Science Teaching Alive workshops

Electromagnetic induction and Faraday's laws

Student worksheet

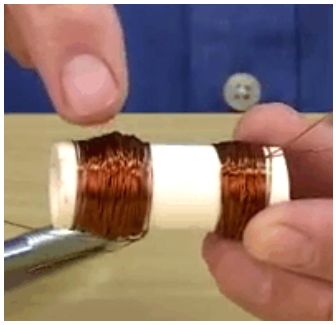
This is not a complete worksheet – it is a suggestion for you as the teacher group to build on. You have probably found other worksheets that they were not right for your classes. Well, now you can change this one until it is right for your classes.

Start to Question 1

Make two coils of copper wire that have 50 turns and 100 turns of wire.

Make a mini-galvanometer from a plotting compass. Show that it indicates a current when you induce a current in the coil.

Figure 1 *Two coils with different numbers of turns, wound on the same former.*



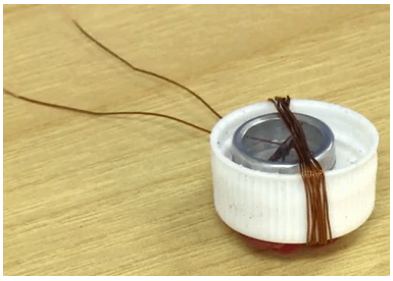
Start to Question 2

Explain how the mini-galvo works. Do a drawing that shows the field that moves the needle. Explain why it needs long wires to keep it far away from the coil and moving magnet.

Start to Question 3

Describe 4 ways to increase the induced voltage in the coil. [**Answers**: *wind on more turns of copper wire, use a stronger magnet, move the magnet faster, put an iron core inside the coil, increase the cross-section area of the coil.*]

Figure 2 *A mini-galvo made from a plotting compass.*



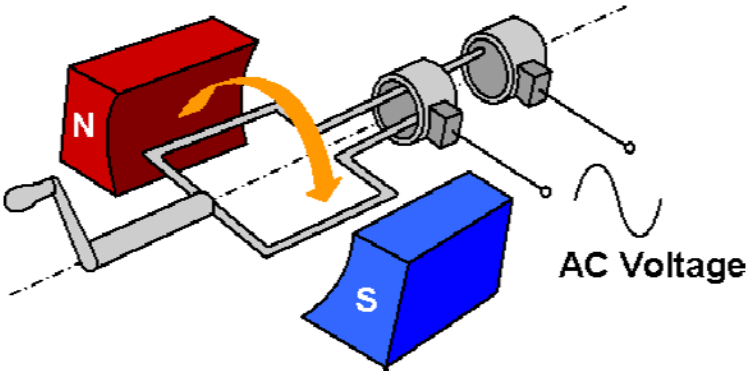
Start to Question 4

Faraday found that he could induce a potential difference in a coil without moving a magnet. How did he do this? Why does it work? **Hint**: Use the concept of changing magnetic flux.

Start to Question 5

Give students photocopies of this diagram or let them trace it into their books. Ask the students to draw in the magnetic field lines, and use a left-hand or right-hand rule to decide which way the current is flowing while the coil turns as shown.

Figure 3 *The curved arrow shows the direction you have to turn the coil to generate the AC voltage.*



Start to Question 6

You can also set a question about transformers, using the fact that the ratio of the turns primary and secondary coils = the ratio of voltages from the primary and secondary coils. (See the BBC website on transformers listed in the Teachers' Notes)

Start to Question 7

Why must the wire that you use for winding coils be insulated?

Why must the wire be made of copper?

Could you use any other metals for wire in motors, generators and transformers? If so, which metals?