Senior Level Lesson 3: Electricity – Conductors and Insulators

Curricular Links

SESE › Energy and Forces › Magnetism and Electricity

SESE › Materials › Materials and Change

SPHE › Myself › Safety and Protection

Objectives

1. Understand the concept of electrical conductors and insulators
2. Investigate whether certain materials are electrical conductors or insulators
3. Classify materials as those which conduct electricity and those which do not allow electricity to pass through

Resources

Pens, 'Electrical Conductors and Insulators' online activity sheet available at **www.esbnetworks.ie/education** or copy book, A3/A4 paper for group work.

Investigation equipment: A bulb, battery, 3 wires, a selection of items made from different materials e.g. paper, a plastic spoon, a metal spoon, paper clips, a rubber band, a wooden ruler, a coin, a nail, a pair of glasses, a cloth, a stone.

Introduction

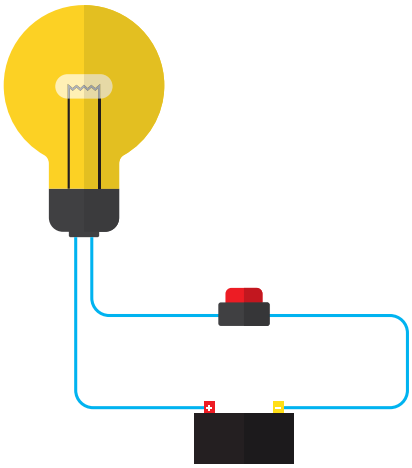
- Ask the pupils to recall from lesson 1 what happens when someone touches an appliance with wet hands (they get an electric shock). Explore this, eliciting that humans can act as electrical conductors, allowing the flow of electric current through their bodies. Explain the term conductor (see definition below).
- Show the pupils a plug. Ask them to think why people don't get an electric shock placing a plug into a mains socket. Elicit that the casing of a plug is made from plastic or rubber, which doesn't allow electricity to pass through. It's an electrical insulator (see definition below).

Electrical conductor – a material which allows electricity to flow through.

Electrical insulator – a material which does not allow electricity to flow through or which slows the flow of electricity.

Development

- Ask the pupils, as a class, to name some materials and list them on the board e.g. metal, wood, plastic, rubber, fabric, paper, glass, stone.
- Divide the class into groups, giving each an A4 page. Ask each group to draw two columns 'Conductors' and 'Insulators'. Ask them to list any items made from these materials which they think will act as an electrical conductor/insulator.
- As a class, or in small groups, set up the following investigation.



***Remember to always Stay Safe, Stay Clear with electricity!**

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Conductors and Insulators Investigation

1. Give each group/pupil a copy of the 'Conductors and Insulators' activity sheet (or ask them to write record the investigation in their copy book). Ask them to predict which materials are conductors/insulators and to record their predictions on their activity sheets.
2. Set up a simple circuit as shown in the diagram above.
3. Test each item as follows. Touch the free end of both wires A and B to the item you are testing. If the bulb lights up, the item is an electrical conductor. If it does not light it is an insulator. The brighter the bulb, the better the item is at conducting.
4. Observe and record results. Compare predictions with the results.
5. Discuss as a class, listing on the board which materials are electrical conductors/insulators. Discuss the importance of materials being conductors/insulators in electrical safety e.g. plastic being used on plug casings, cables.

Conclusion

Divide the class into groups, giving each group A4/A3 paper. Ask them to imagine and design a machine/vehicle which can enable a superhero to move safely through a room full of electricity. Remind pupils to consider the materials they will use to best insulate the superhero.

Extension Activity

- Carry out a similar investigation to the one above, this time investigating which metals are the best conductors of electricity.
- Ask the pupils to carry out an audit of materials used in electrical appliances throughout the classroom/school.

*Remember to check out **www.esbnetworks.ie/education** for lots more resources about electricity.

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