


Year 3/4 Long Term Plan A

	Light (Y6)	Forces (Y5)	Living Things and habitats (Y5) Animals (Y5)		Animals (Y6) Circulatory System	Evolution and Inheritance (Y6)
	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1 – Start in Spring 2 if more time needed.	Summer 2
Key Vocabulary	Light, light source, dark, absence of light, transparent, translucent, opaque, shiny, matt, surface, shadow, reflect, mirror, sunlight, dangerous, straight lines, light rays	Force, gravity, Earth, air resistance, water resistance, friction, mechanisms, simple machines, levers, pulleys, gears	Life cycle, reproduce, sexual, sperm, fertilises, egg, live young, metamorphosis, asexual, plantlets, runners, bulbs, cuttings, Puberty – the vocabulary to describe sexual characteristics		Heart, pulse, rate, pumps, blood, blood vessels, transported, lungs, oxygen, carbon dioxide, nutrients, water, muscles, cycle, circulatory system, diet, exercise, drugs, lifestyle	Offspring, sexual reproduction, vary, characteristics, suited, adapted, environment, inherited, species, fossils

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Previous Knowledge	<ul style="list-style-type: none">• Recognise that they need light in order to see things and that dark is the absence of light. (Y3 - Light)• Notice that light is reflected from surfaces. (Y3 - Light)• Recognise that light from the sun can be dangerous and that there are ways to protect their eyes. (Y3 - Light)• Recognise that shadows are formed when the light from a light source is blocked by an opaque object. (Y3 - Light)<ul style="list-style-type: none">• Find patterns in the way that the size of shadows change. (Y3 - Light)• 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. (Y5 - Properties and changes of materials)	<ul style="list-style-type: none">• Compare how things move on different surfaces. (Y3 - Forces and magnets)• Notice that some forces need contact between two objects, but magnetic forces can act at a distance. (Y3 - Forces and magnets)• Observe how magnets attract or repel each other and attract some materials and not others. (Y3 - Forces and magnets)• Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials. (Y3 - Forces and magnets)• Describe magnets as having two poles. (Y3 - Forces and magnets)• Predict whether two magnets will attract or repel each other, depending on which poles are facing. (Y3 - Forces and magnets)	<ul style="list-style-type: none">• Notice that animals, including humans, have offspring which grow into adults. (Y2 - Animals, including humans)• Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. (Y3 - Plants)	<ul style="list-style-type: none">• Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene. (Y2 - Animals, including humans)• Identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat. (Y3 - Animals, including humans)• Describe the simple functions of the basic parts of the digestive system in humans. (Y4 - Animals, including humans)• Identify the different types of teeth in humans and their simple functions. (Y4 - Animals, including humans)	<ul style="list-style-type: none">• Identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other. (Y2 - Living things and their habitats)<ul style="list-style-type: none">• Notice that animals, including humans, have offspring which grow into adults. (Y2 - Animals, including humans)• Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. (Y3 - Plants)• Describe in simple terms how fossils are formed when things that have lived are trapped within rock. (Y3 - Rocks)• Recognise that environments can change and that this can sometimes pose dangers to living things. (Y4 - Living things and their habitats)• Describe the life process of reproduction in some plants and animals. (Living things and their habitats - Y5)
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NC Objectives	<ul style="list-style-type: none">•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.	<ul style="list-style-type: none">• 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	<ul style="list-style-type: none">• Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird.• Describe the life process of reproduction in some plants and animals.• Describe the changes as humans develop to old age	<ul style="list-style-type: none">• 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	<ul style="list-style-type: none">• 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.
Misconceptions	<p>Some children may think:</p> <ul style="list-style-type: none">• We see objects because light travels from our eyes to the object.	<p>Some children may think:</p> <ul style="list-style-type: none">• the heavier the object the faster it falls, because it has more gravity acting on it• forces always act in pairs which are equal and opposite• smooth surfaces have no friction• objects always travel better on smooth surfaces• a moving object has a force which is pushing it forwards and it stops when the pushing force wears out• a non-moving object has no forces acting o	<p>Some children may think:</p> <ul style="list-style-type: none">• all plants start out as seeds• all plants have flowers• plants that grow from bulbs do not have seeds• only birds lay eggs a baby grows in a mother’s tummy• a baby is “made”.	<p>Some children may think:</p> <ul style="list-style-type: none">• your heart is on the left side of your chest• the heart makes blood• the blood travels in one loop from the heart to the lungs and around the body• when we exercise, our heart beats faster to work the muscles more• some blood in our bodies is blue and some blood is red• we just eat food for energy• all fat is bad for you• all dairy is good for you• protein is good for you, so you can eat as much as you want• foods only contain fat if you can see it• all drugs are bad for you.	<p>Some children may think:</p> <ul style="list-style-type: none">• adaptation occurs during an animal’s lifetime: giraffes’ necks stretch during their lifetime to reach higher leaves and animals living in cold environments grow thick fur during their life• offspring most resemble their parents of the same sex, so that sons look like fathers• all characteristics, including those that are due to actions during the parent’s life such as dyed hair or footballing skills, can be inherited• cavemen and dinosaurs were alive at the same time.

