Y4 Science Planning

A note about the planning Please read carefully.

This planning has been created and adapted by the science leaders at Sacred Heart RC Primary School. It is primarily based on the ASE planning matrices and the exemplification materials but includes other high-quality resources to support the lessons and assessment, such as: Explorify, STEM, BP, YouTube, YPTE, BBC and TAPs. The planning is set out to provide teachers with a series of approximately 6 lessons (a half term's worth) which include the opportunities for working scientifically, incorporating the 5 enquiry types (a table at the end of the planning shows where these enquiry types have been met).

Each set of plans begins with key learning, possible evidence, vocabulary to be used within the topic (created by the ASE), the statutory national curriculum aims and a suggested LO for that lesson. Where possible, we have included the opportunities to incorporate SMSC into the lessons, the opportunity to develop the children's science capital by providing them with information about potential job opportunities that the area of science offers and the chance to learn briefly about a scientist who was well-known within that area of study or the specific discipline. Teachers may wish to expand on this further in reading/writing lessons. As this planning has been created for teachers at Sacred Heart, this document can be edited by class teachers if they believe they have other ideas that will produce the same outcome however, they must inform the science lead before hand and the editing must be done in a different colour and not replace the original.

A set of exemplification materials (with work produced by other pupils) supplements this planning to aid the teacher's understanding. The exemplification materials also include the national curriculum statements for the previous year group and the later year groups. Teachers should look at this before making any changes to the planning.

Where appropriate, there are teacher notes that provide extra information about what teachers may need to be aware of before the topic begins, such as resources that may need to be purchased before the topic or the way that the topic has been designed

Please note that it is down to the teacher's discretion as to how they adapt the activities for SEND /more able pupils although some suggestions have been made. It is important to remember that currently there is no criteria for GD in science.

The start of each topic should begin with the children completing a concept map with the key vocabulary on to show their understanding prior to the topic. Where necessary, children should revisit this, using a different colour, when new learning has taken place and children are secure with their understanding of the vocabulary.

It is important that the children now begin to understand and use the terminology linked to the 5 enquiry types and it is also important to start explaining what type of science their topics are linked to, for example plants – biology etc

We hope you find this planning useful.

Y4 Living things and their habitats

National Curriculum objectives:

1. recognise that living things can be grouped in a variety of ways
2. explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment
3. recognise that environments can change and that this can sometimes pose dangers to living things.

	Assessment guidance	Key learning	Possible Evidence
SECURE	Shows understanding of a concept using scientific vocabulary correctly	Living things can be grouped (classified) in different ways according to their features. Classification keys can be used to identify and name living things. Living things live in a habitat which provides an environment to which they are suited (year 2 learning). These environments may change naturally e.g. through flooding, fire, earthquakes etc. Humans also cause the environment to change. This can be in a good way i.e. positive human impact, such as setting up nature reserves or in a bad way i.e. negative human impact, such as littering. These environments also change with the seasons; different living things can be found in a habitat at different times of the year **Key vocabulary** Classification, classification keys, environment, habitat, human impact, positive, negative, migrate, hibernate	Can name living things living in a range of habitats, giving the key features that helped them to identify them Can give examples of how an environment may change both naturally and due to human impact
	Applying knowledge in familiar related contexts, including a range of enquiries	Observe plants and animals in different habitats throughout the year Compare and contrast the living things observed Use classification keys to name unknown living things Classify living things found in different habitats based on their features Create a simple identification key based on observable features Use fieldwork to explore human impact on the local environment e.g. litter, tree planting Use secondary sources to find out about how environments may naturally change Use secondary sources to find out about human impact, both positive and negative, on environments	Can keep a careful record of living things found in different habitats throughout the year (diagrams, tally charts etc.) Can use classification keys to identify unknown plants and animals Can present their learning about changes to the environment in different ways e.g. campaign video, persuasive letter

Aristotle Sir David Attenborough	Why did God create wildlife and what would happen if it all became extinct?	Biologist, Climatologist, Environmental Scientist, Zoologist,

	LOs	Activities
Planning	Lesson 1: To understand the characteristics of a living thing	Introduce the topic and the key vocabulary to the children (do not give them the definitions/examples). Ask the children to complete a concept map, this can be used for initial assessment. Using talk partners discuss – how do we know If something is alive? Show the clip and discuss https://www.youtube.com/watch?v=RpZUCo_rKLc Create some flash cards with the 7 life processes on and a set with descriptions. Ask the children to work in pairs to match up the descriptions to the correct processes. Once these have been checked, they can now copy these up into their books, writing a description for each process beside.
	Lesson 2: To identify, describe and classify a variety of common animals Research	Recap of previous learning – What are the 7 life processes? Odd one out – show the children 3 images of different animals (e.g. giraffe, frog and a rabbit). Using talk partners discuss which one they think is the odd one out and why (*this builds on prior learning from Year 2).* What does the word classification mean? Show the clip https://www.bbc.co.uk/bitesize/topics/zn22pv4/articles/z3nbcwx What groups could we use to classify animals? *Children learnt in Year 1 the different groups of animals – mammals, reptiles, amphibians, birds, insects and fish.* Explain that usually we start by deciding if it is a vertebrate or invertebrate. Do the children know what these are? Explain. We can then look at its characteristics. The children are now going to choose an animal to research and create a fact file on them. They should include its classification group and characteristics, as well as features such as lifespan, average height/weight and number of

