of teeth and their functions, as well as the process of digestion and excretion, along with the essential vitamins and minerals necessary for the body. Pupils build upon their understanding of humans as mammals, learning that vertebrates have a backbone.	**1. Knowledge of methods that scientists use to answer questions** identifying the processes that living things have in common Identiify parts of a food chain and the organisms that can fulfil those roles **2. Knowledge of the apparatus and techniques, including measurement** **3. Knowledge of data analysis** Children use or produce a graph, table, diagrams, written explanations and a key **4. Knowledge of how science uses evidence to develop explanations**	Year 4 presents the knowledge that space is a vacuum devoid of air particles, strengthening their knowledge of how sound travels.	**1. Knowledge of methods that scientists use to answer questions** comparing the volume of a drumbeat at different distances Researching how Thomas Edison and Lewis Latimer pioneered the lightbulb **2. Knowledge of the apparatus and techniques, including measurement** using a decibel app/data logger to measure volume **3. Knowledge of data analysis** Children use or produce a graph, table, diagrams, and written explanations **4. Knowledge of how science uses evidence to develop explanations**	Pupils extend their knowledge by understanding the concept of states of matter, recognising that water can exist as a solid, liquid, or gas, which is exemplified through the water cycle. They also learn about thermal conductivity and the selection of materials based on their properties.	**1. Knowledge of methods that scientists use to answer questions** observing how an ice cube changes state over time in different temperatures **2. Knowledge of the apparatus and techniques, including measurement** **3. Knowledge of data analysis** Children use or produce a graph, table, diagrams, and written explanations **4. Knowledge of how science uses evidence to develop explanations** Y4 Electricity – inventor Lewis Latimer travelling to Canada, America and London to install electric streetlighting	In year 4, children learn more deeply about weather through the water cycle, where they learn about the four stages, humidity and more on cloud formation.	**1. Knowledge of methods that scientists use to answer questions** **2. Knowledge of the apparatus and techniques, including measurement** **3. Knowledge of data analysis** Children use or produce a graph, table, diagrams, and written explanations **4. Knowledge of how science uses evidence to develop explanations**
	Knowledge	Skills	Knowledge	Skills	Knowledge	Skills	Knowledge	Skills

YEAR 5	In Year 5, students learn the early stages of human growth: gestation, birth, and infancy. They also explore the physical and mental changes occurring during puberty, and they recognise that humans and animals experience growth stages of varying lengths.	**1. Knowledge of methods that scientists use to answer questions** identifying how newt and other amphibian life cycles are similar Researching the work of David Attenborough and Jane Goodall **2. Knowledge of the apparatus and techniques, including measurement** **3. Knowledge of data analysis** Children use or produce a graph, table, diagrams, labelling and written explanations **4. Knowledge of how science uses evidence to develop explanations**	In Year 5, the children learn the concept of gravity, as a force that pulls objects toward the Earth's centre. Their learning extends further as they learn about the Big Bang theory, the formation and characteristics of galaxies, and our position in the Milky Way. Understanding the complexity of the solar system, comprising eight planets and other celestial objects like asteroids and dwarf planets, contributes to a more comprehensive view of the cosmos. The phases of the Moon, human lunar exploration, and the universe's vastness become integral components of their space schema. Also, in Year 5, the Meteorology unit adds depth to their understanding, connecting the atmosphere's layers and their role in shielding Earth from the Sun's energy, along with the significance of ozone and its environmental implications.	**1. Knowledge of methods that scientists use to answer questions** **2. Knowledge of the apparatus and techniques, including measurement** using a Newton meter to measure friction **3. Knowledge of data analysis** Children use or produce a graph, table, diagrams, labelling and written explanations **4. Knowledge of how science uses evidence to develop explanations** Y5 Astronomy – why it is important for scientists to know what other scientists have learned before them	In Year 5, pupils delve deeper into the specifics of properties and materials, including solubility and the processes of dissolution and separation of mixtures. They develop an understanding of reversible and irreversible changes, solidifying their grasp of how materials can transform and be utilised in various scientific contexts.	**1. Knowledge of methods that scientists use to answer questions** observing dissolving and solutions group materials that dissolve or do not dissolve in water comparing which material is the best to keep liquids hot **2. Knowledge of the apparatus and techniques, including measurement** **3. Knowledge of data analysis** Children use or produce a graph, table, diagrams, labelling and written explanations **4. Knowledge of how science uses evidence to develop explanations**	In Year 5, meteorology becomes the focal point, expanding their knowledge of weather systems and the factors influencing them, from atmospheric layers to air masses and fronts, as well as thunder and lightning.	**1. Knowledge of methods that scientists use to answer questions** **2. Knowledge of the apparatus and techniques, including measurement** **3. Knowledge of data analysis** Children use or produce a graph, table, diagrams, labelling and written explanations **4. Knowledge of how science uses evidence to develop explanations**
	Knowledge	Skills	Knowledge	Skills	Knowledge	Skills	Knowledge	Skills
YEAR 6	In Year 6, pupils gain an advanced understanding of the circulatory system, realising how the heart pumps blood, blood vessels transport it, and how heart rate can vary based on bodily needs. They also learn the composition of blood and how excercise and a healthy diet affects the heart rate	**1. Knowledge of methods that scientists use to answer questions** Identifying fair tests for how exercise affects heart rate **2. Knowledge of the apparatus and techniques, including measurement** using repeat measurements to measure pulse rate **3. Knowledge of data analysis** Children use or produce a graph, chart, table, diagrams, labelling and written explanations **4. Knowledge of how science uses evidence to develop explanations**	In Year 6 the children learn concept of light, differentiating between natural and reflected light, and revealing the spectrum of sunlight.	**1. Knowledge of methods that scientists use to answer questions** comparing how the number of batteries affects the brightness of a bulb **2. Knowledge of the apparatus and techniques, including measurement** **3. Knowledge of data analysis** Children use or produce a graph, chart, table, diagrams, labelling and written explanations **4. Knowledge of how science uses evidence to develop explanations**	**CLASSIFICATION AND EVOLUTION**	**1. Knowledge of methods that scientists use to answer questions** Group the five kingdoms of organisms using research to add unfamiliar examples to each kingdom **2. Knowledge of the apparatus and techniques, including measurement** **3. Knowledge of data analysis** Children use or produce a graph, chart, table, diagrams, labelling and written explanations **4. Knowledge of how science uses evidence to develop explanations** Y6 Evolution – Darwin's drawings of the finches	**REPRODUCTION UNIT**	**1. Knowledge of methods that scientists use to answer questions** observing how ginger, garlic and potatoes reproduce asexually **2. Knowledge of the apparatus and techniques, including measurement** **3. Knowledge of data analysis** Children use or produce a graph, chart, table, diagrams, labelling and written explanations **4. Knowledge of how science uses evidence to develop explanations**

observing how ginger, garlic and potatoes reproduce asexually