



Cambridge Park Academy

Character - Preparation - Achievement



Science

Functional Curriculum – Key Stage 4

Stages 4-10

Year 1

Curriculum Intent:

“Our vision is to inspire the next generation of Scientists through an exciting and stimulating Science curriculum!”

Our aim is to ensure that all children build a core body of scientific knowledge, vocabulary and skills so that they may understand and apply science in everyday life.

We provide meaningful hands-on experiences, rooted in inquiry-based learning so that our pupils develop a sense of excitement and curiosity about science within the world in which we live.”

At Cambridge Park we ensure that we

- develop pupils’ sense of excitement of world we live in
- develop pupils’ curiosity about natural phenomena
- encourage pupils to understand how science can be used to explain what is occurring, predict how things will behave, and analyse causes.
- at key stage 4 pupils continue access functional science relating purposeful aspects of biology, chemistry and physics to real life in preparation for adulthood.

Developmental Stages and Ages

Stage 4 5 years <small>(The bridge from the foundation curriculum to the formal curriculum)</small>	Stage 5 5-6 years	Stage 6 6-7 years	Stage 7 & 8 7-9 years	Stage 9 & 10 9-11 years
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Long Term Plan

Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Biology		Chemistry		Physics	Biology
Our Bodies	You Only Have One Life, Look After It! (drugs + alcohol and gasping for breath)	Clean Air!	Crime Scene Investigators	Driving Along	Creepy Crawlies



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Substantive Knowledge					
Autumn 1					
Term					
Key Topic	<p>Biology - Our Bodies</p> <p><i>Pupils will also draw upon their learning in Personal Development where they learn about sexual intercourse and consent applying the science to it in this unit. Pupils will recap and build upon their knowledge of the reproductive organs from key stage 3 and identify the reproduction process from conception to after birth. Studying the changes to both the female body and the developing foetus, pupils will recognise how a baby grows. Identifying that contraception prevents an egg being fertilised and therefore pregnancy, pupils will learn about different types of contraception and begin to compare them. Further developing their knowledge on body systems, pupils will study simple functions of organs in the body. They will take a particularly closer look at the respiratory system, creating models and labelling diagrams.</i></p> <p style="text-align: center;">Working Scientifically:</p> <p style="text-align: center;">Pupils will ask scientific questions about reproduction or pregnancy and ask someone to find the answer e.g. pregnant person/a mother/a nurse.</p> <p><i>Possible trips/experiences: visit from a midwife</i></p>				
	Stage 4	Stage 5	Stage 6	Stage 7&8	Stage 9&10
Prior learning in Key Stage 3		Name, draw and label the basic parts of the human body and say which part of the body is associated with each sense.	Name simple organs in the body: heart, lungs, brain Identify and name external reproductive organs- breasts, vagina, penis, testis *age appropriate	Name ovaries and testes and know that they create eggs and sperm which are needed to reproduce.	Know that a foetus grows in a female's womb and develops into a baby
Reproduction	Identify and name external reproductive organs- breasts, vagina, penis, testis *age appropriate (KS3 stage 6)	Name ovaries and testes and know that they create eggs and sperm which are needed to reproduce. (KS3 stage 7&8) Know the egg is released by the ovary as part of the menstrual cycle. Know that fertilisation occurs by the fusion of a sperm and an egg cell which produces a fertilised egg. Know that there are different types of contraception to prevent pregnancy (Also covered in PD)	Recall some changes that occur to the female body after fertilisation: stopping periods and gaining weight Recall that a fertilised egg develops into a foetus. Name the different types of contraception to prevent pregnancy (Also covered in PD)	Recall names of the main organs of the female reproductive system: ovary, oviduct, womb, and vagina. Know that periods start again after childbirth Identify that there are hormonal and non-hormonal methods of contraception	Know that the placenta is the exchange surface used to transfer substances between the mother and foetus and what happens to it after childbirth. Know the sequence of events during pregnancy and labour leading up to birth (including midwife appointments) State the use of hormones in contraception and evaluate hormonal and non-hormonal methods of contraception. (Also covered in PD)
Body Systems	Know the names of common external body parts like arms, legs, head, and tummy.	Name external body parts and begin to name some internal parts e.g. lungs.	Begin to identify functions of simple organs in the body including lungs, heart, brain.	Know that the respiratory system includes several parts: nasal cavity, throat, voice box, windpipe, bronchi, and lungs	Name the body systems involved with these life processes: circulatory, respiratory and digestive.