		young. Once these are completed, the class can share and compare theirs against others in the class – similar to a game of top trumps.
	Lesson 3: To identify a variety of habitats in our local area	Recap on previous learning – quick fire quiz – name the life processes and ways in which we can classify/group animals. Talk partners – what is a habitat? How many different habitats can we think of together as a class? Record these on the board. Now start to think about what animals would live in these habitats and why? Add these to the list on the board. Take the children on a habitat hunt to the local park (Hall Lee Bank park) - ask them to predict what sort of habits they may see whilst in the park and what living things may be living in them. Record your predictions in your books and then record the results once back in class. Then ask the children to draw pictures and label which living things they spotted whilst on their habitat hunt. Pictures of the children exploring the habitats can also be stuck into books and used as evidence.

	Lesson 4: To understand and correctly use classification keys. Identifying, classifying, and grouping.	Using talk partners discuss the question 'what if we ate insects?'. Think about what the positives/negatives may be. Share responses between the class. Ask the children if they know what a classification key is before playing the clip https://www.bbc.co.uk/bitesize/topics/zxjj6sg/articles/z9cbcwx Have on the board a selection of animals and split the children into small groups. The children are going to play a game of 'Guess Who'. Hand each group a print out of the animals on the board and taking in turns they will select an animal and the others in the group will have to ask a series of yes/no questions to try and find out which animal it is. You may need to model some of the questions to start them off – Does it have legs, can it fly, does it lay eggs etc. Once the children have had a go each at selecting an animal, hand out some post it notes and thin strips of paper. Explain that the children can now use those questions they have practiced, to form a classification key, with one animal at the end of each set of questions. You may need to model what this would look like. The children can now choose 4 or 5 animals and have a go at drawing their own classification keys into their exercise books, following the example shown by the teacher.
	Lesson 5: To explore how humans' impact on animal habitats and the environment. Research	Recap previous learning – You may want to have a classification key up on the board, with only the animals shown along the bottom, as a class can we work our way up the key by thinking of suitable questions. Ask the children think about what environmental issues we are currently facing today, make a list of these on the board. Show the clip and discuss https://www.youtube.com/watch?v=C1jEDKGDoSo . In pairs, ask the children to pick one of the environmental issues you have discussed. Their task is to use the IPads to research that issue, finding the causes, impact on wildlife/habitat loss and any possible solutions they may have to combat the issue. They can then present their information in whichever way they prefer, this could be a PowerPoint presentation, a news report, poster or extended piece of writing.

	Lesson 6: Use a classification key to sort and group animals Identifying, classifying, and grouping.	Recap previous learning – can the children name an environmental issue and its cause/solution. Download the TAPS assessment for Animal Keys and follow the guidance. https://pstt.org.uk/resources/curriculum-materials/assessment Children should have recorded their findings and answered the key questions in their exercise books. TAPS sheet will need to be printed and stapled in over the top of the children's work.

Y4 Animals including humans

National Curriculum objectives:

1. describe the simple functions of the basic parts of the digestive system in humans
2. identify the different types of teeth in humans and their simple functions
3. construct and interpret a variety of food chains, identifying producers, predators and prey

	Assessment guidance	Key learning	Possible Evidence
SECURE	Shows understanding of a concept using scientific vocabulary correctly	Food enters the body through the mouth. Digestion starts when the teeth start to break the food down. Saliva is added and the tongue rolls the food into a ball. The food is swallowed and passes down the oesophagus to the stomach. Here the food is broken down further by being churned around and other chemicals are added. The food passes into the small intestine. Here nutrients are removed from the food and leave the digestive system to be used elsewhere in the body. The rest of the food then passes into the large intestine. Here the water is removed for use elsewhere in the body. What is left is then stored in the rectum until it leaves the body through the anus when you go to the toilet. Humans have four types of teeth - incisors for cutting, canines for tearing, molars and premolars for grinding (chewing). Living things can be classified as producers, predators and prey according to their place in the food chain. **Key vocabulary** Digestive system, digestion, mouth, teeth, saliva, oesophagus, stomach, small intestine, nutrients, large intestine, rectum, anus, teeth, incisor, canine, molar, premolars, herbivore, carnivore, omnivore, producer, predator, prey, food chain	Can sequence the main parts of the digestive system Can draw the main parts of the digestive system onto a human outline Can describe what happens in each part of the digestive system Can point to the three different types of teeth in their mouth and talk about their shape and what they are used for Can name producers, predators and prey within a habitat Can construct food chains

