CRIGGLESTONE ST. JAMES CE PRIMARY ACADEMY

Science

At St James Academy we teach children within the areas of physics, biology and chemistry. They are taught fundamental aspects, ensuring they have the knowledge, understanding and vocabulary to explore the methods, processes and uses of science. Children will have opportunities to ask and explore questions through a range of resources and activities. We will teach specific scientific skills through problem solving, team work and in investigations providing children with an education to explore how science has impacted the ever-developing world around us and preparing them for the future.

‘Ready for the Future’

2022-2024

INTENT:

At Crigglestone St James Academy, our aim is to ensure all pupils are 'Ready for the Future'. Therefore, we provided children with the essential foundations to recognise and understand the uses and implications of science in everyday life. We teach science as a discreet weekly lesson, and it is carried out through a 2 year rolling programme, following the National Curriculum (2014).

Our budding young scientists will have opportunities to build on their prior scientific knowledge and concepts through specific disciplines of chemistry, physics and biology. Using scientific enquiry skills they will be able to explain, predict and analyse the world around them with scientific vocabulary and having opportunities to question concepts Our intention is that our teaching will develop excitement and curiosity to engage and motivate the children to prepare them for the future and make positive contributions to the world in which they live. We will do this by delivering high quality lessons in a creative way, using up to date activities and resources and provided links to the wider curriculum and allow the children to take ownership of their learning.

Our Science curriculum offers the teaching of wider scientific concepts as well as awe and wonder which is found in everyday situations that the children are exposed to, the intention behind this is to promote the love of science through a broad spectrum that shows relevance to the children and prepares them in the future.

IMPLEMENTATION:

The planning consist of a set knowledge and a working scientifically skill that is delivered through purposeful yet challenging units of study using knowledge organisers to support the work that is carefully planned. Children recap on prior knowledge at the beginning of every lesson through mini quizzes to enable opportunities to allow 'knowledge to stick'. New information and knowledge is introduced through whole class inputs and questioning is used to formatively assess children's knowledge and understanding. Children have opportunities to ask questions and share their thoughts as they make connections between the lessons and the world around them. Within the lessons, the children explore the concepts further and apply the knowledge in group work, partner work or independently through written, observational or experimental work.

The lessons are planned in a specific sequence and resourced from Science Bug and Plan It. Each lesson build on prior knowledge ensuring that each area of science shows progression in higher year groups. Teachers are supported through CPD, and use progression grids and knowledge organisers to plan and deliver quality, engaging science lessons. The lessons are clearly prepared to support children's learning. Misconceptions are addressed rapidly and feedback is given for each lesson, which could be through live marking, one to one work with the children, or mini plenaries. Staff ensure children.

There are always rich opportunities for children to work scientifically and use high quality, ambitious vocabulary through hands on experiences, investigative work and when discussing ideas and findings. Within the units of science children also make links within other curriculum areas, such as maths, when working producing and analysing graphs and tables.

As a school we want to support the children to be 'ready for the future', therefore, we link the lessons to the world around them so that they can explore how and why things have occurred as well as referring to the evolution and reasons for this, encouraging them to take on active roles and making positive contributions such as looking after their environment and healthy eating. These elements are strongly linked to wider teaching opportunities of the school, through wider curriculum lessons, through worships and through the schools values. Children are exposed to a range of scientific exploration, and have well-chosen texts to support units in their year groups, as well as having opportunities to the wider world issue and findings from sources such as Newsround and Picture News.