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	<p>Know that the body has parts inside that help it work, like the heart and lungs.</p> <p>Know that things around us, like weather or noise, can make our bodies feel different.</p>	<p>Begin to recognise that changes in our surroundings can affect our bodies.</p>	<p>Understand that changes in our surroundings can affect our body's internal environment</p>	<p>Understand that the body's internal environment can change and that the body tries to control this change, use temperature regulation as an example</p>	<p>Know the ways the body gains or loses water and why we may drink more water in summer.</p>
Key Vocabulary	<p>Ovaries, testes, egg, sperm, breasts, penis, vagina, menstruation cycle, fertilisation, pregnancy, contraception, brain, lungs, heart, stomach,</p>	<p>Foetus, digestion, breathing,</p>	<p>Womb, ovary, oviduct, womb, vagina, periods, hormones, nasal cavity, larynx (voice box), trachea (windpipe), bronchi, bronchus, alveoli (air sacs), diaphragm, gas exchange, oxygen, carbon dioxide, inhale, exhale</p>	<p>Placenta, umbilical cord, embryo, foetus, baby, hormones, testosterone, oestrogen, circulation, respiration, digestion, kidneys,</p>	

	Substantive Knowledge
Term	Autumn 2
Key Topic	<p>Biology – You Only Have One Life, Look After It! <i>Pupils will learn about drugs that are harmful and those which are beneficial to the human body. They will identify what is legal and illegal naming some of each. Learning about the impact different drugs can have on the body, pupils will know the short-term and long-term effects.</i></p>



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<p><i>Working Scientifically:</i> <i>Pupils will use given data from secondary sources and identify the scientific evidence that can be used to support or refute ideas or arguments around making healthy choices.</i></p> <p><i>Possible trips/experiences: first aid session with St John's Ambulance Service</i></p>					
	Stage 4	Stage 5	Stage 6	Stage 7&8	Stage 9&10
<p><i>Prior Learning in Key Stage 3</i></p>		<ul style="list-style-type: none"> Know what humans need to do to keep healthy: eat healthy foods, keep clean including brush our teeth, sleep and exercise 	<ul style="list-style-type: none"> Know the importance for humans of exercise, eating the right amounts of different types of food, and hygiene. 	<ul style="list-style-type: none"> Know that humans need the right types of nutrients to stay healthy State the effect of exercise on the heart 	<ul style="list-style-type: none"> Recognise and state the impact of diet, exercise, drugs and lifestyle on the way their body's function
<p>Healthy Bodies</p>	<ul style="list-style-type: none"> Know that the body needs a balance of food, drink, rest, and movement to stay healthy. Know that eating too much or too little can affect how the body feels and works. Know that the body needs energy from food and helps manage this energy in special ways. 	<ul style="list-style-type: none"> Know that being overweight or underweight is linked to increased health risks Know that blood sugar levels (the amount of glucose in our blood stream) need to be controlled Know that the body controls blood sugar levels with insulin (made in the pancreas) 	<ul style="list-style-type: none"> Know that having a high fat diet can increase the risk of heart disease. Know that maintaining a healthy body weight is important and that being either overweight or underweight can lead to health problems (e.g. heart strain, fatigue, or poor immunity). Understand that the body needs to keep blood sugar (glucose) levels within a healthy range to function properly. Know that blood sugar levels can rise or fall depending on what we eat and how active we are. Know that the body uses a hormone called insulin, made in the pancreas, to help control blood sugar by moving glucose from the blood into the cells for energy. Begin to understand that if insulin does not work properly, or if the body doesn't make enough, this can lead to health conditions such as diabetes. 	<ul style="list-style-type: none"> Begin to understand that eating a lot of fatty foods over time can affect the heart, leading to health problems such as heart disease. Know that diabetes is a condition where the body cannot control blood sugar properly because the pancreas doesn't make enough insulin or the body doesn't respond to it effectively. Recognise that diabetes can develop later in life, especially if someone is overweight or does not follow a balanced diet. Begin to know that lifestyle choices, such as healthy eating and exercise, can help reduce the risk of diabetes and heart problems. 	<ul style="list-style-type: none"> Know that heart disease often develops when the arteries that carry oxygen-rich blood to the heart become narrowed or blocked, usually due to a build-up of fatty deposits (cholesterol). This can reduce blood flow and lead to chest pain or heart attacks. Understand that diabetes is a long-term health condition that can be managed, even though it cannot always be cured. Know that people with diabetes can manage their condition by controlling the amount of sugar in their diet, checking their blood sugar levels regularly, and sometimes using insulin or other medication to help balance those levels. Begin to understand that lifestyle factors like diet, exercise, and weight management are important in reducing the risks linked to both heart disease and diabetes.