	Applying knowledge in familiar related contexts, including a range of enquiries	Research the function of the parts of the digestive system Create a model of the digestive system using household objects Explore eating different types of food, to identify which teeth are being used for cutting, tearing and grinding (chewing) Classify animals as herbivores, carnivores or omnivores according to the type of teeth they have in their skulls Use food chains to identify producers, predators and prey within a habitat Use secondary sources to identify animals in a habitat and find out what they eat	Can use diagrams or a model to describe the journey of food through the body explaining what happens in each part. Can record the teeth in their mouth (make a dental record) Can explain the role of the different types of teeth Can explain how the teeth in animal skulls show they are carnivores, herbivores or omnivores. Can create food chains based on research

		What happens to the food we eat?	
	LOs	**Activities**	
Planning	Lesson 1: To identify and label parts of the human digestive system.	End of unit sticky knowledge quiz (Animals inc humans) to be completed – check retention of previous learning. Introduce the topic and the key vocabulary to the children (do not give them the definitions/examples). Ask the children to complete a concept map, this can be used for initial assessment. Talk partners – discuss what the word digestion means and where does our food go once we put it in our mouths? Have a printout/drawing of the human body outline on the board- Split the class into groups of 3 or 4 and share out pictures of the parts of the digestive system. See if the children can identify which part they have and where it belongs on the diagram at the front of the class. Children to now label the parts of the digestive system into the correct place on their sheet and glue in – the parts should be up on the board for children to see/spell. For SEN/LA children, you may have put in the first letter for each of the body parts.	

	Lesson 2: To describe the functions of the human digestive system.	Recap of previous learning – quick fire quiz - name of parts in the digestive system. Children should now be confident in knowing all the basic parts and where they are in the human body. Information cards are shared out between the class, 1 between 2 – a set of cards with the names of parts in digestive system and a set with the functions. Allow the children time to read through these independently and then together as a class – clarifying any key words/answering any questions. In pairs, can the children match the cards with their correct function. Feedback together in pairs to check understanding and inform of any errors/misconceptions. Teacher/TA to support SEN/LA group. Children to then independently create a poster to demonstrate their knowledge and understanding of the digestive system. Poster should include why the digestive system is important, the main parts of the system and their functions. *Children should be encouraged to use the correct scientific vocabulary.*
	Lesson 3: To understand the journey food takes through the human digestive system.	Recap previous learning – children to give 1 fact/piece of information they have learnt so far about the digestive system. Children are going to be recreating the digestive system themselves – see the link to find out what equipment will be needed and the method for the experiment. https://www.youtube.com/watch?v=7av19YhNkhE. Show the video to the children and then allow for any questions. Ask the children to now write/bullet point the journey in which food makes through the body – This should be recapping previous knowledge. Once complete, you may want to do the experiment from the video as a whole class (led by you) or in groups. Take plenty of pictures for the children to stick into their books as evidence of learning.

	Lesson 4: To identify the different types of teeth in humans and their functions Identifying, classifying, and grouping.	Talk partners – How many different types of teeth do humans have? Can you name of them? Why do we need different types of teeth, what are their purpose? Show video clip https://www.bbc.co.uk/bitesize/topics/z27kng8/articles/zsp76yc Put up onto the board pictures of the different types of teeth and see if the children can come up and match the correct name to the picture. Recap the different types of teeth asking the children to point to them as you go through, then explain their shape and function. Can the children come up with any examples of what foods you might need to use certain teeth? See 'What if' activity at: https://explorify.wellcome.ac.uk/en/activities/what-if/you-had-teeth-like-a-snake Children to label a diagram with the 4 types of teeth and then explain each one's function – could be a cut and stick exercise SEN/LA children may need support or have the types of teeth given; they just need to match the correct function. Set up and introduce the practical needed for next lessons TAPS assessment. – liquids on egg investigation.
	Lesson 5: To investigate what effect different liquids have on our teeth. Observations over time	Download the TAPS assessment for teeth in liquid and follow the guidance. https://pstt.org.uk/resources/curriculum-materials/assessment Children should have recorded their findings and answered the key questions in their exercise books. TAPS sheet will need to be printed and stapled in over the top of the children's work.