Biology				
Strand	**EYFS**	**KS1**	**LKS2**	**UKS2**
Animals including humans	Body parts – songs and games Painting self-portraits – link to maths – tables of eye colour. life cycles of animals and humans – The hungry caterpillar healthy eating	(Year 1) – Animal kingdom Sorting animals and objects (living/non-living) Difference between an invertebrate and a vertebrate Animal families with vertebrates Animal families with invertebrates Differences between mammals and birds Types of food living things eat (Year 2) – Human Lifestyle Body parts of a human being. Exercise is important A healthy diet Bodies change as they get older Importance of being hygienic Who keeps us healthy?	(Year 4) - Anatomy Organs Bones in the human body Compare humans anatomy to animals Are all teeth the same? Oxygen Digesting food	(Year 6) – Diet and Lifestyle Healthy diet Lifestyles and diets Exercise and muscles Circulatory system Medicinal systems Nicotine and alcohol
Vocab		Animal Kingdom Vertebrate, invertebrate, Carnivore Herbivore, Omnivore, Crustacea	Anatomy Endoskeleton, Exoskeleton, Organ, Peristalsis, Platelets, Plasma, Oxygen, Carbon dioxide	
Plants	Growth of seeds. – Sunflower Children will plant Look at tall and short vocabulary Signs of spring – spring flowers Signs of winter – trees loosing leaves Life cycles of plants Planting potatoes	(Year 1) – Plants Planting a bean (different conditions) Wild plants Deciduous and evergreen trees Parts of trees and plants Changes of a tomato plant Changes to the bean plant	(Year 3) – Plants Conditions of a plant Plants growth in different conditions (hyacinth bulb) Parts and functions of a flowering plant (dissect tulip) Cycle of a plant (pea shoots) Plants transport water Plants adapt to different conditions. (echeveria vs epipremnums)	
Vocabulary			Sepals, ovule, ovary, style, stigma, petal, filament, anther, germination, flowering, pollination, fertilisation, seed dispersal.	

Living things	Identifying minibeasts Habitats/microhabitats of minibeasts Making bug hotels/houses What do animals need? Farm animals Sea animals	<u>(Year 2) - Habitats</u> Characteristics of living things Habitats Micro habitats Desert habitat Rainforest habitat City habitat	<u>(Year 3) - Ecosystems</u> An ecosystem Classify diets of animals Producers are important Construct a food chain Construct a food web Disruption to food webs <u>(Year 4) – Adaptations</u> Adaptation explanation Organisms adapt to hot environments Organisms adapt to cold environments Nocturnal animals Underwater adaptations Deep sea adaptations	<u>(Year 5) – Reproductive cycles</u> Plants have flowers Clone a potato Insect vs amphibian life cycles Mammal lifecycles Birds lay eggs Comparing animal life cycles <u>(Year 6) – Cells</u> Living vs non living Main organ systems of the body Organ systems, organs, tissues and cells Animal cells Plant cells Specialised cells
Vocab		Organism, microorganism, food chain, habitats	<u>Ecosystems</u> Predator, Prey, Producer, Consumer, Photosynthesis <u>Adaptations</u> Adaptation, camouflage, nocturnal, echolocation, biome	
Evolution and inheritance	Dinosaurs – small world Grandparents – mum and dad – family tree – do you look alike?			<u>(Year 5) – Humans and animals overtime</u> Evolution theory Fossils as evidence Development of animal kingdom Organisms living over era's Homo sapiens Impact of humans in the future
Vocab ulary				

Chemistry				
Strand	**EYFS**	**KS1**	**LKS2**	**UKS2**
Materials	Three little pigs houses – describing materials and textures Warmth/strength /rough/smooth Mathematical language – heavy/light Recycling/sorting/Upcycling Making playdough Manipulating playdough Baking bread - kneading Art and design area to make models Building with plastic crates/wood/ Cardboard Covers with tarpaulin/sheets /netting	<u>(Year 1) – Materials</u> What is a material? What are objects made from? Describe material Floating and sinking Waterproof materials Magnetic materials <u>(Year 1) – building things</u> Waterproof materials Building a waterproof wall Explore if wall is waterproof Build a wall to withstand a strong wind Creating winds to explore experiment Mixtures – cookie cement <u>Year 2 - Changing materials</u> Common materials and properties Changing solid shapes Stretchiest material Absorbent materials Changing raw materials/sorting materials Changing materials - raw vs synthetic	<u>(Year 3) – Raw and synthetic materials</u> Raw materials Synthetic materials Synthetic materials made from raw materials How paper is made Recycling Living sustainably	(Year 6) – sustainability Glass, ceramics and plastics Recycling Life cycle Burning fuel Global warming Climate change
Vocabulary				