	Light	Forces	Living Things and habitats	Animals Circulatory system	Evolution and Inheritance
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Key knowledge to be assessed		<ul style="list-style-type: none">•Light appears to travel in straight lines, and we see objects when light from them goes into our eyes.•The light may come directly from light sources, but for other objects some light must be reflected from the object into our eyes for the object to be seen.•Objects that block light (are not fully transparent) will cause shadows.•Because light travels in straight lines the shape of the shadow will be the same as the outline shape of the object.	<ul style="list-style-type: none">• A force causes an object to start moving, stop moving, speed up, slow down or change direction.• Gravity is a force that acts at a distance. Everything is pulled to the Earth by gravity. This causes unsupported objects to fall.• Air resistance, water resistance and friction are contact forces that act between moving surfaces. The object may be moving through the air or water, or the air and water may be moving over a stationary object.• A mechanism is a device that allows a small force to be increased to a larger force. The pay back is that it requires a greater movement.	<ul style="list-style-type: none">• As part of their life cycle, plants and animals reproduce. Most animals reproduce sexually. This involves two parents where the sperm from the male fertilises the female egg.• Animals, including humans, have offspring which grow into adults. In humans and some animals, these offspring will be born live, such as babies or kittens, and then grow into adults.• In other animals, such as chickens or snakes, there may be eggs laid that hatch to young which then grow to adults.• Some young undergo a further change before becoming adults e.g. caterpillars to butterflies. This is called a metamorphosis.• Plants reproduce both sexually and asexually. Bulbs, tubers, runners and plantlets are examples of asexual plant reproduction which involves only one parent. Gardeners may force plants to reproduce asexually by taking cuttings.• Sexual reproduction occurs through pollination, usually involving wind or insects.• When babies are young, they grow rapidly. They are very dependent on their parents. As they develop, they learn many skills.• At puberty, a child’s body changes and develops primary and secondary sexual characteristics. This enables the adult to reproduce.	<ul style="list-style-type: none">• The heart pumps blood in the blood vessels around to the lungs. Oxygen goes into the blood and carbon dioxide is removed. The blood goes back to the heart and is then pumped around the body.• Nutrients, water and oxygen are transported in the blood to the muscles and other parts of the body where they are needed. As they are used, they produce carbon dioxide and other waste products. Carbon dioxide is carried by the blood back to the heart and then the cycle starts again as it is transported back to the lungs to be removed from the body. This is the human circulatory system.• Diet, exercise, drugs and lifestyle have an impact on the way our bodies function. They can affect how well out heart and lungs work, how likely we are to suffer from conditions such as diabetes, how clearly, we think, and generally how fit and well we feel• Some conditions are caused by deficiencies in our diet e.g. lack of vitamins.	<ul style="list-style-type: none">• All living things have offspring of the same kind, as features in the offspring are inherited from the parents.• Due to sexual reproduction, the offspring are not identical to their parents and vary from each other.