	Lesson 6: To construct and understand food chains. Research	Check prior learning as a class – brainstorm ideas on the board of what a food chain is, may look like and consist of – what can they remember from KS1. Watch the video clip (stop at 2 mins 15 secs) https://www.youtube.com/watch?v=YuO4WB4SwCg you can now add any new ideas to your brainstorm. Show a simple food chain on the board. Using talk partners, children must read and interpret the food chain, feeding back on the following: • How the food chain is constructed • What the arrows represent • What key words we may use to label the different parts Go through these and clarify any misconceptions before starting the children off on the next task. Children to research which animals live in a certain habitat (e.g. jungle or woodland), then asked to create a food chain based on their research.

Y4 States of matter

National Curriculum objectives:

1. compare and group materials together, according to whether they are solids, liquids or gases
2. observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C)
3. identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature

	Assessment guidance	Key learning	Possible Evidence
SECURE	Shows understanding of a concept using scientific vocabulary correctly	A solid keeps its shape and has a fixed volume. A liquid has a fixed volume but changes in shape to fit the container. A liquid can be poured and keeps a level, horizontal surface. A gas fills all available space; it has no fixed shape or volume. Granular and powdery solids like sand can be confused with liquids because they can be poured, but when poured they form a heap and they do not keep a level surface when tipped. Each individual grain demonstrates the properties of a solid. Melting is a state change from solid to liquid. Freezing is a state change from liquid to solid. The freezing point of water is 0°C. Boiling is a change of state from liquid to gas that happens when a liquid is heated to a specific temperature and bubbles of the gas can be seen in the liquid. Water boils when it is heated to 100°C. Evaporation is the same state change as boiling (liquid to gas) but it happens slowly at lower temperatures and only at the surface of the liquid. Evaporation happens more quickly if the temperature is higher, the liquid is spread out or it is windy. Condensation is the change back from a gas to a liquid caused by cooling. Water at the surface of seas, rivers etc. evaporates into water vapour (a gas). This rises, cools and condenses back into a liquid forming clouds. When too much water has condensed the water droplets in the cloud get too heavy and fall back down as rain, snow, sleet etc. and drain back into rivers etc. This is known as precipitation. This is the water cycle. **Key vocabulary** Solid, liquid, gas, state change, melting, freezing, melting point, boiling point, evaporation,	Can create a concept map, including arrows linking the key vocabulary Can name properties of solids, liquids and gases Can give everyday examples of melting and freezing Can give everyday examples of evaporation and condensation Can describe the water cycle

		temperature, water cycle	
	Applying knowledge in familiar related contexts, including a range of enquiries	Observe closely and classify a range of solids Observe closely and classify a range of liquids Explore making gases visible e.g. squeezing sponges under water to see bubbles, and showing their effect e.g. using straws to blow objects, trees moving in the wind Classify materials according to whether they are solids, liquids and gases Observe a range of materials melting e.g. ice, chocolate, butter Investigate how to melt ice more quickly Observe the changes when making rocky road cakes or ice-cream Investigating melting point of different materials e.g. ice, margarine, butter and chocolate Explore freezing different liquids e.g. tomato ketchup, oil, shampoo Use a thermometer to measure temperatures e.g. icy water (melting), tap water, hot water, boiling water (demonstration) Observe water evaporating and condensing e.g. on cups of icy water and hot water Set up investigations to explore changing the rate of evaporation e.g. washing, puddles, handprints on paper towels, liquids in containers Use secondary sources to find out about the water cycle	Can give reasons to justify why something is a solid liquid or gas Can give examples of things that melt/freeze and how their melting points vary From their observations, can give the melting points of some materials Using their data, can explain what affects how quickly a solid melts Can measure temperatures using a thermometer Can explain why there is condensation on the inside the hot water cup but on the outside of the icy water cup From their data, can explain how to speed up or slow down evaporation Can present their learning about the water cycle in a range of ways e.g. diagrams, explanation text, story of a water droplet

	LOs	Activities
Planning	Lesson 1: To compare and group materials together according to whether they are solids or liquids. Identifying, classifying, and grouping	End of unit sticky knowledge quiz (Animals inc humans) to be completed – check retention of previous learning. Introduce the topic and the key vocabulary to the children (do not give them the definitions/examples). Ask the children to complete a concept map, this can be used for initial assessment. Watch this short clip which introduces the three states of matter. Children can then come up to the board and complete the interactive game which is below the clip https://www.bbc.co.uk/bitesize/topics/zkgg87h/articles/zsqwwxs . Provide the children with a set of images of different materials which they will now group identify and group according to its state of matter (where possible, try to bring in some examples for the children to physically explore). Try to include some tricky ones such as an air freshener or sand etc. Children should be encouraged to try and justify and explain their ideas. Quick fire round – go round the class and ask children from each table to give an example of a solid/liquid/gas
	Lesson 2: To identify and explore the properties of solids, liquids and gasses.	Recap previous learning – quick fire quiz – what are the three states of matter we have learnt and can you give an example of them. Using talk partners – ask the children what they already know about solids, liquids and gases. If the children are struggling, give them some pointers such as – what are they like to touch, can we see them, do they move etc. Make a table and list the children's ideas, correcting any misconceptions as and when they are identified. Show the clip https://www.bbc.co.uk/bitesize/clips/zpbvr82 and discuss how the particles are different in the three states. Ask the children to come up in small groups and act out how the particles would behave in a solid, liquid and gas. Children to name a material and the children then need to act out how the particles would behave in that material. Children to record in their books how the particles in each of the states behave and to draw a picture to represent them – this could be modelled on the board first. Information taken from the task earlier can also be used. You may want to