States of matter	Whisking bubbles in the water Blowing bubbles Mixing ingredients – making playdough/baking	<u>Year 2 – mixing and making</u> Solids, liquids and gases Heating a solid Making bubbles Mixing solid and liquid - soluble/insoluble Separating mixtures Unreversible changes	<u>(Year 4) – phases of matter</u> Properties of solids, liquids and gases Particles inside solids, liquids and gases. Heating and cooling Changes of state Melting and boiling points Substances which are not a state of matter.	<u>(Year 5) – physical and chemical changes</u> What happens during a change? Physical changes Chemical changes Differences between physical and chemical changes Investigate chemical reactions Metals into acids <u>(Year 5) – separating mixtures</u> Pure substances Mixtures Formulation Separating mixtures into pure substances Separate mixtures of sand, salt and water Separating river water <u>(Year 6) – Heat</u> Heating particles Expansion Thermal equilibrium Transferring heat Thermal conductors and insulators Keeping ice frozen/cold <u>(Year 6) – Particles and chemical reactions</u> Particles in solids, liquids and gasses Particles in pure substances Dissolving Separating mixtures Chemical reactions Burning particles
Vocabulary				**<u>Heat</u>** Particles, Solid, Liquid, Gas, Heat transfer Thermal equilibrium, Conductor, Insulator

Rocks			(Year 4) – Rock cycle Igneous rock Sedimentary rock Metamorphic rock Identifying rocks Changes of rocks Rock cycle	
Vocabulary				

Physics				
Strand	**EYFS**	**KS1**	**LKS2**	**UKS2**
Seasonal changes	Calendar – what is the weather today. Autumn/spring/ Winter/summer walks – identifying signs Deciduous trees/evergreen trees - identification Minibeasts in spring/summer Animals hibernating in winter Spring animals.	<u>Year 1 – seasons and weather</u> What do we know about the weather? Weather change across the seasons Trees change cross the seasons Measuring rainfall Hibernation Recording wind direction		
Vocabulary				
Sound	Exploring different sounds of instruments Recognising different sounds of everyday objects Loud and quiet sounds with instruments	<u>(Year 1) - Sound (links to animals including humans)</u> 5 senses What is sound? Hearing Looking after ears. Describe pitch of sound Make and describe sounds	<u>(Year 3) – Sound</u> Sound traveling as a vibration Producing different sounds Pitch and frequency Amplitude of sound Designed objects around sound Uses of sound	
Vocab		Pitch, Volume, Decibels, Sound waves, Vibrations , Hearing	Frequency, hertz, amplitude, acoustics, ear drum, acoustician	
Light	Identifying/drawing round shadows. Exploring torches	<u>(Year 1) - light</u> What is light? What we need to see Day and night Reflective materials	<u>(Year 4) – light</u> Where does light come form? Absorption and reflection Refraction Parts of the eyes	

	Making dark dens Objects on light boxes When to turn the lights on and off.	Forming shadows Changing size of shadows	Colours of light Shadow puppets	
Vocab		Light source, Light, Dark, Shadow Reflection, Absorb		
Earth and space	How do you know it is night time – discussions about stars and the moon. Seasons – hemispheres and how the earth orbits the sun.	<u>Year 2 – Space (linked to materials(rock) and animals including humans (habitats)</u> What is space? Planets in the solar system Earth orbiting and rotating Constellations Discovering space Scientists that study space	<u>(Year 4) – Space</u> Solar and lunar eclipse Solar system How planets differ How a star is formed The universe Astronomers	
Vocabulary				
Forces and Magnets	Exploring magnets Pulleys and leavers Pushes and pulls in toys		<u>(Year 3) – Forces</u> What are forces? Measuring the size of forces Contact forces Non-contact forces What affects the ability to float? Gears, leavers and pulleys.	<u>(Year 5) – magnetism</u> Gravity Magnets Compass work Magnetic field Magnetic materials Uses of magnetic materials (Year 6) – energy (Link to electricity/living things/animals inc humans) Energy stores Energy transformation Efficiency Power and electrical appliances Speed, distance and time Kinetic energy
Vocab		Pitch, Volume, Decibels, Sound waves Vibrations , Hearing		<u>Magnetism</u> Magnetic field, forces, contact forces, non-contact forces, electromagnetic, attract, repel

Electricity				(Year 5) – electrical circuits Static electricity Parts of an electrical circuit Circuit diagrams Conductors and insulators Components in a circuit Create a circuit
Vocab				Cell, Battery, Bulb, Buzzer, Switch, Static electricity, Circuit, Ammeter, Voltage

