YEAR 6	
Working scientifically **During years 5 and 6, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:**	**Vocabulary** **Focus 3/5 to be introduced 2023**
• 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	plan variables measurements accuracy precision repeat repeats record data scientific diagrams labels classification keys tables scatter graphs bar graph line graph predictions further comparative and fair tests report and present conclusions casual relationships explanations degree of trust oral and written display presentation evidence support refute ideas arguments identify, classify and describe patterns systematic quantitative measurements

Programme of study, skills and vocabulary

	Autumn 1		Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
A	**From Sept 23** Revisit and practice key vocab 'Focus 3/5' and concepts from previous year's learning	Electricity	Living things and their habitats	Animals inc humans	Light	**Revisit previous content**	Living things and their habitats Evolution and inheritance
B		Earth and space	Earth and space	Forces	Animals inc humans	Properties and changes of materials	Properties and changes of materials

Stories

Teaching science through stories | STEM

story-links-list.pdf

Book Lists for Primary Science Topics (booksfortopics.com)

diverse-representation-in-science-book-corner-suggestions-1.pdf

Goodnight Mister Tom *(Michelle Magorian)* ***Blackout*** *(John Rocco)*	***Itch*** *(Simon Mayo)* ***Kensuke's Kingdom*** *(Michael Morpurgo)*

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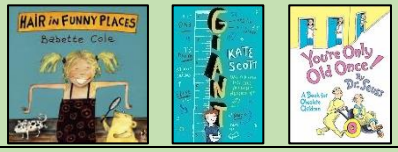
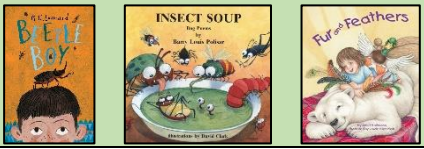
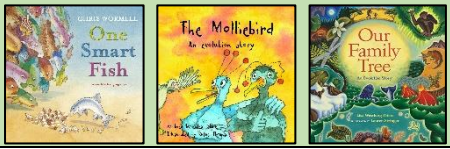
Hitler's Canary *(Sandi Toksvig)* 	***The BFG*** *(Roald Dahl)* 
Pig-Heart Boy *(Malorie Blackman)* ***Skellig*** *(David Almond)* ***A Heart Pumping Adventure*** *(Heather Manley)* 	***Hair in Funny Places*** *(Babette Cole)* ***Giant*** *(Kate Scott)* ***You're Only Old Once!*** *(Dr. Seuss)* 
The Enormous Turnip *(Katie Daynes)* ***Leonardo's Dream*** *(Hans de Beer)* ***The Aerodynamics of Biscuits*** *(Clare Helen Welsh)* 	***The Skies Above My Eyes*** *(Charlotte Guillain & Yuval Zommer)* ***George's Secret Key to the Universe*** *(Lucy and Stephen Hawking with Christophe Galfard)* ***The Way Back Home*** *(Oliver Jeffers)* 
Charlotte's Web *(E.B. White)* ***The Land of Neverbelieve*** *(Norman Messenger)* ***Mummy Laid an Egg*** *(Babette Cole)* 	***Letters from the Lighthouse*** *(Emma Carroll)* ***The Gruffalo's Child*** *(Julia Donaldson)* ***The King Who Banned the Dark*** *(Emily Haworth-Booth)* 
Beetle Boy *(M G Leonard)* ***Insect Soup*** *(Barry Louis Polisar)* ***Fur and Feathers*** *(Janet Halfmann)* 	***One Smart Fish*** *(Christopher Wormell)* ***The Molliebird*** *(Jules Pottle)* ***Our Family Tree*** *(Lisa Westberg Peters)* 

Job titles

[01 stem-careers-by-topic-1.pdf]