		do this activity as a 'fill in the gaps' exercise which can then be differentiated accordingly. Check for any common misconceptions – you pour a bowl of cereal, although cereal itself Is not a liquid. Ask the children if it is possible to see a solid, liquid and gas together and what would happen? Demonstrate the dancing raisins experiment and then let the children have a go themselves in small groups. Follow the instructions at https://www.sublimescience.com/free-science-experiments/dancing-raisins/ . Children to then record their results in their books, using the scientific vocabulary.
	Lesson 3: To observe that materials change state when they are heated or cooled. Research Pattern seeking	Discuss the terms melting and freezing – which links to heating something up/cooling something down? Discuss what a melting/freezing point is. As a class run the 'What's going on?' activity on explorify https://explorify.wellcome.ac.uk/en/activities/whats-going-on/melting-ice-cubes Children to research the melting/freezing points of certain materials (including water) and record this in their books, along with what happens in the process of a solid becoming a liquid and a liquid becoming a gas (using the correct scientific vocabulary). Have a bowl of ice cubes and ask the children to check the temperature these. Explain that you are going to put the ice into a pan and heat them up – children to record in their books what they predict will happen (using scientific vocabulary). As the heat is applied the children should be able to quickly identify that the ice is beginning to melt from a solid to a liquid. Ask the children to now predict what will happen if you continued to heat the water. The children should then be able to identify the bubbles forming as the water boils and the water vapour (steam) comes off, they should then be able to associate this with the change of state from a liquid to a gas. *You may also want to then put chocolate in the bowl and see how that melts above the boiling water, making a tasty treat to go over a piece of fruit!*

	Lesson 4: To plan and set up a fair test - investigating ice cubes. Comparative and fair testing	Use talking partners to explore the question – What if water couldn't freeze? Try to get the children to think of the positives and negatives of this and remind them that there are no right or wrong answers. *You may want to provide SEN/LA children with some thought provoking questions yourself, such as: what would happen to the sea levels? How would it affect wildlife? How would you keep your drink cold in summer etc?* Download the TAPS assessment for Ice cubes and follow the guidance. https://pstt.org.uk/resources/curriculum-materials/assessment Children should have answered the key questions in their exercise books. TAPS sheet will need to be printed and stapled in over the top of the children's work.
	Lesson 5: To understand the water cycle. Pattern seeking	Talk partners discussion – where does water come from and how is it formed? Show the children the clip of the water cycle song – pausing to explain each section/answer any questions. https://www.youtube.com/watch?time_continue=142&v=Og8iCsV4woE&feature=emb_title Have print outs of each stage of the water cycle, asking children to come up and perform an action to show what happens at each stage. Children to write about the journey of Danny the rain droplet – starting with his life as a tiny water droplet in the lake/river/sea and how he finds his way back to the start of the cycle again. Children to then stick in a diagram of the water cycle and label the key stages. *SEN/LA children can be provided with the key words and need to then just place in the correct place.* Quick fire quiz – true or false questions on the water cycle

	Lesson 6: To identify how evaporation and condensation is part of the water cycle. Observation over time	Before going out for lunch/break ask the children to put a handprint on a paper towel using water – they will start to see the print changing straight away. By the time the children get back in, the print should have disappeared. On post it notes - question the children as to why they think this is, what has happened? What other things have a similar effect? Watch the clip and discuss https://www.bbc.co.uk/bitesize/topics/zkgg87h/articles/zydxmnb . Ask the children to write a sentence which explains what evaporation/condensation is and how it is affected. You may want to put up some key words on the board which must be included. Put the children into groups and give each group a plastic cup, some cling film and an ice cube. The children place hot water in a cup, cover it with cling film and place an ice cube on top. They can now observe what happens and record their findings (using relevant scientific vocabulary) in their books. Put onto the board the concept cartoon from the ASE exemplification document and as a class discuss.