EYFS Overview Year A & B						
	Autumn One 2022	Autumn Two 2022	Spring One 2023	Spring Two 2023	Summer One 2023	Summer Two 2023
Area/Topic:	Marvellous Me 	Superheroes (linked to 'Supertato' T4W) 	Weather- Come Outside (linked to 'Lost and found' T4W) 	Once Upon a Time (linked to 'TLRH' T4W) 	Wonderful Minibeasts (linked to 'TVHC' T4W)	Only One Earth (linked to 'The Life of a Little Plastic Bottle' T4W) 
Big question	What makes you unique? (PSED Driver)	Are superheroes real? (PSED Driver)	Can we go out in any weather? (UW Driver)	Should we forgive people for making bad choices? (PSED and-UW Driver)	What is a lifecycle? (UW Driver)	What can we do to look after our environment? (UW Driver)
Provocative Statement	To be special you have to be good at something.	All superheroes wear a cape.	People are happier when its warm.	Traditional tales are just silly stories.	Some animals are more important than others.	Our environment can look after itself.
Subject content from EY Framework 2021 (Not Linked to NC)	NA	Understanding the World **ELG- The Natural World** **- Explore the natural world around them, making observations of animals and plants.** Understanding the World	Understanding the World **ELG- The Natural World** - Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class.	Understanding the World **ELG- The Natural World** -Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class. -Understand some important processes and changes in the	Understanding the World **ELG- The Natural World** -Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class. -Understand some important processes and changes in the	Understanding the World **ELG- The Natural World** - Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class. - Understand some important processes and changes in the

		ELG- The Natural World - Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter. **- Explore the natural world around them, making observations of animals and plants.**	- Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter. **- Explore the natural world around them, making observations of animals and plants.**	natural world around them, including the seasons and changing states of matter. **- Explore the natural world around them, making observations of animals and plants.**	natural world around them, including the seasons and changing states of matter. **- Explore the natural world around them, making observations of animals and plants.**	natural world around them, including the seasons and changing states of matter. **ELG- People, Cultures and Communities** -Describe their immediate environment using knowledge from observation, discussion, stories, non-fiction texts and maps.
Knowledge taught	Looking at features of our faces. Observing natural environment – autumn walk British food week Harvest festival -	Observing in the natural world – Autumn Daily calendar Daily weather check Autumn – observing changes	Weather – seasons Observing changes to the weather Identifying winter – what winter looks and feels like. Drawings of animals and weather scenes. North pole and south pole – which animals from each environment.	Baking – bread making Growing – beans/seeds to grow. Observing plant growth and changes Life cycles of the bean plant Drawings of plants	Where can we find some mini-beasts we know? Why do they live there? Compare habitats. Life cycle of butterflies and frogs Observe the life cycle	What do we mean by 'Local Environment'? (Our Local Area- Crigglestone- home to school.) How is our local environment different to another place in the UK? Materials – recycling/upcycling – junk modelling Sorting Clean planet – pollution Caring for sea life – polluting the sea.
Vocabulary	Autumn, changes, Harvest, crop, grow, sow, season, leaves, vegetables, conkers,	Autumn, changes, season, leaves, vegetables, conkers, hibernation, animals, hedgehogs,	Winter, changes, season, cold, snow, flurry, environment, habitat, Penguins, polar bears, weather, similar, different, contrast	Planting, growing, seed, shoot, plant, flower, life-cycle		
Link texts	-Silly Billy The hungry caterpillar -Diwalli	Supertato series Where the poppies now grow Tree - Christmas Stories (RE links)	-Rain Before Rainbows -Little Polar Bear Papa penguin Lost and found The snowflake machine	-Jack and The Beanstalk -Jaspers Beanstalk -Little Red Reading Hood Little Red Hen Other Traditional Tales	-What the Ladybird Heard -Aaaarrgghh Spider! -The Teeny Weeny Tadpole	-Last Tree in the City -What a Waste -Michel Recycle