• Plants and animals have characteristics that make them suited (adapted) to their environment. If the environment changes rapidly, some variations of a species may not suit the new environment and will die. If the environment changes slowly, animals and plants with variations that are best suited survive in greater numbers to reproduce and pass their characteristics on to their young. Over time, these inherited characteristics become more dominant within the population. Over a very long period of time, these characteristics may be so different to how they were originally that a new species is created. This is evolution.• Fossils give us evidence of what lived on the Earth millions of year ago and provide evidence to support the theory of evolution. More recently, scientists such as Darwin and Wallace observed how living things adapt to different environments to become distinct varieties with their own characteristics.
What does this look like at Bramhope?	Resources	Torches Batteries Mirrors Shiny metal spoons	Equipment for making parachutes	Different plant examples e.g. tubers, bulbs, plants with runners Plant cuttings for propagation Potatoes to chit		Chopsticks and tweezers
	Activities	Explore different ways to demonstrate that light travels in straight lines e.g. shining a torch down a bent and straight hose pipe, shining a torch through different shaped holes in card. Explore the uses of the behaviour of light, reflection and shadows, such as in periscope design, rear view mirrors and shadow puppets.	Investigate the effect of friction in a range of contexts e.g. trainers, bathmats, mats for a helter-skelter. Investigate the effects of water resistance in a range of contexts e.g. dropping shapes through water and pulling shapes, such as boats, along the surface of water. Investigate the effects of air resistance in a range of contexts e.g. parachutes, spinners, sails on boats. Explore how levers, pulleys and gears work. Make a product that involves a lever, pulley or gear. Create a timer that uses gravity to move a ball. Research how the work of scientists such as Galileo Galilei and Isaac Newton helped to develop the theory of gravitation.	Use secondary sources and, where possible, first-hand observations to find out about the life cycle of a range of animals. Compare the gestation times for mammals and look for patterns e.g. in relation to size of animal or length of dependency after birth. Look for patterns between the size of an animal and its expected life span. Grow and observe plants that reproduce asexually e.g. strawberries, spider plants, potatoes. Take cuttings from a range of plants e.g. African violet, mint. Plant bulbs and then harvest to see how they multiply. Use secondary sources to find out about pollination.	Create a role play model for the circulatory system. Carry out a range of pulse rate investigations: <ul style="list-style-type: none">• fair test – effect of different activities on my pulse rate• pattern seeking – exploring which groups of people may have higher or lower resting pulse rates• observation over time - how long does it take my pulse rate to return to my resting pulse rate (recovery rate)• pattern seeking – exploring recovery rate for different groups of people.• Research the negative effects of drugs (e.g. tobacco) and the benefits of a healthy diet and regular exercise by asking an expert or using carefully selected secondary sources.	Design a new plant or animal to live in a particular habitat. Use models to demonstrate evolution e.g. ‘Darwin’s finches’ bird beak activity. Use secondary sources to find out about how the population of peppered moths changed during the industrial revolution. Make observations of fossils to identify living things that lived on Earth millions of years ago. Identify features in animals and plants that are passed on to offspring and explore this process by considering the artificial breeding of animals or plants e.g. dogs. Compare the ideas of Charles Darwin and Alfred Wallace on evolution. Research the work of Mary Anning and how this provided evidence of evolution.
	Enrichment			Wildife garden – for planting bulbs/potatoes, observing pollination, making observations of strawberry plants	Heart dissection activity/visit	

