

Short Term Planning

Science Year 4 Term 1

Topic 4F Circuits & Conductors Session 1

<p>Main focus and Objectives</p>	<p>Children should be able to explain what is meant by an electrical circuit. They should be familiar with the vocabulary associated with circuits and be able to describe an electrical insulator and an electrical conductor. Children should appreciate that if a device is to operate : 1. A power source is needed, 2. The circuit must be complete. 3. All components in the circuit must be electrical conductors.</p>
<p>Procedure and teaching points</p>	<p>Begin by reminding children about the electrical circuit. Use a drawing of a simple circuit to explain the concept of a circuit. Explain that three conditions have to be met for electricity to flow around a circuit. Introduce the expression current (<i>analogy water. Need a pump to move water in a tank</i>)</p> <p>For a current to flow: Need something to provide the power.</p> <p style="padding-left: 40px;">Need complete (unbroken) circuit.</p> <p style="padding-left: 40px;">Need all components to be conductors.</p> <p>Demonstrate a simple circuit using a cell, some crocodile leads and a bulb. Explain what each component does and how all conditions are met.</p> <p><u>Activity</u></p> <p>Show children a range of drawings of connections which will or will not work. Ask the children to explain why or why not. Explain why circuit might not work even when all appears to be OK.(faulty leads, bulbs or cells)</p>
<p>Resources</p>	<p>An OHP acetate with a series of connected "circuits". Cells, lamp , lampholder, crocodile leads.</p>
<p>Vocabulary</p>	<p>Circuit, complete circuit, cell, battery, break, bulb, lamp, leads, conductors, insulators.</p>

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Science Year 4 Term 1

Topic 4F Circuits & Conductors Session 2

Main focus and Objectives	<p>Children should understand and be able to describe the difference between an electrical insulator and an electrical conductor. They will be able to describe and investigate practically how to find out which materials are conductors and which are not. They will be able to make a generalisation about conductors, i.e. that all conductors are metals. (Exception : pencil lead, which is a form of carbon)</p>
Procedure and teaching points	<p>Remind children of the conditions for a circuit to work. Explain that they are going to practice connecting some circuits.</p> <p>They should practice connecting circuits using bulbs and motors. (buzzers can cause severe irritation) Ensure all children are able to connect a simple circuit.</p> <p>Provide children with a variety of materials which they can insert into a "test part " of the circuit. (see diagram) They take each test material (and any others they may wish to try) and make a prediction prior to connecting it in the circuit to see if it is a conductor or not. Children draw a results table to record their observations. They should be able to make a generalisation about their results.</p> <p>Ask the Children to write a brief note under the heading "Conductors and Insulators" describing what they did and what conclusions they were able to draw.</p> <p>The circuit diagram is important and should also be included in the books.</p>
Resources	<p>Various test materials(comb, pencil, ruler assortment of metals) Cells, lamp , motor, lampholder, crocodile leads.</p>
Vocabulary	<p>Circuit, complete circuit, cell, battery, break, bulb, lamp, leads, motor circuit diagram, conductors, insulators.</p>

Short Term Planning

Science/DT Year 4 Term 1

Topic 4F Circuits & Conductors Session 3

Topic 4E Lighting it up

<p>Main focus and Objectives</p>	<p>Children should understand that a switch in a circuit gives us a degree of control, by enabling us to turn things on or off. They will appreciate that a switch can exist in a number of forms and that they can be made in different ways to suit different applications.</p>
<p>Procedure and teaching points</p>	<p>Explain to children that a circuit consisting of a battery (cell) and a lamp is not very satisfactory because in order to turn the lamp on and off it is necessary to detach one of the leads. Demonstrate a circuit which incorporates a switch. (different types if possible, push switches, slide switches, throw switches etc.) Explain that this is the case in most circuits because it is more convenient.</p> <p>Ask the children to give examples of switches in everyday use:-</p> <p><i>Torch switch, switch on kettles, hairdryers, lights in the house, on the computer, printer, radio.</i></p> <p>Demonstrate the "home made switch". Describe the steps in making the switch, the function of each part and explain how it works. Allow children to make a switch to control a motor or lamp.</p>
<p>Resources</p>	<p>Foam wrap, stiff card, silver foil, paper fasteners, lolly sticks Cells, lamp , motor, lampholder, crocodile leads.</p>
<p>IT</p>	<p>Children use CD ROM such as "The Way things work" or "Encarta" to research the electric switch.</p>
<p>Vocabulary</p>	<p>Switch, push switch, throw switch, insulator, conductor</p>

Short Term Planning

Science Year 4 Term 1

Topic 4F Circuits & Conductors Session 4

Main focus and Objectives	<p>Children should understand the purpose of a cell in a circuit and the effect of adding an additional cell. They should also understand that lamps, motors and buzzers etc. have certain optimum operating voltages and that exceeding this limit can be dangerous and may damage the device.</p> <p>The children will understand the effect of adding additional load to a circuit. They should be able to predict what will happen if extra bulbs or motors are added.</p>
Procedure and teaching points	<p>Begin by explaining the rating of a bulb or other electrical appliance. (Most devices have a plate or are embossed with the ideal operating voltage) It is important to keep within the recommended voltage range to avoid damaging the device.</p> <p>Ask children if they can predict the effect of adding additional cells to a circuit containing 1. a lamp, 2. a buzzer, 3. A motor.</p> <p>Demonstrate (using 1.5-volt cells if possible) what can happen to a bulb if the limit is exceeded.</p> <p>Ask the children if they can suggest what will happen if additional bulbs are added into a circuit. Children can then investigate how many bulbs they can connect into a circuit before the light is not detectable. Be certain that bulbs are connected in series i.e. in a loop.</p> <p>As an interesting discussion point can compare this series connection with a parallel circuit (demo) and discuss the advantage that the bulbs are brighter and if one bulb fails, the others remain on (disadvantage.....shorter battery life)</p>
Resources	9v cells and Ni-Cad 1.2 V cells, bulbs, motors and leads
Vocabulary	Series, parallel, voltage, brighter, dimmer.

Short Term Planning

Science Year 4 Term 1

Topic 4F Circuits & Conductors Session 5

Main focus and Objectives	<p>Children will understand the difference between series and parallel circuits. They should be able to describe the advantage and disadvantage of connecting bulbs in series.</p> <p>Children will appreciate the difference between battery powered circuits and mains powered circuits and the hazards of mains electricity.</p>
Procedure and teaching points	<p>Demonstrate the difference between a series and a parallel circuit. Use a four bulb circuit and construct both circuits to show the difference in connections. (This will become clear to the more able children on a circuit diagram.)</p> <p>It should be obvious that the lights in the parallel circuit are much brighter than in the series circuit and we can demonstrate that one bulb can be removed without affecting the other bulbs. It may occur to some children however that there is a price to pay for these advantages. The battery will run down faster as it is supplying more current or energy to the circuit.</p> <p>Ask children if they can list a range of devices which work from batteries. Do the same for mains-operated devices. Are there any appliances which can work from both sources? Make a list on the board. Batteries , Mains and Both or get children to produce their own lists in books.</p> <p>Explain why mains electricity can be dangerous, discuss the Dos and don'ts and explain possible electrical hazards.(bare wires, wet hands, covering heaters, overloading outlets, climbing pylons, poking knives, fingers into toasters etc.</p>
Resources	9v cells, bulbs, motors and leads. Pictures of hazardous situations
Vocabulary	Series, parallel, voltage, mains electricity, electrical hazards