KS3 Electricity Lesson 7: Magnets
Teaching Ideas

Learning Objective:	To investigate magnets.
Success Criteria:	• To identify materials that are attracted to magnets. • To construct a compass. • To apply my knowledge of magnets to plot magnetic field lines.
Context:	This is lesson 7 in a series of lessons that covers the topic of KS3 electricity with a focus on magnets. Students are asked to imagine that they are taking part in an around the world sailing competition. Unfortunately, a storm has blown them off course and their boat has crashed into the rocks off the coast of a tiny island in the South Pacific. Students are asked to make a compass using a selection of material they find in a washed-up box. You can teach this lesson as a stand-alone lesson or use it to form the wider unit of work on the introduction of electricity. The choice is yours!

Resources

whiteboards
aluminium can
iron nail
paperclip
tweezers
pencil
tennis ball
screw
magnet
sewing needle
bar magnet
wax paper
scissors
bucket (Petri dish)
water
A3 paper
pen
plotting compass

Starter

True or False

Use this as an opportunity to gauge students' understanding of the topic. Ask students the questions from one to six; you may choose to use mini whiteboards for this activity or simply ask for students to put their hands up.

Main Activities

Magnetism

Introduce the topic of magnetism. Once you have introduced the topic, students could carry out an investigation to discover which objects are magnetic and which are not. Before commencing the investigation, present pupils with the **Magnet Investigation Activity Sheet**. For each of the objects, ask students to make a prediction about whether they think the object will be magnetic or not. Once students have made a prediction, present them with the following objects: an aluminium can, iron nail, paperclip, tweezers, pencil, tennis ball, screw and a magnet. Ask students to place the magnet on each object; if the magnet is attracted towards the object, we say that it is magnetic. Students should record their results in the table on the activity sheet. Once students have finished the investigation, go through the investigation. You may choose to ask the class using a 'no hands up' activity.

Desert Island

Ask students to imagine that they are taking part in an around the world sailing competition. Unfortunately, a storm has blown them off course and their boat has crashed into the rocks off the coast of a tiny island in the South Pacific. Their lucky compass was damaged in the accident and they now have no way of getting back into the race. The racing boat needs to be fixed; whilst fixing the side of the boat, students notice a box that has washed up onto the shore.

Within the box, they find a sewing needle, bar magnet, wax paper, scissors, bucket and water. Ask students to discuss with their partner how they could use the selection of equipment to create a compass. You may wish to use a Petri dish or beaker as an alternative to a bucket. In pairs, they have two minutes to come up with some ideas. You may choose to provide students with whiteboards so that they are able to write down their ideas before sharing them as a class.

There is a step-by-step method for those students who may need more support with this task.

Knowledge Check

Once students have completed the desert island challenge, you may choose to check students understanding of magnets. There are three differentiated questions for different ability learners; Knowledge Check Gold is most suitable for higher-ability learners, Knowledge Check Silver is most suited for middle-ability learners and Knowledge Check Bronze for lower-ability learners. Allow students time to self-assess and correct any mistakes. Alternatively, you may choose to do this as a peer-assessment activity.

Plotting Field Lines

Magnets can create magnetic field lines around them which cannot be seen. The magnetic field lines around the magnet demonstrate how magnetic forces work and show how magnets can attract or repel magnetic objects. This can be demonstrated to the class or you may choose to carry out a class practical using iron filings. The tiny fragments of iron act like a compass and line up along the magnetic field lines. You may choose to allow students time to practise plotting their own magnetic field lines. There is a video which gives a visual demonstration of how to plot magnetic field lines.

There is a step-by-step method for students who may need more support with this task.

Exam Questions

Present students with the **Magnets Questions Activity Sheet**; challenge students to apply their knowledge to the exam questions. There is an opportunity here for self-/peer-assessment; allows students time to correct any mistakes before moving onto the next activity.

Plenary

Spot the Magnet

For each of the three pictures, students should draw where they think the magnet is, using the compass needles as clues to help them.