KS1 Overview YEAR B						
Area:	**Physics** Sound	**Physics** Light	**Biology – Animals including humans** Animal Kingdom	**Biology – Animals including humans** Human Lifestyle	**Biology – Living things** Habitats	
Big question/provocative statement	You can see sound as well as hear it.	Where do shadows come from?	All animals need the same things.	What does it mean to be healthy?	What do animals need to survive?	
Outcome	Make own musical instrument – describe the pitch	Making a shadow puppet story.	Create an animal fact file.	A poster to promote being healthy.	Design/create a habitat for an organism.	
Experiment	See the sound. Watch the vibrations make the items move on the cling film. Make ear guitars LINK	Light travels in a straight line. https://www.ducksters.com/science/experiment_light_travel.php Which materials are reflective? Torches on globe and moon Shadow puppets	Balloons for lungs Explore fish and crab from fishmongers Mirrors to look at teeth	Hands on mouldy bread Pepper in water and wash hands so repel the pepper. How does exercise effect the breathing?	Explore microhabitat in local area. Explore pond habitat Pictogram of animals seen in local area	
Key figure	Robert Boyle Aristotle	Ibn al-Haytham	Jane Goodalll	Florence Nightingale Mary Seacole	Charles Elton	
Digging deeper	Sound has to travel through the medium, air. Sound travels in waves	A pioneer thinker who made important contributions to the understanding of vision, optics (the science of sight) and light. https://photonterrace.net/en/photon/history/	Studied chimpanzees Founded institute to save wildlife and chimpanzees.	Nurse in the Crimean war – helped clean soldiers wounds and gave clean bandages.	First introduced food chains	
Sticky knowledge (substantive knowledge)	• Volume is measured in decibels. • Loud and quiet is describing volume • High or low sounds describe pitch • 5 senses are, touch, taste, sight, hearing, smell • Sound travels through air • Your ears never stop working.	• The sun is a natural source of light. • The Moon looks like it shines, but actually, it is reflecting the Sun's light • Nothing travels faster than the speed of light. • The sun reaches the earth in 8 minutes. • The earth spins on an axis and takes 24 hours to spin all the way around. • light cannot pass through an opaque object, it will form a shadow. • Smooth, shiny surfaces reflect light well. • Dull, dark surfaces do not reflect light well.	Mammals breathe air, grow fur and feed their babies milk. Amphibians live in the water as babies and land as they get older Fish live and breathe underwater. They have scaly skin, fins to help them underwater and gills to breathe. Reptiles breathe air and have scaley skin. Birds have a beak, wings and two legs. Crustaceas have a hard shell	There are 5 different food groups – carbohydrates, dairy, protein, fruits and vegetables and fats and sugars. Muscles help our bodies to move. A skeleton gives the body shape and protects the organs. A brain controls the actions and helps us learn new things. A heart pumps blood and oxygen around the body. Lungs help us to breathe air in and out.	MRS GREN- Movement, respiration, sensitivity, growth, reproduction, excretion, nutrition. Rainforests are humid, rainy and have lots of trees. Woodlands are where trees are the dominant plant. Deserts are hot during the day and cold during the night. An urban area has lots of buildings and roads. A pond is a small area of still, fresh water. An ocean is a huge body of salt water.	

			Arachnids have 8 legs and two parts to their body. Insects have three parts to their body. Carnivores eat meat Herbivores eat plants Omnivores eat both plants and meat.		All animals need energy to survive. Plants make their own food using the sun. A food chain usually starts with a plant and finishes with a larger, hungrier animal.	
Knowledge taught (substantive knowledge)	• 5 senses Play the game LINK • What is sound? Experiment – see the sound using cling film Explore key figure Aristotle (hearing lessons) • Hearing • Looking after ears. • Describe pitch of sound Create own ear guitar LINK • Make and describe sounds Make own musical instrument – describe the pitch. • Assessment (12 questions)	• Natural and artificial light sources. • Experiment – light travels in a straight line. • How can we see objects? • The difference between night and day. • Reflective and non-reflective materials. • Changing size of shadows. (Swapped around) • Shadow puppets – making shadows. (Swapped around) • Assessment – (12 questions)	• Sorting living and non living things • The difference between vertebrate and non vertebrate. • Vertebrate animal families • Invertebrate animal families • Mammals vs birds • What type of food do living things eat? • Assessment (12 questions)	• Parts of the human body – skeleton, muscles, brain, heart, lungs. • Importance of exercise • A healthy diet • How our bodies change as we grow. • Good hygiene • Jobs that help keep us healthy. • Assessment – 12 questions	• Characteristics of living things • Habitats • Microhabitat • Desert habitat • Rainforest habitat • City habitat • Assessment – 12 questions	•
Key vocabulary	Pitch, Volume, Decibels, Sound waves, Vibrations Hearing	Light source, Light, Dark, Shadow Reflection, Absorb	Vertebrate, Invertebrate, Carnivore, Herbivore, Omnivore, Crustacea	Exercise, healthy, hygiene, germs, food groups, balanced diet	Organism, microorganism, food chain, habitats	
Link texts	Listen by Shannon Stocker Get into science – the five senses	The lighthouse keepers lunch Little Glow The miracle of Hanukkah The marvellous moon map The Darkest Dark	David Attenborough LEGO Big book of animals. An encyclopaedia of very important animals.	Hair raising human body facts Marvellous body How your body works My amazing body machines The couch potato- Jory John Keeping clean Exercise and me	Bug collector – Alex G Griffiths The most important animal of them all. One day on our blue planet…in the Antarctic/in the rainforest/in the savannah	