Y4 Electricity

National Curriculum objectives:

1. identify common appliances that run on electricity
2. construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers
3. 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
4. recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit
5. recognise some common conductors and insulators, and associate metals with being good conductors

	Assessment guidance	Key learning	Possible Evidence
SECURE	Shows understanding of a concept using scientific vocabulary correctly	Many household devices and appliances run on electricity. Some plug in to the mains and others run on batteries. An electrical circuit consists of a cell or battery connected to a component using wires. If there is a break in the circuit, a loose connection or a short circuit the component will not work. A switch can be added to the circuit to turn the component on and off. Metals are good conductors so they can be used as wires in a circuit. Non-metallic solids are insulators except for graphite (pencil lead). Water, if not completely pure, also conducts electricity **Key Vocabulary** Electricity, electrical appliance/device, mains, plug, electrical circuit, complete circuit, component, cell, battery, positive, negative, connect/connections, loose connection, short circuit, crocodile clip, bulb, switch, buzzer, motor, conductor, insulator, metal, non-metal, symbol N.B. Children in year 4 do not ned to use standard symbols as this is taught in year 6	Can name the components in a circuit Can make electric circuits Can control a circuit using a switch Can name some metals that are conductors Can name materials that are insulators

	Applying knowledge in familiar related contexts, including a range of enquiries	Construct a range of circuits Explore which materials can be used instead of wires to make a circuit Classify the materials that were suitable/not suitable for wires Explore how to connect a range of different switches and investigate how they function in different ways Choose switches to add to circuits to solve particular problems such as a pressure switch for a burglar alarm Apply their knowledge of conductors and insulators to design and make different types of switch Make circuits that can be controlled as part of a D&T project N.B. Children should be given one component at a time to add to circuits.	Can communicate structures of circuits using drawings which show how the components are connected Use classification evidence to identify that metals are good conductors and non-metals are insulators Can incorporate a switch into a circuit to turn it on and off Can connect a range of different switches identifying the parts that are insulators and conductors Can add a circuit with a switch to a DT project and can demonstrate how it works Can give reasons for choice of materials for making different parts of a switch Can describe how their switch works

	LOs	Activities
Planning	Lesson 1: To identify and group a range of electrical appliances Identifying, classifying, and grouping	End of unit sticky knowledge quiz (States of Matter) to be completed – check retention of previous learning. Introduce the topic and the key vocabulary to the children (do not give them the definitions/examples). Ask the children to complete a concept map, this can be used for initial assessment. Ask the class to come up with some appliances they may find at home which use electricity and make a note of them on the board. Explain to the class what mains powered electricity and battery powered are and the differences between them. Working in pairs, give the children a set of images of household items and ask them to group them in a variety of different ways. Go round each group and ask them to explain their reasons for the grouping they chose. Now ask the children to independently draw out a Venn diagram in their books – two large circles which overlap in the middle (you may need to model this for them). Their task is to now label the diagram with mains powered, battery powered and both. Now group each of the items from the images into the correct zone in the Venn diagram (pictures can then be drawn next to each appliance). *SEN/LA children may need addition support and benefit from gluing in the images. They may also need further explanation as to how an appliance can be both mains and battery powered*.

	Lesson 2: To investigate simple circuits and their different components.	Run the 'Odd one out' activity from explorify https://explorify.wellcome.ac.uk/en/activities/odd-one-out/battery-bonanza Check previous knowledge (If any) of circuits, can the children name any components needed for a simple circuit? Do they know how they are powered? Show the BBC clip https://www.bbc.co.uk/bitesize/topics/zq99q6f/articles/zt8vg82 and discuss. Now the children have seen how a circuit works, put them into groups and give them the equipment needed to make a simple circuit – wires, battery, bulb, bulb holder and battery holder. Ask them to experiment with the equipment and try to make the light bulb come on *(Please ensure you have checked all the equipment is working before the lesson, just in case)*. Once the children have successfully lit up the bulb, ask them to draw the circuit into their books and label the key components. Remind the children of how the circuit looked on the video and that it was more a diagram than a picture. Y*ou may want to model this for the SEN/LA group.* Draw two examples on the board - one well-constructed diagram using a ruler and one which is quite hard to read/understand. Ask the children which one is best and why.

	Lesson 3: To recognise that a switch opens and closes a circuit	Recap of previous learning – ask the children to draw and label a simple circuit on whiteboards. Using talk partners discuss – how can we stop the electricity from continuously flowing? Why is important to be able to stop and start the electricity rather than have it running all the time? What types of switch do we know about already and what are they used for? Ask the children to now make a simple circuit, using the same equipment as yesterday. Show the children how to make a simple switch by using a paperclip and ask them to make their own switches using a paper clip and add it into their circuit to see if they can now turn the light bulb on and off. Children could also add in another component, such as a buzzer, into the circuit. Children to record in their books their thoughts on what the purpose of having a switch in the circuit is, what it does and how you work it. *Take pictures so these can be stuck into books as evidence*.
	Lesson 4: To investigate working and broken circuits and how to fix them. Pattern seeking	Recap previous learning – Quiz about switches available at https://www.andythelwell.com/blobz/guide.html (section 3). Hand out sheets which have diagrams of a range of working and broken circuits on them. Explain that today the children will be working in partners as circuit testers. Their job is to identify, by looking at diagrams, whether certain circuits are complete or not. Any circuits on their sheet which they predict are broken, and the bulb will not light, they need to explain what must be done to complete it and make the bulb light up. Children can then set up the circuits themselves by looking at the diagrams and test whether their original predictions were correct or not. Predictions and results can be recorded in a table inside their exercise books. Show the children how simple circuits can be used in toys and games – watch the clip at https://www.bbc.co.uk/bitesize/clips/zxrb4wx

