Electricity		
KS 1	Lower KS2	Upper KS2
Identify common appliances that run on electricity. **Electricity can be dangerous.** <u>Health and safety message</u> Discuss with the children this question “What do you have at home that uses electricity?” Discuss from this experience the elements of danger when using electricity. Be aware that mains electricity is very dangerous and should be adult guided. Teacher to reassure that electricity used in school science is much less powerful than mains, but still need a lot of care. So children must follow adult instructions. **Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers.** <u>Exploring electricity</u> Children to have a single bulb and magnifier to observe carefully and record a detailed drawing of what they see, noting down their ideas about what each bit does in the bulb. Ask the children what do you think you need to make the bulb light? Why? Let the children explore their ideas and see if they can make it work. Using only a large spring battery and a bulb, children in pairs, see if they can light the bulb. Once they have found out how to do this they need to discuss the important contact points. Make a large display model of the bulb and annotate these contact points, keep this on your science learning wall. Now try lighting a bulb with the spring battery and 1 wire. Then using 2 wires. Discuss with the children their ideas about electricity and use this discussion to establish that when electricity moves around a pathway from one end of the battery to the other this is called a **<u>circuit.</u>** **Batteries ‘push’ electricity round a circuit and can make bulbs, buzzers and motors work.** **Drawings, photographs and diagrams can be used to**	**Electricity can be dangerous.** **Electricity sources can be mains or battery.** <u>Health and safety</u> Be aware that mains electricity is very dangerous and should be adult guided. Teacher to reassure that electricity used in school science is much less powerful than mains, but still need a lot of care. So children must follow adult instructions. <u>Exploring electricity</u> Children to explore the ideas of a short circuit. Teacher to demonstrate the wire and a battery and explain the electricity being used and heat being created and that the battery runs down very quickly so we must not create a short circuit. Use this to instruct the children that they must also disconnect their circuits during class discussion and recordings. Introduce a spring battery, bulb and plain wires. Can you make a circuit? Introduce some components, croc clips, bulb holder and now can they remake the circuit? Elicit the children’s ideas about circuits, focus on what they think about the power source and electricity flow. Discuss the ideas of what the children think they know **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.**	**Electricity can be dangerous.** <u>Health and safety</u> Be aware that mains electricity is very dangerous and should be adult guided. Teacher to reassure that electricity used in school science is much less powerful than mains, but still need a lot of care. So children must follow adult instructions. Teacher to demonstrate the wire and a battery and explain the electricity being used and heat being created and that the battery runs down very quickly so we must not create a short circuit. Use this to instruct the children that they must also disconnect their circuits during class discussion and recordings. **Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers.** <u>Exploring electricity</u> Children given circuit piece to construct simple circuits, bulb, switch, wires, buzzers, battery. Encourage the children to make a variety of circuits. Use this to revisit ideas about electricity flow and power source. Ask which circuit works? Why? What happens when more than one component is included? Does this experience change what they think about the power source and electricity flow? **Faults in circuits can be found by methodically testing connections.** **Drawings, photographs and diagrams can be used to represent circuits (although standard symbols need not be introduced until UKS2).** **Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit.**

represent circuits (although standard symbols need not be introduced until UKS2). <u>Representation of the movement of electricity.</u> Using the circuit with 2 wires ask the children to trace with their fingers the path that the electricity moves through the circuit. Repeat this discussion with a friend, so that the children are secure with the pathway the electricity takes. Then ask the children to create a free hand drawing to show the connections in the circuit. Repeat this with the 2 circuits from above. Ask the children how can we stop the circuit? (turn off the light?) Children are to explore their ideas for this and use this to establish that a gap in the circuit breaks the flow of electricity. Explore the children's ideas of what Electricity is like and what concepts do they have about electricity now. Children need to draw a representation of a circuit that doesn't work, tracing first as above. Introduce circuit pieces as a way of keeping the circuits still and they don't have to be held in place. E.g. croc clips, bulb holder. Ask the children to put these components together using the new pieces. Introduce a toggle switch (following on from the gap idea). Look at the switch, identify how it makes a gap in the circuit. Try the switch at different points in the simple circuit, does it make a difference? Explore the children's ideas of what Electricity is like and what concepts do they have about electricity now. Draw this new circuit reinforcing accuracy of the points in the circuits. Introduce 2 bulbs and holders and 2 more croc clips. How can you light both bulbs in a circuit? Let the children explore their ideas and share ideas afterwards. Which worked? Which ideas didn't? and why do they think this happened? Explore the children's ideas of what Electricity is like and what concepts do they have about electricity now.	