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Exercise	<ul style="list-style-type: none"> Know that moving their body in different ways (like running, jumping, dancing) is called exercise. Know that exercise can help people feel good and stay strong. Know that everyone, including children and adults, needs to move their body to stay healthy. 	<ul style="list-style-type: none"> Recognise what constitutes as exercise and know that all humans need exercise. 	<ul style="list-style-type: none"> Understand that regular exercise is important for a healthy lifestyle. 	<ul style="list-style-type: none"> Explain why people who exercise regularly are usually fitter than people who take little exercise. Know that regular exercise reduces the risk of heart disease 	<ul style="list-style-type: none"> Know that different people have different lifestyles and therefore dietary requirements. Know that during exercise, more oxygen is needed by muscles
Drugs and Alcohol	<ul style="list-style-type: none"> Know that some things people put in their bodies can help them feel better or get well. Know that some things can be harmful to the body if used the wrong way. Know that grown-ups make rules about what is safe or not safe to use or take. 	<ul style="list-style-type: none"> Know that a drug is a chemical that has an effect on the mind and the body Know that drugs can be beneficial or harmful. Know that there are legal and illegal drugs. Identify that illegal drugs and alcohol have negative effects on the body. 	<ul style="list-style-type: none"> Know that some drugs are addictive Know that all drugs have side effects and in medications these are listed in the leaflet. Begin to identify how legal and illegal drugs affect the body. Know the short-term effects of alcohol (limited blurred vision, slurred speech, poor balance and slower reactions) 	<ul style="list-style-type: none"> Antibiotics, including penicillin, are medicines that help to cure bacterial disease by killing infective bacteria inside the body. Know how legal and illegal drugs affect the body. Know the long-term effects of alcohol (liver damage) 	<ul style="list-style-type: none"> Know that vaccines can make people immune to a disease. Know that once you are immune you are protected from a certain disease. Explain why some drugs are illegal. Know that alcohol abuse accounts for more deaths and crime than any other drug. Know the dangers of drink driving
Gasping for breath	<ul style="list-style-type: none"> Know that our lungs help us breathe and we need them to be healthy. Know that putting harmful smoke or chemicals into the body can make it harder to breathe. Know that smoke from cigarettes and other products can hurt the body and should be avoided. 	<ul style="list-style-type: none"> Understand that lung volumes vary and may be affected by smoking Know that nicotine is a highly addictive drug found in tobacco. Vaping is considered to be less harmful than smoking, but still not safe. 	<ul style="list-style-type: none"> Know that nicotine is addictive and that nicotine patches can be used to help someone give up smoking. Know that other people may be affected by passive smoking. Know that smoking can make it more difficult for blood to move around the body and deliver oxygen to the muscles. 	<ul style="list-style-type: none"> Know that smoking can lead to a number of diseases, including heart and lung disease. Know that smoking can cause heart disease and cancer 	<ul style="list-style-type: none"> Understand the speed of breathing varies and may be affected by smoking.
Key Vocab	Weight, mass, insulin, healthy, exercise, drugs, alcohol, legal, illegal, smoking,		Heart disease, pancreas, addiction, nicotine, tar, passive smoking,	High cholesterol, obesity, anorexia, antibiotics, liver damage, cancer,	Arteries, diabetes, oxygen, aerobic, anaerobic, vaccinations, immunity, drink driving, lung capacity