	Lesson 5: To recognise and explore some common conductors and insulators. Identifying, classifying, and grouping	Recap on previous learning and show the children how simple circuits can be used in toys and games – watch the clip at https://www.bbc.co.uk/bitesize/clips/zxrb4wx Talk partners – Could we still make a closed circuit without having any electrical wires? What are the wires made of? What do the words conductor and insulator mean? What affect might that have on a circuit? Show the clip and then discuss as a class the terms conductor and insulator. https://www.bbc.co.uk/bitesize/topics/z2882hv/articles/zxv482p . Children to record in their books explanations of what a conductor/insulator is using scientific vocabulary. Place pictures of some objects up onto the board – metal spoon, rubber band, pencil, a key, wooden spoon, plastic toothbrush etc. Ask the children to group these independently into conductors and insulators. The pencil can be used as both an insulator and a conductor – how? Challenge – Can you think of any other objects which may be used as both an insulator and a conductor?
	Lesson 6: To construct and test circuits using different materials.	Recap previous learning – in teams of 3 or 4, complete the quiz on conductors and insulators at https://www.educationquizzes.com/ks2/science/electrical-conductors-and-insulators/ Download the TAPS assessment for conductors and insulators and follow the guidance. https://pstt.org.uk/resources/curriculum-materials/assessment Children should have drawn their own table and answered the key questions in their exercise books. TAPS sheet will need to be printed and stapled in over the top of the children's work.

Y4 Sound

National Curriculum objectives:

1. identify how sounds are made, associating some of them with something vibrating
2. recognise that vibrations from sounds travel through a medium to the ear
3. find patterns between the pitch of a sound and features of the object that produced it
4. 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

	Assessment guidance	Key learning	Possible evidence
SECURE	Shows understanding of a concept using scientific vocabulary correctly	A sound source produces vibrations which travel through a medium from the source to our ears. Different mediums such as solids, liquids and gases can carry sound but sound cannot travel through a vacuum (an area empty of matter). The vibrations cause parts of our body inside our ears to vibrate, allowing us to hear (sense) the sound. The loudness (volume) of the sound depends on the strength (size) of vibrations which decreases as they travel through the medium. Therefore, sounds decrease in volume as you move away from the source. A sound insulator is a material which blocks sound effectively. Pitch is the highness or lowness of a sound and is affected by features of objects producing the sounds. For example, smaller objects usually produce higher pitched sounds. **Key Vocabulary** Sound, source, vibrate, vibration, travel, pitch (high, low), volume, faint, loud, insulation	Can name sound sources and state that sounds are produced by the vibration of the object. Can state that sounds travel through different mediums such as air, water, metal Can give examples to demonstrate how the pitch of a sound are linked to the features of the object that produced it Can give examples of how to change the volume of a sound e.g. increase the size of vibrations by hitting or blowing harder Can give examples to demonstrate that sounds get fainter as the distance from the sound source increases

	Applying knowledge in familiar related contexts, including a range of enquiries	Classify sound sources Explore making sounds with a range of objects such as musical instruments and other household objects Explore how string telephones or ear gongs work Explore using objects that change in feature to change pitch and volume such as length of guitar string, bottles of water or tuning forks Measure sounds over different distances Measure sounds through different insulation materials	Can explain what happens when you strike a drum or pluck a string and use a diagram to show how sounds travel from an object to the ear Can demonstrate how to increase or decrease pitch and volume using musical instruments or other objects Can use data to identify patterns in pitch and volume Can explain how loudness can be reduced by moving further from the sound source or by using a sound insulating medium

