

# Planning & conducting investigations

## Experiment Printout - Electro-magnet

### Teachers Notes

#### Observing and exploring

(ask questions, pose problems, find out what is currently known)

#### Task: Create an electro-magnet.

#### Equipment

- role badges for manager, safety officer and speaker
- each team member's SciTech journal
- 1 x 1.5 volt battery
- copper wire
- nail
- sticky tape
- wire cutters
- paper-clip
- connecting wires

#### Activity steps

- Review previous sessions (open and closed circuits), refer to word wall and KWL chart.
- Have students cover approximately half of the nail with sticky tape.
- Ask students to wind a length of copper wire around the sticky taped section of the nail.
- Space the coiled wire so that the coils are not touching (just separated).
- Test the electro-magnet without the battery connection.
- Connect the ends of the copper wire to a battery to complete the circuit.
- Test the strength of the electro-magnet by picking up various metal objects such as a paper-clip, staples, etc.
- Once the students have constructed their electro-magnets have them independently investigate how they could increase the strength of their electro-magnet.
- Revise the steps involved in the process of investigating scientifically.

An electro-magnet is simply a coil of wire. It is usually wound around an iron core. When connected to a voltage source, the electro-magnet becomes energized, creating a magnet just like a permanent magnet.

#### Sample hypothesis

Increasing the number of coils in the electro-magnet will increase the strength of the electro-magnet.

Increasing the voltage in an electro-magnet will increase the strength of the electro-magnetic (sample procedure not provided).

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### Devising and testing

(describe a procedure for collecting data, identify appropriate equipment to carry out the procedure)

#### Varying the number of coils

- wind a length of copper wire around 3 nails a) 10 times, b )20 times, c) 30 times.
- Space the coiled wire so that the coils are separate.
- Connect a battery to the ends of the copper wire to complete the circuit.
- Test the strength of the electro-magnet by picking up various metal objects such as a paper-clip, staples.
- Students should independently develop a method of measuring and recording their observations regarding the strength of the tested magnet.

#### Analysing and drawing conclusions

- Which electro-magnet was the strongest?
- Was your test fair?
- How could you improve your investigation?
- Why was sticky tape used on the nails?