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Substantive Knowledge						
Spring 1						
Term						
Key Topic	<p>Chemistry - Clean Air! Pupils will use their knowledge from states of matter in Key Stage 3, to recognise that gasses are all around us in the atmosphere. They will learn about how the atmosphere has been changing due to the actions of humans and the increase of carbon dioxide. Experience what is meant by renewable and non-renewable e.g. when wood is burnt it cannot be burnt again but when we recycle, we reuse products like solar energy is reused. Identifying the impact of this on global warming and health e.g. increase in asthma sufferers. Pupils will begin to recognise how they can reduce their carbon footprint.</p> <p style="text-align: center;"><i>Working Scientifically:</i></p> <p><i>Conducting research using secondary sources, pupils will find out the main ways humans globally are polluting the land, air and water. They will report on their findings including some key facts and figures. Additionally, pupils will plan and conduct their own investigation on pollution in school e.g. playground litter, not recycling, food waste or air quality in classrooms.</i></p> <p>Possible trips or experiences: Orsted Contact us Ørsted</p>					
	Stage 4	Stage 5	Stage 6	Stage 7&8	Stage 9&10	
Prior Learning in Key Stage 3		<ul style="list-style-type: none"> Experience different ways to separate materials using filter paper and funnels, sieves, magnets Experience solids liquids and gases when heated or cooled 	<ul style="list-style-type: none"> Experience how some solid materials will dissolve in a liquid and how to separate them e.g. salt water Begin to understand how some materials change state 	<ul style="list-style-type: none"> Observe change of state can happen when materials are heated or cooled, measure the temperature at which this happens. Know about and explore how some materials can change state Identify the part played by evaporation and condensation in the water cycle Compare and group materials based on their state of matter (solid, liquid, gas) 	<ul style="list-style-type: none"> 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 Demonstrate that dissolving, mixing and changes of state are reversible changes 	
Knowledge	<ul style="list-style-type: none"> Know that some things are wet (liquids), hard (solids), or invisible like air (gases). Know that we breathe in air, even though we can't see it. Know that people can make the environment dirty by dropping rubbish, using cars, or burning things. 	<ul style="list-style-type: none"> Name at least one solid, liquid and gas. Begin to know that gas is all around us and we breath it in. Identify three causes of pollution by humans. Begin to recognise that some materials can change state and be used more than once e.g. water whilst others cannot when heated e.g. paper. 	<ul style="list-style-type: none"> Know that the atmosphere is a collection of gases that surround the earth. Know that carbon dioxide can be a pollutant. Know that the amount of carbon dioxide in the atmosphere is slowly increasing. Know that the increasing level of carbon dioxide is linked to global warming. Know what is meant by renewable and non-renewable. Know what is meant by carbon footprint. 	<ul style="list-style-type: none"> Name gasses within the atmosphere. Increasing carbon dioxide levels in the atmosphere raises average temperatures on Earth. Know the impact of increasing temperatures e.g. change in climates Know that the remains of living things (fossils) become fuels over millions of years. Know that fossil fuels are non-renewable. Begin to identify that there are alternative sources of energy that are renewable. Know how to reduce own carbon footprint. 	<ul style="list-style-type: none"> Begin to recognise that there are layers in the atmosphere. Know that greenhouse gases in the atmosphere trap heat that warms Earth. Burning fossil fuels creates carbon dioxide and tiny pieces of solid matter, such as soot. Fossil fuels have been used increasingly since the 1800s for heating, transport and generating electricity. Know three types of renewable energy (wind power, waterpower, solar power). Know the impact of own carbon footprint. 	
Key Vocab	Solid, liquid, gas, breathing, noise pollution, light pollution, air pollution, changing state, water, ice, steam,		Atmosphere, carbon dioxide, global warming, renewable, non-renewable, carbon foot print, coal, oil, gas,		Oxygen, carbon dioxide, nitrogen, climate change, fossil fuels,	Ozone layer, greenhouse gases, greenhouse effect, renewable energy, tidal and wave power, solar power, wind power



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	Substantive Knowledge				
Term	Spring 2				
Key Topic	<p>Chemistry and Biology – Crime Scene Investigators. <i>Pupils will experience how to make a record of person's fingerprints and learn about DNA by making simple models using pipe cleaners. Awe and wonder will be created for the pupils looking at chromatography where they will watch the magic as ink separates into the colours they are made from in practical lessons. Pupils will learn the roles of a Crime Scene Investigator and understand the importance of the rules and techniques.</i></p> <p style="text-align: right;"><i>Working Scientifically;</i></p> <p><i>Pupils will use a variety of practical investigations to identify the fingerprint and ink used to interpret data from a staged crime scene in school.</i></p> <p><i>Possible trips or experiences: Police visit</i></p>				
	Stage 4	Stage 5	Stage 6	Stage 7&8	Stage 9&10



