

The Electromagnets project allows students to experience the connection between electricity and magnetism. It also provides excellent opportunities for students to pose and answer questions. During the program, students are encouraged to ask questions and conduct experiments. Follow-up materials ask students to formalize their experimentation process and to write about it.

As a follow-up to the Electromagnets program, you might:

- Ask students to report what they noticed and what they are curious about.
- Ask students to design an experiment to answer a scientific question (Student Sheet Investigation 1.)
- Ask students to adapt their electromagnets for a specific purpose. (Student Sheet Investigation 2)
- Ask students to pose and answer their own questions (Student Sheet “My Investigation”).
- Provide students opportunities to learn more about telegraphs, motors, and generators/dynamos, as well as other applications of the connection between electricity and magnetism.

Using the Student Sheet with your students

Investigation 1

This investigation provides students with a focused investigative question that can be answered using their electromagnet. Students can answer the question by comparing the movement of the magnet on the pole when current is run through the coil with the first magnet hanging from it; with current and the first magnet held out of the way; and moving the first magnet when there is no current at all.

- Talk with the students about how to draw diagrams that communicate experimental set-ups (clear line drawings, important parts labeled.)
- Make sure that students understand what a scientific conclusion is: a clear statement of the answer to the experimental question, with an explanation of why if possible.



Investigation 2

This investigation tends to be very engaging for students. It also offers the possibility of multiple correct solutions, with the opportunity to discuss the differences between the solutions.

Some correct solutions include:

- Lining the magnets in each electromagnet up so that when the first person completes their circuit, the magnet hanging from their pole moves the magnet in the second person’s coil, which in turn moves the magnet hanging from the pole, and so on...
- Connecting the magnets in each electromagnet with a string or wire to the next person’s, so that a ‘tug’ is passed down the line.

- Joining the wires in the different electromagnets so that they all are connected in one electric circuit that travels through all the coils. This is the closest representation of some of the early telegraphs. Students who have this idea may not be able to construct a working circuit immediately and may need some support to follow the path of electricity from the battery through the wires and back to the other terminal of the battery.

Investigation 3

Encourage students to choose their own investigable question.

Student questions might include:

- What happens if I use more than one battery?
- How can I change the direction that the magnet swings?
- What happens if I change which wire connects to which battery terminal?
- How far away can I move the magnet on the pole and still have it be affected by the first?
- What happens if I have more or fewer turns in my coil of wire?