				I don't want to be small – Laura Ellen Anderson Funny Bones – Janet and Allan Ahlbergh	Find out about animal homes.	

LKS2 Overview YEAR B						
Area:	**Biology – living things** Ecosystems	**Biology – Animals including humans** Anatomy	**Biology – Living things** Adaptations	**Physics** Sound	**Biology** Plants	
Big question/Provocative statement	Plants are the most important part of our food chains.	What is the most important part of the anatomy?	Animals can live anywhere	The louder the sound the better it is.	What conditions are best for a plant?	
Outcome	Presentation of a food chain and its disruptions.	Create a human body with functions. (modelling/life size drawing) - groups	Adaptation fact file.	Create an amplitude graph using the meter to measure the volume. https://youlean.co/online-loudness-meter/	Plant diary – describing parts/functions and conditions. Describe what has a negative impact on it's growth.	
Experiment	Food chains – what would happen if we remove one organism? Food webs Ecosystems in our local environment.	Exploring digestive system https://www.science-sparks.com/digestive-system-model/ Pumping heart model https://www.science-sparks.com/pumping-heart-model/ Fake lungs https://www.science-sparks.com/breathing-making-a-fake-lung/	How do polar bears stay warm? - keeping hand warm in Icey water. – see planning sheet.	Make a string telephone	Changing conditions for a plant to grow. Dissecting a tulip. Plant/grow pea shoots. Celery/carnations and dye for water transportation	
Key figure	Al-Jahiz	Joseph E Murray	Alfred Russel Wallace	James Edward Maceo West Heinrich Hertz	Agnes Arber	
Digging deeper	The first person to describe food chains	Transplanted a kidney between twins. The first organ transplant in 1954.	Wallace believed that the evolution of organisms was connected in some way with adaptation of organisms to changing environmental conditions.	Invented the foil electret microphone while developing products to assist human hearing Gave the name to the unit for frequency - hertz.	Researched a special group of flowering plants, including grass and grass-like flowering plants. She discovered lots of information about their appearance and their anatomy.	
Sticky knowledge (substantive knowledge)	A food chain shows how plants and animals get their energy. A food chain always starts with a producer. Predators are found at the top of a food chain.	Red blood cells transport oxygen White blood cells protect against disease Lungs help us to breathe lungs in and out.	Living organisms are adapted to their habitats. If a habitat changes, the plants and animals are affected. Animals and plants cannot choose their adaptations.	Sounds are vibrations that pass through the air. When something makes a sound the particles in the air wobble and vibrate. Amplitude is measured in decibels.	Plants grow faster the lighter they have. Plants need a steady supply of water to increase growth – but not too much.	