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<p>Prior Learning in Key Stage 3</p>		<p>Materials Know that different equipment can be used to separate materials</p> <p>Humans Name, draw and label the basic parts of the human body and say which part of the body is associated with each sense.</p>	<p>Materials Experience different ways to separate materials using filter paper and funnels, sieves, magnets</p> <p>Humans Start to name simple organs in the body: heart, lungs, brain</p>	<p>Materials Experience how some solid materials will dissolve in a liquid and how to separate them eg salt water</p> <p>Humans Know the simple functions of the basic parts of the digestive system in humans</p>	<p>Materials Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution Demonstrate that dissolving, mixing and changes of state are reversible changes</p> <p>Humans Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood</p>
<p>Knowledge</p>	<ul style="list-style-type: none"> Know that people can leave behind clues like marks or objects when they touch things. Know that fingerprints are special patterns on our fingers that belong only to us. Know that people can be identified by special clues like hair or fingerprints. 	<ul style="list-style-type: none"> Know what is meant by evidence e.g. fingerprint, hair, bodily fluids. Know that anyone at a crime scene will leave evidence behind Know how dusting a surface with a special powder can make fingerprints show up. Know that DNA is unique to them and inherited from their parents. Know that DNA identifies a person. Begin to recognise that there is difference forms in which DNA can be left. Know that chromatography is a process that separates the colours in ink. 	<ul style="list-style-type: none"> Know that a fingerprint is left on a surface because oils on the skin are left behind on the surface. Know that crime scene investigators wear special clothing to avoid leaving their own evidence at a crime scene Know how to remove a fingerprint from a surface as physical evidence. Know that everyone's fingerprint is unique even identical twins. Know that DNA can be collected as evidence in the form of; spit, urine, blood, semen and hair. Know how to use chromatography to separate colours in ink. 	<ul style="list-style-type: none"> Know how to extract different types of evidence from a crime scene. Know that evidence must be bagged and dated. Identify loop, arch and a whirl are features of fingerprints. Know that there are four main blood groups A, B, O and AB. Know that the results of separating colours can identify a particular ink that has been used e.g. for writing a ransom note. 	<ul style="list-style-type: none"> Know how to collect evidence not to contaminate with their own DNA/fingerprints. Know that innocent people have their fingerprints taken to be eliminated from a crime scene. Begin to recognise that blood contains red blood cells, white blood cells, platelets and plasma. Know how to use chromatogram to compare two different inks.
<p>Key Vocab</p>	<p>Blood, hair, saliva chromatography, fingerprints, evidence, unique,</p>		<p>Crime scene, personal protective clothing, DNA, identical twins,</p>	<p>Loop, arch, whorl fingerprints, blood types,</p>	<p>Contamination, chromatogram, red/white blood cells, platelets, plasma</p>

Substantive Knowledge	
Summer 1	
<p>Key Topic</p>	<p>Physics (Forces and Electricity)– Driving Along Pupils will apply learning of electricity and forces to the real-life experience of owning and riding a bicycle. They will look at the different parts of a bicycle having the opportunity to get hands on with real bikes taking them apart to learn and understand how they work. Pupils will construct simple electric circuits to learn and understand how a battery powered light on a bicycle works. Opportunities to learn about safety on the road including speed limits and how to be safety when riding a bike through visibility and bike maintenance will be provided.</p>



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[Forces including simple machines KS2 | Y5 Science Lesson Resources | Oak National Academy](#)

Working Scientifically:

Pupils will conduct investigations to acquire data on using different mechanisms (e.g. pulley) and use their data to answer questions such as, 'Does using a pulley make it easier to lift an object?' 'Can I lift heavier objects easier with a pulley?'

In stages 7+, pupils will investigate gears by making their own gears and finding out the impact on gears having more or less 'teeth.' [Purposeful-practical_gears.pdf](#)

[How do Bike Gears Work? | Design Squad](#)

Possible trips or experiences: Visitor to talk about and answer questions about the workings of a bicycle and maintaining one [Spokes Bike Fix | Mobile Cycle Repair in Grimsby & Cleethorpes](#)

