



Magnetism

Lesson Overview:

This presentation will aid you in teaching some of the magnetism curriculum with mention to a current space mission to Mercury called BepiColombo. There are interactive parts where students can ask and answer questions as well as do experiments.

Objectives:

- Know what a magnet is
- Know what materials are magnetic
- Learn what a “prediction” is
- Know not all metals are magnetic
- Think about BepiColombo’s mission to Mercury
- Have an understanding of north and south poles
- Recognise whether attraction or repulsion would occur

Outline for lesson: Time 80-90 minutes (not including experiments)

Lesson can be split in half after the experiment

Slide 2 Time: 2 minutes

Settling class down, lets them see what the lesson will be about

Slide 3 Time: 5 minutes

Introduction to topic, brief class with what the objectives are

Slide 4 Time: 10 minutes

Ask students what they think magnets look like and where they come across them. They could be informed that the size of a magnet doesn’t always mean that it’s stronger.

Slide 5 Time: 5 minutes

Introduction to the experiment. They will be testing which materials are magnetic. It would be useful to have a variety of different objects that they could test. Preferably some copper materials, to let them find out that not all metals are magnetic.

Slide 6 Time: 15 minutes

This will be the table they can write in (template is at the bottom of this document). Ask them to predict what result they will get, like a scientist would do! You can then let them do this individually or in groups, depending on resources. If there are groups, you can give different groups different materials, which will be useful for the next slide.



Slide 7 Time: 10 minutes

This slide allows for the class results to be written up. You can select groups/individuals to name a material they tested, what they predicted and what happened. Once all the materials have been written up, you can ask if they noticed anything they didn't expect. This is where they can be told that not all materials are magnetic, and not even all metals are magnetic. (End of lesson 1)

Possible homework activity: Find some magnetic materials at home. They may need to ask parents/guardians if a material is magnetic or not.

Slide 8 Time: 5-10 minutes

(Lesson 2) Summarise the previous lesson. Did anyone find any interesting magnetic materials at home?

This slide allows you to talk about a current mission to mercury called BepiColombo. It launched in October 2018 and will get into its final orbit of Mercury in 2025. BepiColombo is made from two modules, one called Bepi and the other called Mio. One of Bepi's objectives is to measure the magnetic field close to Mercury. However, it may be more useful to use Mio as an example of magnetism being able to act at a distance. This is because Mio will be researching the **outer** magnetic field of the planet. A simple way to describe how this research is whether the magnets are pointing north/south and how strong they are.

Slide 9 Time: 5 minutes

This follows on from slide 7, to show students what a magnetic field looks like. If you have iron filings, you could show it in person. The main point to get across is how the magnet can move the filings without *touching* them.

Slide 10 Time: 2 minutes

This slide is there to show the two space modules in their final orbit around Mercury. Bepi is the module orbiting closer to the planet, Mio is the one orbiting further away. By having this orbital path, it can look at the variation of magnetic fields (shown in blue) of Mercury. Just like iron filings show the field lines of a bar magnet, Mio will help to understand what the magnetic field of Mercury is like.

Slide 11-18 Time: 10 minutes

These slides show what will happen with each configuration of magnets. It may be useful to ask students what they think will happen in each case. The last case is still attraction, but the poles have been swapped. This is in case a student thinks that only north attracts south when north is on the right.

Slide 11 Summarise what's been learnt

At the end of the lesson, you can summarise what has been learnt, and ask the students to answer questions on the subject. It may be useful to add to the PowerPoint based on your own use/experience to specialise it to your own situation. The students can then be asked to complete the worksheets associated with this lesson.



Name _____

Date _____



MATERIAL	GUESS/ PREDICTION	WAS IT MAGNETIC?	COMMENT

Magnetic Materials



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LEICESTER

Material provided by the School of Physics and Astronomy
For more information on BepiColombo, please visit: <https://le.ac.uk/bepicolombo>