Year 3 and 4 - Science Programme of Study

Programme of study	Light	Living things and their habitats	Electricity	Animals including humans	Sound
Coverage	Shadows, reflection, sources of light, the sun.	Classification, effect of habitat change	Constructing simple circuits, using switches, insulators and conductors	Animals – skeletons, adaptation, diets	Sound and vibration, transmission in different media, pitch and loudness
Content	Recognise that they need light in order to see things and that dark is the absence of light Notice that light is reflected from surfaces Recognise that light from the sun can be dangerous and that there are ways to protect their eyes Recognise that shadows are formed when the light from a light source is blocked by an opaque object Find patterns in the way that the size of shadows change.	Recognise that living things can be grouped in a variety of ways Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment Recognise that environments can change and that this can sometimes pose dangers to living things.	Identify common appliances that run on electricity Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers 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 Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit Recognise some common conductors and insulators, and associate metals with	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 Identify that humans and some other animals have skeletons and muscles for support, protection and movement.	Identify how sounds are made, associating some of them with something vibrating Recognise that vibrations from sounds travel through a medium to the ear Find patterns between the pitch of a sound and features of the object that produced it Find patterns between the volume of a sound and the strength of the vibrations that produced it Recognise that sounds get fainter as the distance from the sound source increases.

			being good conductors.		
Notes and guidance	Explore what happens when light reflects off a mirror or other reflective surfaces, including playing mirror games to help them to answer questions about how light behaves. Think about why it is important to protect their eyes from bright lights. Look for, and measure shadows, and find out how they are formed and what might cause the shadows to change.	Use the local environment throughout the year to raise and answer questions that help them to identify and study plants and animals in their habitat. Identify how the habitat changes throughout the year. Explore possible ways of grouping a wide selection of living things that include animals and flowering plants and non-flowering plants. Begin to put vertebrate animals into groups such as fish, amphibians, reptiles, birds, and mammals; and invertebrates into snails and slugs, worms, spiders, and insects. Explore examples of human impact (both positive and negative) on environments, for	Construct simple series circuits, trying different components, for example, bulbs, buzzers and motors, and including switches, and use their circuits to create simple devices. Draw the circuit as a pictorial representation Be taught about precautions for working safely with electricity.	Continue to learn about the importance of nutrition and should be introduced to the main body parts associated with the skeleton and muscles, finding out how different parts of the body have special functions.	Explore and identify the way sound is made through vibration in a range of different musical instruments from around the world. Find out how the pitch and volume of sounds can be changed in a variety of ways.

		example, the positive effects of nature reserves, ecologically planned parks, or garden ponds, and the negative effects of population and development, litter or deforestation.			
Working Scientifically	♣ planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary ♣ taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate ♣ recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs ♣ using test results to make predictions to set up further comparative and fair tests ♣ reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations ♣ identifying scientific evidence that has been used to support or refute ideas or arguments.				
	Looking for patterns in what happens to shadows when the light source moves or the distance between the light source and the object changes.	Using and making simple guides or keys to explore and identify local plants and animals Making a guide to local living things Raising and answering questions based on their observations of animals and what they have found out about other animals that they have researched.	Observing patterns, for example, that bulbs get brighter if more cells are added, that metals tend to be conductors of electricity, and that some materials can and some cannot be used to connect across a gap in a circuit.	Identifying and grouping animals with and without skeletons and observing and comparing their movement Compare and contrast the diets of different animals (including their pets) and decide ways of grouping them according to what they eat.	Finding patterns in the sounds that are made by different objects such as saucepan lids of different sizes or elastic bands of different thicknesses. Make earmuffs from a variety of different materials to investigate which provides the best insulation against sound. Make and play their own instruments by using what they have found out about pitch and volume.
Identifying and Classifying	Regularly revisit KS1 skills: Focus on asking questions about the similarities and differences between things. Go outside to explore the world around them at all times of the year.				

	Increased focus on measuring and using data to answer 'big questions'. Continue to build on their observational skills, becoming more independent in identifying, through the use of increasingly complex tools, as well as developing higher order skills in reasoning and justification when explaining how they have chosen to group things. Design simple tests to help them classify materials, as well as independently using a range of secondary sources to support them in identifying a range of living things.				
	How would you organise these light sources into natural and artificial sources?	Can we use the classification keys to identify all the animals that we caught in the school garden?	How would you group these electrical devices based on where the electricity comes from? How would you sort these objects/materials based on their temperature?	How do the skeletons of different animals compare?	How would you group these instruments based on how they produce sound? How would you group these instruments based on how they change pitch or volume?
Comparative testing	Use an increasingly wide range of equipment to make measurements. Learn what it means to measure accurately and check for reliability. Learn to independently plan how to record and analyse the data, using tables, pictograms, and bar charts to compare the measurements they make. Use the bar charts to draw conclusions about what they have found out to be the answer to their 'big question' Evaluate the procedure they used and the quality of their data, suggesting ways they could improve their test.				
	Which pair of sunglasses will be best at protecting our eyes?	How does the average temperature of the playground, greenhouse, school field etc change in each season?	Which metal is the best conductor of electricity?		Which material is best to use for muffling sound in ear defenders? Are two ears better than one?
Fair tests	Plan their own tests to collect data. Through fair testing learn to understand the different types of variables: • the dependent variable that they will change in their test,				