	Stage 4	Stage 5	Stage 6	Stage 7&8	Stage 9&10
Prior Learning in Key Stage 3	<p>Electricity Repeat actions that have an effect e.g. turning a light switch off and on. Explore how things work.</p>	<p>Electricity Know some common appliances that run on mains electricity and battery powered. Know how to handle electrical appliances with care and is aware of dangers including not sticking fingers in mains, water kept away from it, and never touching switches with wet hands.</p> <p>Forces Identify some magnetic materials Identify how objects move on different surfaces Explain that forces make things move or stop moving including pushing, pulling, magnets</p>	<p>Electricity Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers Know that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit</p> <p>Forces Notice that some forces need contact between two objects, but magnetic forces can act at a distance Describe magnets as having two poles Predict whether two magnets will attract or repel each other, depending on which poles are facing</p>	<p>Electricity Identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery Know some common conductors and insulators, and associate metals with being good conductors.</p> <p>Forces Describe and compare how objects move on different surfaces Describe and compare how different objects move on the same surfaces. Explain that forces need contact between two objects, but magnetic forces can act at a distance Explain how magnets attract and repel each other and attract some materials but not others 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</p>	<p>Electricity Know that the brightness of a lamp or the volume of a buzzer is associated with the number and voltage 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.</p> <p>Forces 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.</p>
Knowledge	<ul style="list-style-type: none"> Know that pushing and pulling can make things move or stop. Know that wearing a helmet helps protect the head when riding a bike. Know that some things, like lights on a bike, need power (like batteries) to work. 	<ul style="list-style-type: none"> Know that the lights on a bicycle can be battery powered. Pushes and pulls are forces. Different types of forces can be contact or non-contact forces. Forces can change an object's speed, direction, and/or shape. 	<ul style="list-style-type: none"> Know that the lights on a bicycle can be battery powered or reflectors. Construct a simple circuit to light a bulb. Know that a pulley is a simple mechanism or machine, used in everyday life, which is useful for lifting things. Know that pulleys make it easier to lift an object because they 	<ul style="list-style-type: none"> Identify whether a bulb in a circuit will light based on whether the bulb is part of a complete loop with a battery. Know that gears are wheels with teeth that slot together and turn on an axle. Know that gears can change the direction of a force and when one gear is turned, the other 	<ul style="list-style-type: none"> Know that the brightness of a bike light is associated with the number and voltage used in the circuit. Name examples of machines and where they are used on a bicycle e.g. pulley, gears, wheel and axle. Recognise that machines allow a greater load to be moved for less effort.



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		<ul style="list-style-type: none"> Begin to recognise road safety when riding a bicycle. Know that a helmet provides protection to the head in case of an accident when riding a bike. Know that speed limits were introduced to save fuel and improve road safety. Know that reaction time is how long it takes a human to respond to something. Know that air bags and seatbelts reduce impact forces for people in the vehicle. 	<p>decrease the effort or force needed</p> <ul style="list-style-type: none"> Know that there is a pulley on a bicycle. Understand what constitutes safe and unsafe behaviour for cyclists and how to be as safe as possible on a bike. Know the importance of high visibility clothing, wearing a cycle helmet, using lights at night. Know the national speed limits for a built-up area, an A road, a motorway and dual carriageway. Know methods of measuring human reaction times and recall typical results. 	<p>gear turns in the opposite direction.</p> <ul style="list-style-type: none"> Know that bikes have two sets of different-sized gears on the wheel you pedal and the back wheel. Know the importance of keeping a bicycle in good working order. Know why speed limits are less in towns and recognise that they are usually 20 outside schools. Know that thinking distance is the distance travelled between seeing danger and starting to brake. Know that braking distance is the distance travelled whilst braking. 	<ul style="list-style-type: none"> Begin to recognise how gears on a bike work. Know how to maintain a bicycle. Know that stopping distance = thinking distance + braking distance. Know that speed = distance ÷ time. Know how to use a calculator to work out a vehicles' speed. Know that more power is required to stop a fast-moving vehicle.
Key Vocab	Battery, electricity, Helmet, safety, protection, push, pull, contact, non-contact, direction, force, speed limit, road safety, reaction time, air bag, seatbelt, impact force, vehicle		electrical circuit, complete circuit, component, cell, battery, positive, negative, connect/connections, crocodile clip, bulb, switch, Traffic, cycle, cyclist, pedestrian, high-visibility, fluorescent, reflective, signal, crash, incident, pulley, machine, mechanism, effort, load, national speed limit, A road, motorway, dual carriageway,	Maintenance, loose connection, short circuit, complete circuit, gears, cogs, axle, clockwise, town roads, thinking distance, danger, brake, braking distance, distance, travel,	Circuit, complete circuit, circuit diagram, circuit symbol, cell, battery, bulb, switch, stopping distance, speed, power

