3. Switched on: using switches imaginatively

1 hour activity

Responding once again to the problems posed in the letter. The children build a variety of circuit switches and explore ways in which they can be incorporated into sensors.

OBJECTIVES

- Y4: Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit
- Y4: Recognise some common conductors and insulators, and associate metals with being good conductors

RESOURCES

(per group of 4 children, unless otherwise stated)

- A collection of different switch making resources: Paper clips
- Split pins
- Stiff card
- Foil
- Metal discs - coins
- Nails/tacks
- Paper fasteners
- Card
- Paper
- Plastic sheets
- Circuit kit (e.g. at least 3 wires, bulb or buzzer, battery)

INTRODUCING THE ACTIVITY

This is an excellent opportunity to revise the difference between electrical conductors and insulators. Remind the children that a switch creates a break in the circuit and this stops the flow of electricity. Act out the tennis ball analogy first with a child acting as an insulator and then two children acting as a switch. Appendix B.

MAIN ACTIVITY

Children make a circuit to incorporate a switch that they will make by connecting the bulb to the battery with wires, but leave a space.

Children may have already made a basic switch using a paper clip, two paper fasteners and some card. Ask the children to explain this to their group and then the class how the switch works using the vocabulary: circuit, complete, conductor, insulator, break, etc.

Then provide children with a selection of different everyday insulators and conductors (e.g. paper clips, foil, metal discs, nails/tacks, paper fasteners, card, paper, plastic etc.) and ask them to make different types of switch.

Again, ask them to explain how their switch works using the key vocabulary. They could record an annotated drawing of their switch design, listing the materials needed and explain how it works. Children could also draw a circuit diagram showing the complete circuit with the switch in place.

PLENARY

Children share their design ideas. As a class they could evaluate each others switch design looking for imaginative ideas, and effective switches that are easy to use and easy to make.

Discuss switches in other electrical items. Talk about the many electrical or electronic items that use switches; they can be used to switch from one circuit to another. Often, electrical devices use switches to change the operation that is being done.

Explain that sensors use switches to connect/disconnect a circuit for different purposes, e.g. a burglar alarm, thermostat, smoke detector. If it is possible show some examples of sensors/switches working in everyday items like an electric kettle turning off when the water has boiled or a radio alarm coming on. For homework children list different electrical devices that use switches and explain how they use them. They can then think about how different switches are triggered in different sensors, e.g. heat, pressure-pads, etc.

EXTENSION

Children could make a switch that changes from one circuit to another. Make a parallel circuit using one battery, two bulbs, buzzers, etc., or a combination. Then make a break in the circuit at one of the junctions where the two parallel sections meet up, and place a two way switch in the break. To do this, use three paper fasteners, a paper-clip length away from each other on a piece of card.

Ask the children:

What could we do to get both bulbs to light?
Connect both switches at the same time.

How would this type of circuit come in useful?
It could be used in traffic lights, for example.