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Electricity	**Key objectives** 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.	**Specific skills** Pupils might work scientifically by: systematically identifying the effect of changing one component at a time in a circuit; designing and making a set of traffic lights, a burglar alarm or some other useful circuit	**Vocabulary** appliances electrical circuit complete circuit circuit diagram circuit symbol components cell battery positive/ negative terminal connection loose connection short circuit wire crocodile clip bulb brightness switch buzzer volume motor conductor insulator voltage current resistance danger series circuit
	Big question? **What can change the brightness of a bulb?**	**Famous names/inventions** Nikola Telsa -AC electric system Alessandro Volta- Electrical Battery Nicola Tesla- Alternating Currents Edith Clarke -Electrical engineer	
Living things and their habitats	**Key objectives** describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals give reasons for classifying plants and animals based on specific characteristics	**Specific skills** using classification systems and keys to identify some animals and plants in the immediate environment. They could research unfamiliar animals and plants from a broad range of other habitats and decide where they belong in the classification system	**Vocabulary** **plants animals vegetable garden flower border reproduction plants- sexual, asexual animals- sexual life cycles- mammal, amphibian, insect, bird lifecycles around the world- rainforest, oceans, desert prehistoric similarities differences germination pollination stamen stigma** **organism micro-organism fungus mushrooms classification keys environment fish amphibians reptiles birds mammals vertebrates invertebrate**
	Big question? **Why do polar bears have white fur?**	**Famous names/inventions** Jane Goodall- naturalist Sylvia Earle - Marine biologist Dr. Paula Kahumbu-wildlife conservationist Mangala Mani – Antarctic scientist Sir David Attenborough- Animal Behaviourist Carl Linneus Classification Libby Hyman Classification Invertebrates	

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<table>
<tr>
<td rowspan="2">Animals inc humans</td>
<td>Key objectives
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.

describe the changes as humans develop to old age.</td>
<td>Specific skills
Pupils might work scientifically by: exploring the work of scientists and scientific research about the relationship between diet, exercise, drugs, lifestyle and health.

Pupils could work scientifically by researching the gestation periods of other animals and comparing them with humans; by finding out and recording the length and mass of a baby as it grows.</td>
<td>Vocabulary
circulatory system heart blood blood vessels pumps oxygen carbon dioxide lungs nutrients water diet exercise drugs lifestyle</td>
</tr>
<tr>
<td>Big question?
What is the most important body part?</td>
<td>Famous names/inventions

Alexander Fleming- Penicillin

Louis Pasteur- Vaccination

Eva Crane -Reproduction in Bees

Virginia Apgar- obstetrical anaesthesiologist

Leonardo Da Vinci- anatomy

Santorio Santorio-Anatomist

Dr. Katherine Dibb – Expert in Cardiovascular Sciences

Justus von Liebig- Theories of Nutrition and Metabolism

Sir Richard Doll- Linking Smoking and Health Problems</td>
<td></td>
</tr>
<tr>
<td>Evolution and inheritance</td>
<td>Key objectives
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.</td>
<td>Specific skills
Pupils might work scientifically by: observing and raising questions about local animals and how they are adapted to their environment; comparing how some living things are adapted to survive in extreme conditions, for example, cactuses, penguins and camels. They might analyse the advantages and disadvantages of specific adaptations, such as being on two feet rather than four, having a long or a short beak, having gills or lungs, tendrils on climbing plants, brightly coloured and scented flowers.</td>
<td>Vocabulary
evolution suited/ suitable adapted/ adaptation offspring characteristics vary/ variation inherit/ inheritance fossils</td>
</tr>
</table>