Substantive Knowledge	
Summer 2	
Term	
Key Topic	<p>Biology – Creepy Crawlies</p> <p><i>Pupils will enjoy getting outside in nature to learn about local wildlife, their habitats and impacts on their habitats. Activities including pond dipping, collecting leaf litter organisms and pitfall traps will be carried out to give pupils the opportunity to use simple keys to name plants and animals. Exploring local habitats on school grounds, in a local park or woodland, pupils will identify a variety of animal's habitats and microhabitats. Pupils will further their knowledge on habitats, looking at current issues affecting them and identifying local wildlife whose numbers are in decline.</i></p> <p><i>Working Scientifically:</i></p>



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	<p>When outdoors, pupil's will collect data on what living things are found in a habitat/microhabitat and use this data to answer questions e.g. What can be found in a woodland/under a log? They will also use this data and their learning from the changes in habitats to ask their own scientific questions e.g. How does little pollution effect woodlice in the park?</p> <p>Possible experiences or trips: Visits to local habitats e.g. park, woodlands to conduct research. Visit from the Wildlife Trust. HOME PAGE</p>				
	Stage 4	Stage 5	Stage 6	Stage 7&8	Stage 9&10
<p>Prior Learning in Key Stage 3</p>	<p>Can name and describe some common animals</p> <p>Begin to notice and talk about changes</p>	<p>Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals</p> <p>Notice that animals, including humans, have offspring which grow into adults</p> <p>Explore and compare the differences between things that are living, dead, and things that have never been alive</p> <p>Identify that most living things live in habitats to which they are suited</p> <p>Identify and name different food sources for animals</p> <p>Find out about and describe the basic needs of animals, incl humans, for survival (water, food and air)</p>	<p>Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets)</p> <p>Identify the young of different animals and describe how they change as they grow.</p> <p>Identify and name a variety of plants and animals in their habitats, incl microhabitats</p> <p>Describe how different habitats provide the basic needs for different kinds of animals and plants, and how they depend on each other</p> <p>Describe how animals obtain their food from plants and other animals, using the idea of a simple food chain,</p> <p>Identify and name a variety of common animals that are carnivores, herbivores and omnivores</p>	<p><i>Classify animals according to their features including invertebrate</i></p> <p>Identify that animals have skeletons and muscles for support, protection and movement</p> <p>Identify the lifecycles of animals from different groups including mammals, amphibians, insects and birds.</p> <p>Begin to understand changes to plants and animal's habitats can impact on how it provides their basic needs</p> <p>Construct and interpret a variety of food chains identifying producers, predators and prey.</p> <p>Identify that animals, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat</p>	<p>Give reasons for classifying animals based on specific characters including all types of invertebrates and vertebrates.</p> <p>Describe the lifecycles of animals from different groups including mammals, amphibians, insects and birds</p> <p>Know that animals produce offspring of the same kind but normally offspring vary and are not identical to their parents.</p> <p>Describe the life process of reproduction in some animals.</p> <p>Describe how changes to an environment could endanger living things</p> <p>Know that adaptation due to changes in their environment, may lead to evolution.</p> <p>Describe the way in which nutrition and water is transported in animals.</p>
<p>Knowledge</p>	<ul style="list-style-type: none"> Know that animals live in different places called habitats, like ponds, trees, or gardens. Know that animals need food to live and may eat plants or other animals. Know that some animals have similar features, like fur or feathers. 	<ul style="list-style-type: none"> Know how to use a simple key to name living things in local habitats incl. fish, amphibians, reptiles, birds and mammals Know that a specie is a group of living things with similar features Know that animals get their food from eating other animals or plants and name food forces for some local wildlife. Know how to carry out simple sampling methods using a net or pooter Know that habitat means a natural environment 	<ul style="list-style-type: none"> Describe and compare the structure of a variety of common animals in a local habitat (fish, amphibians, reptiles, birds and mammals) Know that a specie can reproduce to make fertile offspring Know that some animals are adapted to survive being caught as prey Know that some animals are adapted to be successful predators Know that herbivores eat plants and carnivores eat meat (other animals) 	<ul style="list-style-type: none"> Know how to use a classification key to name animals from all groups including invertebrates. Know how to construct a food chain with a plant, herbivore and carnivore Name producers, predators and prey in given food chains. Describe ways to carry out sample methods of living things Understand that organisms are adapted to live in a habitat. Begin to understand changes to local habitats can impact on how it provides for their basic needs 	<ul style="list-style-type: none"> Know the terms herbivore, carnivore and omnivore and name local animals for each Know how to interpret a simple food web Know how to estimate the number of plants and animals that are in an area using the results of a quadrat survey Understand how a change affecting one specie Describe how changes to a local environment could endanger living things