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<tr><td></td><td colspan="5">• the independent variable that they are going to measure so that they can find out how the dependent variable affects it,
• the control variables which the children will need to keep the same so that they don't affect their results.
Measure and record data that can then be displayed in a scatter graph or line graph.
Use their data to draw conclusions that identify a causal relationship eg 'when you increase X, Y will always decrease'.
Throughout KS2, become progressively more systematic in how they approach fair tests and increasingly independent.
Written conclusions to become increasingly sophisticated, with more focus on scientific explanations.
Focus on their skills in evaluating their scientific enquiries.
Learn to critique not just their experimental methods but also their data by reflecting on reliability and accuracy.</td></tr>
<tr><td></td><td>How does the number of layers of transparent plastic affect how much light can pass through?
How does the distance between the shadow puppet and the screen affect the size of the shadow?</td><td>Does the amount of light affect how many woodlice move around?</td><td>How does the thickness of a conducting material affect how bright the lamp is?</td><td></td><td>How does the volume of a drum change as you move further away from it?

How does the length of a guitar string/tuning fork affect the pitch of the sound?</td></tr>
<tr><td>Pattern seeking</td><td colspan="5">Begin to think for themselves when deciding what they should measure and observe.
Begin to make decisions about the most appropriate equipment to use to collect data.
Begin to think even more about their planning, including identifying the variables that they cannot control and suggesting the potential impact those variables might have on the data they collect.
Use a data logger to collect the most accurate data they can.
Using data analysis techniques to spot patterns, including using tabulated data and a variety of charts and graphs.
Use data and graphs to support their explanations when describing relationships.
Use pattern seeking as a preliminary test; use their findings to form and justify their own predictions, then propose further investigations to test these predictions.</td></tr>
<tr><td></td><td></td><td>How has the use of insecticides affected bee population?</td><td>Which room has the most electrical sockets in a house?</td><td>Do male humans have larger skulls that female humans?

Are you more likely to have bad eye sight and to wear glasses if you are older?</td><td>Is there a link between how loud it is in school and the time of day? If there is a pattern, is it the same in every area of the school?</td></tr>
<tr><td>Research</td><td colspan="5">Reading for information and note-taking.
Learn to interpret the information they find and critically consider its relevance in answering their 'big questions'.
Use a range of secondary sources, including books, websites, and video to find their information.
Listen to presentations from experts and science professionals to get their information, or ask them questions in interviews and letters
Find more data in their research and use this to help answer questions
Start to collect their own data through questionnaires and interviews.</td></tr>
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	Begin to evaluate the quality of the information they have found and how well it has enabled them to draw conclusions and answer their 'big question'.				
	How does the Sun make light?	Why are people cutting down the rainforests and what effect does that have?	How has electricity changed the way we live? How does a light bulb work?		Do all animals have the same hearing range?
Ideas over time	Explore and talk about their own and other people's scientific ideas. Begin to recognise how scientific ideas change and develop over time. Use a range of secondary sources of information. Develop their use of scientific language. Explain ideas using their scientific knowledge and understanding. Evaluate the significance, strengths and weaknesses of different scientists' ideas.				
	How have our ideas about eclipses changed over time?	How did Jane Goodall learn about the habits and behaviours of chimpanzees and why does she still need to work to protect their habitat?	Who actually invented the light bulb, Thomas Edison or Joseph Swan?		How has our understanding and use of ultrasound changed over time? Since the 1800s, how has science helped people who are deaf?
Scientists to research	James Clerk Maxwell (Visible and Invisible Waves of Light)	Cindy Looy (Environmental Change and Extinction) Jaques Cousteau (Marine Biologist)	Thomas Eddison (First Working Lightbulb) Joseph Swan (Incadesecant Light Bulb)	Adelle Davis (20th Century Nutritionist) Marie Curie (Radiation / X-Rays)	Aristotle (Sound Waves) Gailileo Galilei (Frequency and Pitch of Sound Waves) Alexander Graham Bell (Invented the Telephone)