	A community of plants, animals and microorganisms in their habitat is called an ecosystem. If one part of the ecosystem is changed it can effect other living things in the ecosystem	A liver cleans the blood and makes sure we don't have toxins in the blood. Kidneys filter liquid from the blood and makes urine. A stomach is where food is digested. It contains acid to break the food down. A small intestine breaks food down into smaller pieces so vitamins and minerals can be absorbed by the body. Skin covers the entire body to protect it from disease. Blood takes oxygen from the lungs and is pumped around the body. Organs take oxygen and give back carbon dioxide. Blood carries the carbon dioxide via the heart to be pumped. Blood is sent back to the lungs to collect more oxygen and dispose of the carbon dioxide.	Animals in hot climates can go for a long time without water. Plants in hot climates have roots which spread over a long distance to collect water. Most animals in cold climates have thick layers of fat to keep them warm. Nocturnal animals have big eyes to help them see in the dark. Marine animals that don't have gills need to hold their breath for a long time. Many deep-sea organisms live for a long time.	Frequency is measured in hertz. The outer ear funnels the sound into the middle ear. Sound causes the eardrum to vibrate. Hearing receptors turn vibrations into signals which are sent to the brain. A concert hall makes sound be heard from a long way away. Headphones and speakers make the bet quality sound possible.	Plants will grow more quickly in warmer conditions – but not too hot. Plants will grow more quickly when the have nutrients available (found in the soil). Water enters the roots, soaks up through the stem and exits the leaves.	
Knowledge taught (substantive knowledge)	• An ecosystem What ecosystem can we find in the school grounds? • Classify diets of animals list favourite meals and discuss that is eaten. • Producers are important Research and create a fact file of a coral reef • Construct a food chain Make a food chain with cups • All about Al Jahiz • Construct a food web • Disruption to food webs • Assessment – 12 questions	• Functions of major organs • Label human skeleton, what are the functions? • Comparing organs and skeleton of animals and humans. • Compare animal teeth. Types of human teeth and functions. • Components of the circulatory system and how it works. • Digestive system. • Assessment (12 questions)	• Common adaptations • Adaptations of the desert • Adaptations to cold environments • Adaptations of nocturnal animals. • Adaptations to under water • Adaptations to live in the deep sea. • Assessment (12 questions)	• Exploring what sound is • How different sounds are produced. • Pitch and frequency • Amplitude of sound • Scientist that study sound • Some uses of sounds • Assessment – 12 questions	• Conditions for a plant • Changing plants conditions • Parts and functions of a flowering plant. • Parts of a plants life cycle. • Water transportation • Plants adapting to conditions. • Assessment – 12 questions	•
Vocabulary	Predator, Prey, Producer, Consumer, Photosynthesis	Endoskeleton, Exoskeleton, Organ, Peristalsis Platelets, Plasma, Oxygen, Carbon dioxide	Adaptation, camouflage, nocturnal, echolocation, biome	Frequency, hertz, amplitude, acoustics, ear drum, acoustician	Sepals, ovule, ovary, style, stigma, petal, filament, anther, germination, flowering, pollination, fertilisation, seed dispersal.	
Link texts	Over and under the rainforest by Kate Messner Habitats (non fiction)	Illumanatomy – Kate Davies	Charlotte's web Kaleidoscope of creatures Wild animals of the world	The boy in the jam jar – Joyce Dunbar	Wangari's tree of peace – Jeanette Winter Bloom – Nicola Skinner	

	It's a wonderful world (non fiction)	The brain book – Dr Liam Drew	Amazing animals		A seed is sleepy Botanicum Grow Killer plants	