Cambridge Park Academy

Character - Preparation - Achievement

			<ul style="list-style-type: none"> • Know how to carry out sampling methods using pitfall traps and quadrat surveys • Know that a habitat is where living things can be found. • Know that habitats provide for a living thing's basic needs. 	
Key Vocab	<p>tail, wing, claw, fin, scales, feathers, fur, beak, paws, hooves, names of animals experienced first-hand/from topic studied from each vertebrate group, offspring, habitat, environment, natural environment, suited, suitable, plants, animals,</p> <p>* The children need to be able to name and identify a range of animals in each group e.g. name specific birds and fish</p> <p>** They do not need to use the terms mammal, reptiles etc. or recall all of the key characteristics of each, although they will probably be able to identify birds and fish, based on their characteristics.</p>	<p>Amphibian, reptile, fish, bird, mammal, prey, predators, basic needs, food, food chain, herbivore, omnivore, carnivore, shelter, move, feed, water, air, survive, survival, names of local habitats (e.g. pond, woodland etc.), names of micro-habitats (e.g. under logs, in bushes etc.), conditions, light, dark, shady, sunny, wet, damp, dry, hot, cold</p>	<p>Invertebrate, insects, mollusks, arthropods, worms, cnidarians, echinoderms, Seasonal change, human impact, migrate, hibernate, food chain, producer, energy, nutrition,</p> <p>*arrows in a food chain represent the transfer of energy.</p>	<p>Omnivore, food web, human impact, positive, negative, nutrient</p>

Disciplinary Knowledge

Being a Scientist!






*Pupils are explicitly taught the working scientifically skills across all substantive knowledge units. They learn how to **plan** and carry out (**do**) investigations, **record** and **review** their findings. Finally, in later stages they begin to **evaluate** what they have found out.*

Stage 4	Strands	Stage 5 & 6	Stage 7&8	Stage 9&10
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Cambridge Park Academy


Character - Preparation - Achievement

 <p>Science</p> <ul style="list-style-type: none"> • Talks about what they see in the natural world, like trees, animals, weather, or changes in seasons. • Can name and describe some common animals and plants. • Explores natural objects using their senses (e.g., "It's rough," "It smells sweet"). • Begins to notice and talk about changes (e.g., melting ice, growing seeds, rain turning to puddles). • Understands simple features of the weather and seasons. • Knows that some things are living and some are not 	<p>Plan</p>  	<p>Ask simple questions and recognise that they can be answered in different ways</p> <p>Plan how to reach a goal.</p> <p>Choose the resources they need for their investigation</p>	<p>Ask relevant questions and use different types of scientific enquiries to answer them.</p> <p>Set up simple practical enquiries.</p> <p>Conduct comparative and fair tests.</p>	<p>Plan different types of scientific enquiry to answer questions, including recognising and controlling variables when necessary.</p>
	<p>Do</p> 	<p>Observe closely using simple equipment (e.g. stop watches, magnifying glasses,</p> <p>Perform simple tests</p>	<p>Make systematic and careful observation.</p> <p>Take accurate measurements using standard units, using a range of equipment (e.g. thermometers, stop watches and data loggers).</p>	<p>Take measurements using a range of scientific equipment with increasing accuracy and precision, taking repeat readings when appropriate.</p>
	<p>Record</p> 	<p>Gather and record data to help in answering questions Use a variety of methods including drawings (stage 5 - pictograms, tallys and block diagrams) (stage 6- bar charts, pictograms and tables)</p>	<p>Record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and time graphs</p> <p>Report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions</p>	<p>Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, bar and line graphs.</p>



Cambridge Park Academy

Character - Preparation - Achievement

	<p>review</p> 	<p>Identify and classify</p> <p>Use observations and ideas to suggest answers to questions</p>	<p>Use results to draw simple conclusions</p> <p>Make predictions for new values</p> <p>Suggest improvements and raise further questions</p> <p>Identifying differences, similarities or changes related to simple scientific ideas and processes</p>	<p>Using test results to make predictions to set up further comparative and fair tests.</p> <p>Reporting and presenting findings from enquiries including conclusions, casual relationships and explanations of and degree in trust of results, in oral and written forms such as displays and other presentations.</p>
	<p>Evaluate</p>		<p>Use straightforward scientific evidence to answer questions or to support their findings.</p>	<p>Identifying scientific evidence that has been used to support or refute ideas or arguments.</p>