	LOs	Activities
Planning	Lesson 1: To identify how sounds are made Pattern seeking	End of unit sticky knowledge quiz (Electricity) to be completed – check retention of previous learning. Introduce the topic and the key vocabulary to the children (do not give them the definitions/examples). Ask the children to complete a concept map, this can be used for initial assessment. Ask the children to hum a song and place their fingers on their throats – what can they feel? What happens when they hum louder/softer? What is causing this? Play the clip and discuss. Keep pausing to answer any questions and clarify any identified misconceptions the children may have. https://www.bbc.co.uk/teach/class-clips-video/music--science-ks2-what-is-sound/zbnmhbk Set up a carousel of 3/4 activities for the children to make observations of different sounds. 1. Tap a drum with some rice grains on top of the skin – do this using varying amounts of force. 2. Place a ruler on the edge of the table and flick one end of it. Move the ruler further off the edge of the table and try again. 3. Tie a piece of string to the corners of a wire coat hanger and wrap your index fingers. Let the hanger hang between your hands and tap gently on a hard surface. Now put your index fingers in your ears and repeat. 4. Tap a tuning fork against a hard surface and quickly place in a container with water. Create a results table for the children to complete – noting what they could see, hear and feel during each activity. Encourage the children to use some of the scientific vocabulary covered earlier in the lesson – you may already have some of the key words up on the board to refer to. As a class, start to discuss and compare the results.

	Lesson 2: To understand how sound travels and is heard	Recap previous learning – what patterns did the children find when doing last lessons experiment? Run the problem solver task 'What's that sound' from explorify https://explorify.wellcome.ac.uk/en/activities/problem-solvers/what-s-that-sound Watch the clip on how sound travels and discuss https://www.youtube.com/watch?v=3-xKZKxXuu0 . Download and print the 'How we hear things' activity at https://www.outstandingscience.co.uk/index.php?action=view_page&page=view_unit&unit=4d. Children to use the information from the sheet to order and explain the journey of sound using scientific vocabulary. *SEN/LA group may benefit from cutting out and matching up the pictures to the statements and then gluing these into the correct order.*
	Lesson 3: To find patterns between the pitch of a sound and features of the object that produced it Pattern seeking	Recap previous learning – Ask children to come up one at a time and explain each section of the journey sound makes from vibrations leaving the sound source, through to being processed in the brain. Follow the 'What's going on' activity from explorify - https://explorify.wellcome.ac.uk/en/activities/whats-going-on/bottle-orchestra This can be done practically in class – just need 4 or 5 empty glass bottles. Show the children on the board the difference between the soundwaves in a low pitch sound and a high pitch sound. Ask the children to draw and label these in their books. Set up a carousel of 3 or 4 musical instruments – 1 on each table. Children are going to look for any patterns between the pitch of the sound and the instruments features. As the children go round exploring each instrument, they will record their observations in their books. You may want to look at the first one (guitar) together as a class – then model a WAGOLL answer on the board. 1. Guitar – look at the difference in pitch between the different strings. 2. Glass bottles with different amounts of liquids in (from earlier)

		3. Xylophone – look at the difference in pitch between the different blocks 4. Recorder (or other woodwind instrument) – look at the difference in pitch when more/less holes are covered As a class – share some of your findings together.
	Lesson 4 To investigate how you can increase the level of sound. Research	Recap on previous learning – ask children to draw on whiteboards what a low/high pitched soundwave would look like and explain. Today the children will be investigating how to increase the volume of sound by designing and creating their own speakers. See and follow the Science Museum's 'Tune Booster' resource at https://learning.sciencemuseumgroup.org.uk/resources/tune-booster/. Children can use their books to draw out a results table and use data loggers to complete their results. *Pictures can also be used to provide evidence of the work completed.* Once completed – Inform the children that sounds travel much quicker through water than air – therefore creating much more noise. Ask the children to research this using iPad and make a note in their books of any key facts/information they find.

	Lesson 5: To investigate how to muffle sound. Comparative and fair testing	Recap previous learning – How do speakers help increase the level of sound? Using talk partners discuss – what happens to sound the further away it gets? Show the clip and discuss https://www.youtube.com/watch?v=NN3x6Fycv98 For this lesson you will need some materials to be used as sound blockers e.g. tin foil, bubble wrap, felt, cotton wool, paper etc. As a class, work through the interactive slides at: http://resources.hwb.wales.gov.uk/VTC/16022007/sound_travels/lesson.html Discuss as a class how we could set up an investigation to find the best material for our ear protectors – make a note of ideas on the board. Children to record in their books what the investigation is and how they will keep it a fair test *(you my want to share a template with the children or a WAGOLL example of how to set this out).* Children can then create a table of results once they have tested the materials and used data loggers to record their results.
	Lesson 6: To investigate how string telephones work	Download the TAPS assessment for string telephone and follow the guidance. https://pstt.org.uk/resources/curriculum-materials/assessment Children should have drawn their own diagram and answered the key questions in their exercise books. TAPS sheet will need to be printed and stapled in over the top of the children's work. Children to complete the end of unit sticky knowledge quiz.

Types of enquiry checklist					
	Observation over time	**Pattern seeking**	**Identifying, classifying and grouping**	**Comparative and fair testing**	**Research**
Animals inc. Humans					
Living Things and their Habitats					
Electricity					
Sound					
States of Matter					