	UKS2 Overview YEAR B					
Area:	**Chemistry - States of matter** Heat	**Physics - Electricity** Electrical circuits	**Physics – forces and magnets** Magnetism	**Physics – forces and magnets** Energy	**Chemistry – Materials** Sustainability	
Big question/provocative statement	What is the best thermal insulator?	How does a buzzer work?	The Earth is one big magnet.	What producers more energy, faster or bogger objects?	There is no such thing as sustainability.	
Outcome	Create an advertisement for the best thermal flask	Build a circuit buzzer game.	Make a magnetic trick https://www.science-sparks.com/how-to-defy-gravity/	Measuring the speed of the aeroplane.	Create a debate to express viewpoints on sustainability.	
Experiment	Condensation Melting ice Heating a knife from a candle Investigation of thermal conductors and insulators	Static electricity https://premeditatedleftovers.com/naturally-frugal-mom/easy-static-electricity-experiment/ Changing circuit components Building a circuit buzzer game.	Floating compass http://smallscience.club/experiments/floating-compass/ Magnetic maze https://learning.sciencemuseumgroup.org.uk/resources/magnetic-maze/	Paper aeroplane launcher LINK	Comparisons of coffee shop cups. Evaluations.	
Key figure	James Dewar	Michael Faraday	William Gilbert	Thomas Young	Dr. Katherine Hayhoe	
Digging deeper	Invented the first thermal flask.	Theorised Faraday cages - a shell that attracts and conducts electricity while interior does not. Also made discoveries about electromagnetism and electrolysis.	First to investigate magnetism systematically using scientific methods	First introduced the word "energy" to the field of physics in 1800, but the word did not gain popularity.	Atmospheric scientist whose research focuses on understanding the impacts of climate change on people and the planet.	
Sticky knowledge (substantive knowledge)	Solid particles are close together and do not move Liquid particles are close together but can slide past each other. Gas particles are apart from each other and move all around. Heating particles makes them move more	Electricity comes in two forms – Static electricity and electricity in circuits. There must be at least one cell in a circuit There must be a complete loop in a circuit for electricity to flow. An electrical insulator will not allow electricity to pass through it easily. An electrical conductor will allow electricity to pass through it easily.	A compass line up with the Earth's magnetic field to show where north is. Magnets are objects that repel or attract other magnetic materials. Gravitational force acts between any object and the earth. All objects are attracted to the Earth, which means they are pulled down to its surface. Magnetic forces act between two magnets, when they attract or repel. Iron, steel, nickel and cobalt are examples of magnetic materials. An electromagnet can be switched on and off, it is made form a power source.	All energy already exists and can not be created or destroyed. Gravitational potential energy is when energy is stored in an object that is lifted above the ground. Kinetic energy is stored in a moving object.	It can take 450 years for a plastic bottle to decompose. Scientists complete a life cycle assessment to decide which materials are best for different uses. Global warming is leading to ocean acidification, extreme weather events, melting ice caps and rising sea levels.	

	Substances expand when heated and contract when cooled. Good conductors allow heat to ass through them more easily. Good insulators do not allow heat to pass through them.			Kinetic energy is bigger if the object is heavy or moving fast. Chemical energy is stored inside of a substance. Elastic potential energy is when energy sis stored in an object that has been squashed or stretched and will return back to its original shape. Heat energy is stored in vibrations and particles as heat. Speed = distance / time.	Combustion reactions fuel is burned, mixed with oxygen and creates water and carbon dioxide. The 3 R's support sustainability – Reduce, Reuse, Recycle. A natural resource is a material created from Earth that can benefit humans.	
Knowledge taught (substantive knowledge)	• Heating particles breath on mirrors melting ice cubes • Expansion • Thermal equilibrium warming and cooling hands Ice melting in boiling water • Transferring heat Heat a knife from a candle • Thermal conductors and insulators - investigate • Keeping ice frozen/cold – experiment The best thermal flask – why? • Assessment – 12 questions	• Static electricity • Parts of an electrical circuit • Circuit diagrams • Electrical conductors and insulators. • Changing component of a circuit. • Building a circuit buzzer game. • Assessment – 12 questions	• What are non-contact forces? • Exploring magnets • Explaining how a compass works. • Magnetic fields • What is magnetic and not? • Uses of magnetic materials. • Assessment – 12 questions	• Energy stores • Energy transformation • Calculating efficiency • Power and electrical appliances • Speed distance and time • Kinetic energy • Assessment – 12 questions.	• Everyday materials. • Recycling • Life cycle assessment • Fuel burning • Global warming • Climate change • Assessment – 12 questions	
Vocabulary	Particles, Solid, Liquid, Gas, Heat transfer,	Cell, Battery, Bulb, Buzzer, Switch, Static electricity, Circuit, Ammeter, Voltage	Magnetic field, forces, contact forces, non-contact forces, electromagnetic, attract, repel	Energy transfer, energy transformation,	Sustainability, combustion, Global warming, climate change, brittle, landfill,	

	Thermal equilibrium, Conductor, Insulator			efficiency(high and low), power, speed	recycling, synthetic, decompose biodegradable	
Link texts	Non-fiction texts	Secret Science – Dara O Briain	Forces and magnets – lets investigate	Fly high crew - Ashley and Jodan Banjo	Be the change – Poems to help you save the world. Floodland	