**Drawings, photographs and diagrams can be used to represent circuits (although standard symbols need not be introduced until UKS2).** <u>Representation of the movement of electricity.</u> Children to represent their ideas about the circuits they have made in a drawing being precise about where connections are shown (repeat tracing activity KS1 if needed) Ask children to add bulbs into a circuit 1 by 1 and discuss their ideas of what they notice happening. Does this experience change what they think about the power source and electricity flow? Children are to represent the circuits in drawings and try to explain what they notice happening in annotations on their drawings. Children need to go back to a simple circuit with 1 bulb and add a buzzer. The children need to look at the affect this has on the bulb. Children need to try the buzzers in different places (allow them to find out the buzzer is directional) Does this experience change what they think about the power source and electricity flow? Introduce a switch as a way of turning a circuit on and off (controlling the flow of electricity). Can the children explain what is happening? And why? Children are to explore putting a switch into a bulb and buzzer circuit. What do they notice? What can the children explain? Children to draw representations of the circuits they make. Teacher to introduce a range of switches and explore what happens in a simple circuit when they added. Let the children explore how each switch works to stop the electricity flow. Reed switch and magnets, push switch, 3 way switch, toggle switch. Does this experience change what they think about the power source and electricity flow?	**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.** **Circuit diagrams can be used to construct a variety of more complex circuits predicting whether they will 'work'.** <u>Representation of the movement of electricity.</u> Use the circuits previously made to create circuit diagrams to represent the electricity flow in the circuits. Children need to explore the effect of different arrangements of circuits on the flow of electricity. Children to focus on circuits with just a bulb, is there other ways of arranging a circuit with 2 bulbs? The discussion should centre around how many different circuits can we make? (series or parallel but do not introduce this concept yet) Draw the circuit diagrams for the different arrangements, explaining which worked and which didn't. and how this affected the brightness of the bulb. Does this experience change what they think about the power source and electricity flow? Children need to explore 3 bulbs in a circuit then 4, drawing circuit diagrams each time. Does this experience change what they think about the power source and electricity flow? Possibly introduce the terms series and parallel but not any earlier than this. Children need to explore the affects of adding other components e.g. buzzer (remember directional) or motor into a series circuit with 2 bulbs and look at the effect on flow of electricity (brightness of bulb). Children can then draw circuit diagrams. Does this experience change what they think about the power source and electricity flow?

Children to have a go at the circuits that work and don't work. Give the children a battery, buzzer and wires can you make this buzz? Allow the children to find out for them selves that the buzzer is directional and only works 1 way. Give the children a switch with a buzzer, battery and wires. Can they change the position of the buzzer? Does the circuit still work? Explore the children's ideas of what Electricity is like and what concepts do they have about electricity now. Children to draw the circuits, with buzzer both the working and none working circuits. **Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers.** <u>Application task</u> Using the components you have used can you make a light switch on in a dolls house? A door bell ring? Use this to establish that in a circuit, Electricity can be changed (converted) into light in a bulb or sound in a buzzer.	Can they represent their circuits in drawings? Children to use a simple circuit, battery, wires and a bulb. They are to use a wide range of materials. Children to find out which materials conduct electricity? Teacher to include a range of metallic and non metallic for the children to try. Discuss the outcomes and establish that electrical conductors are generally metallic and that non metallic are electric insulators. Children are to use their learning to construct their own 'switches' to create circuits with. Use cork tiles for the children to pin their switch choices to. Children to try them in simple circuits and then draw representations of their circuits showing the connections. Does this experience change what they think about the power source and electricity flow? **Recognise some common conductors and insulators, and associate metals with being good conductors.** <u>Application Challenge</u> Use the game operation as an inspiration for their own board game. Quick focus discussion on electricity makes other devices work and electricity is changed into other energy forms such as light, heat, movement etc.	Look at the different arrangements for circuits with 2 bulbs and try inserting 1 switch at different points in the different arrangements, drawing circuit diagrams for each. Does this experience change what they think about the power source and electricity flow? <u>Application challenge</u> Can they create a working model of a traffic crossing? LA to work on series circuit to run the pedestrian display MA to work on the green to red then red to green sequence. HA to work as advisors for the groups then they are in charge of putting the two circuits together. Dicuss how energy is transferred into other forms of energy. E.g. light, sound, movement children can try fixing a propeller or pulley to a motor