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	Big question? **Why are there so many different living things on Earth?**	**Famous names/inventions** Hippocrates -The Father of Medicine Charles Darwin- Evolution Alfred Russell Wallace – naturalist Rosalind Franklin – DNA Nettie Stevens – Geneticist Professor Alice Roberts - Evolutionary biologist	
Light	**Key objectives** recognise that light appears to travel in straight lines use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.	**Specific skills** **Pupils might work scientifically by: deciding where to place rear-view mirrors on cars; designing and making a periscope and using the idea that light appears to travel in straight lines to explain how it works. They might investigate the relationship between light sources, objects and shadows by using shadow puppets. They could extend their experience of light by looking a range of phenomena including rainbows, colours on soap bubbles, objects looking bent in water and coloured filters (they do not need to explain why these phenomena occur).**	**Vocabulary** **light travels straight reflect reflection light source object shadows mirrors periscope rainbow filters**
	Big question? **What allows us to see?**	**Famous names/inventions** Thomas Edison -Invented electric light bulb Patricia Bath (BP website)- saving sight Thomas Young (Wave Theory of Light) Ibn al-Haytham -Light and our Eyes Percy Shaw - The Cats Eye Maria Telkes- Solar energy	

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Forces	Key objectives 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.	**Specific skills** **Pupils might work scientifically by: exploring falling paper cones or cup-cake cases, and designing and making a variety of parachutes and carrying out fair tests to determine which designs are the most effective. They might explore resistance in water by making and testing boats of different shapes. They might design and make products that use levers, pulleys, gears and/or springs and explore their effects.**	**Vocabulary** **fall gravity force air resistance water resistance friction moving surfaces mechanisms levers pulleys gears magnetic force magnet attract**
	Big question? **Why do we fall?**	**Famous names/inventions** Isaac Newton- Gravity Albert Einstein- The Theory Of relativity Galileo Galilei - Gravity and Acceleration Archimedes of Syracuse- Levers	
Properties and changes of materials	**Key objectives** 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.	**Specific skills** **Pupils might work scientifically by: carrying out tests to answer questions, for example, 'Which materials would be the most effective for making a warm jacket, for wrapping ice cream to stop it melting, or for making blackout curtains?' They might compare materials in order to make a switch in a circuit. They could observe and compare the changes that take place, for example, when burning different materials or baking bread or cakes. They might research and discuss how chemical changes have an impact on our lives, for example, cooking, and discuss the creative use of new materials such as polymers, super-sticky and super-thin materials.**	**Vocabulary** **properties hardness solubility transparency conductive response to magnets dissolve liquid solution solute separate separating solids, liquids, gases filtering sieving evaporating reversible changes mixing evaporation filtering sieving melting irreversible conductivity insulation chemical opaque translucent rusting residue condensing**

	Big question? **Can anything be a solid, liquid and gas?**	**Famous names/inventions** Sir Humphrey Davy- Separating gases Jamie Garcia (BP website)- Invention of a new plastic Becky Schroeder - fluorescence material Spencer Silver, Arthur Fry and Alan Amron - Post-It Notes Ruth Benerito - Wrinkle-Free Cotton	
Earth and space	**Key objectives** describe the movement of the Earth, and other planets, relative to the Sun in the solar system describe the movement of the Moon relative to the Earth describe the Sun, Earth and Moon as approximately spherical bodies use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky.	**Specific skills** **Pupils might work scientifically by: comparing the time of day at different places on the Earth through internet links and direct communication; creating simple models of the solar system; constructing simple shadow clocks and sundials, calibrated to show midday and the start and end of the school day; finding out why some people think that structures such as Stonehenge might have been used as astronomical clocks.**	**Vocabulary** **Earth planets Sun solar system Moon celestial body sphere/ spherical rotate/ rotation spin night and day Mercury Venus Mars Jupiter Saturn Uranus Neptune Pluto 'dwarf' planet orbit revolve geocentric model heliocentric model shadow clocks sundials astronomical clocks**
	Big question? **Why does the Sun appear to move?**	**Famous names/inventions** Dr Sian Proctor- Analog Astronaut Margaret Hamilton- Computer scientist (Moon Landings) Stephen Hawking- Black Holes Mae Jemison – Astronaut Claudius Ptolemy and Nicolaus Copernicus - Heliocentric vs Geocentric Universe Neil Armstrong- First man on the Moon Helen Sharman- GB astronaut *Caroline Herschel- First to find a comet* Valentina Tereshkova-Cosmonaut	

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