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	Cross Curricular links/Texts	DT – creating shadow puppets Computing – using micro:bits as light sensors	DT - Design, build and test model cars, rockets or bridges, and investigate the forces acting on them. PE – investigating forces/air resistance through throwing rugby balls, javelins. See outdoor ideas.	Botanicum The boy in the tower	Dr Astrocat’s Human Body Odyssey	Mr Men Moth Molliebird Origin of species The story of life
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Working Scientifically Skills – Taken from PLAN – Progression in working scientifically document

Asking questions and recognising they can be answered in different ways	Making observations and taking measurements	Engaging in practical enquiry to answer questions	Recording and presenting evidence	Answering questions and concluding	Evaluating and raising questions and predictions	Communicating their findings
<p>Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary</p> <ul style="list-style-type: none"> Children independently ask scientific questions. This may be stimulated by a scientific experience or involve asking further questions based on their developed understanding following an enquiry. Given a wide range of resources the children decide for themselves how to gather evidence to answer a scientific question. They choose a type of enquiry to carry out and justify their choice. They recognise how secondary sources can be used to answer questions that cannot be answered through practical work 	<p>Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate</p> <ul style="list-style-type: none"> The children select measuring equipment to give the most precise results e.g., ruler, tape measure or trundle wheel, forcemeter with a suitable scale. During an enquiry, they make decisions e.g., whether they need to:take repeat readings (fair testing); increase the sample size (pattern seeking); adjust the observation period and frequency (observing over time); or check further secondary sources (researching); in order to get accurate data (closer to the true value). 	<p>Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary</p> <ul style="list-style-type: none"> The children select from a range of practical resources to gather evidence to answer their questions. They carry out fair tests, recognising and controlling variables. They decide what observations or measurements to make over time and for how long. They look for patterns and relationships using a suitable sample. 	<p>Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs</p> <ul style="list-style-type: none"> The children decide how to record and present evidence. They record observations e.g., using annotated photographs, videos, labelled diagrams, observational drawings, labelled scientific diagrams or writing. They record measurements e.g., using tables, tally charts, bar charts, line graphs and scatter graphs. They record classifications e.g., using tables, Venn diagrams, Carroll diagrams and classification keys. Children present the same data in different ways in order to help with answering the question. 	<p>Identifying scientific evidence that has been used to support or refute ideas or arguments</p> <ul style="list-style-type: none"> Children answer their own and others' questions based on observations they have made, measurements they have taken or information they have gained from secondary sources. When doing this, they discuss whether other evidence e.g., from other groups, secondary sources and their scientific understanding, supports or refutes their answer. They talk about how their scientific ideas change due to new evidence that they have gathered. They talk about how new discoveries change scientific understanding. <p>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</p> <ul style="list-style-type: none"> In their conclusions, children identify causal relationships and patterns in the natural world from their evidence identify results that do not fit the overall pattern; and explain their findings using their subject knowledge. 	<p>Using test results to make predictions to set up further comparative and fair tests.</p> <ul style="list-style-type: none"> Children use the scientific knowledge gained from enquiry work to make predictions they can investigate using comparative and fair tests. 	<p>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</p> <ul style="list-style-type: none"> They communicate their findings to an audience using relevant scientific language and illustrations.

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Outdoor Learning Opportunities - Any activities in **bold** must be taught outdoors.

Year 5		
National Curriculum Statements	Possible Outdoor Activities	Resources
Living things and their habitats		
Describe the life process of reproduction in some plants and animals.	<p>Pupils take cuttings from plants in the wildlife to grow. Pupils could plant potatoes and strawberry plants in raised beds and observe their reproduction process over time (looking at tubers on potatoes and runners on strawberries).</p> <p>Pupils visit wildlife garden to make observations of different plants e.g. moss/ferns for spores /different ways of plants reproducing. Take photos and make annotations.</p> <p>Pupils could make wildflower bombs and decide where is a good location in the wildlife garden for the seeds to disperse and grow. This could link back to lifecycle work in the classroom.</p>	Wildflower seeds Strawberry plants Potatoes Gardening gloves Trowels iPads
Forces		
Identify the effects of air resistance, water resistance and friction that act between moving surfaces.	<p>Make parachutes and drop from greater height in school e.g. Y5/6 classrooms to investigate air resistance.</p> <p>It may be more convenient to explore water resistance in the playground to avoid water on the floor in the classroom.</p> <p>Visit the local playground and explore friction by going down the slide on different materials.</p> <p>Running across the playground, then running across with an open umbrella to introduce the concept of air resistance.</p> <p>Throwing different equipment like rugby balls and javelins across the playground to investigate air resistance.</p> <p>Hitting a tennis ball into the air in the playground to understand gravity. What other forces are influencing the ball? What happens when you hit it with a harder force?</p>	Sports equipment Umbrellas Water trays Materials for parachutes
Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.	Larger scale examples of levers, pulleys and gears can be explored outside. Larger pulleys will help them experience the force and understand why pulleys are used in real life. E.g. bottle on the end of a rope, fill bottle up with water to feel more resistance on the pulley.	Rope Water bottles

Year 6		
National Curriculum Statements	Possible Outdoor Activities	Resources
Animals, including humans		
Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood.	The playground provides a larger space to create a model of the circulatory system.	
Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function	Pupils explore how their pulse rate changes during and after exercise.	
Evolution and Inheritance		
Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.	Pupils talk about how the livings things in the playground or local environment are adapted to suit the habitat in which they found them.	

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