13 Electromagnetic induction and flux – Part 1

Name: _____ Class: _____ Date: _____

Vocabulary

Write each word three times.

English	**Write it 3 times** (English)		
electromagnetic induction			
magnetic flux			

Recall

You saw that a current makes a magnetic field. The reverse is just as important:

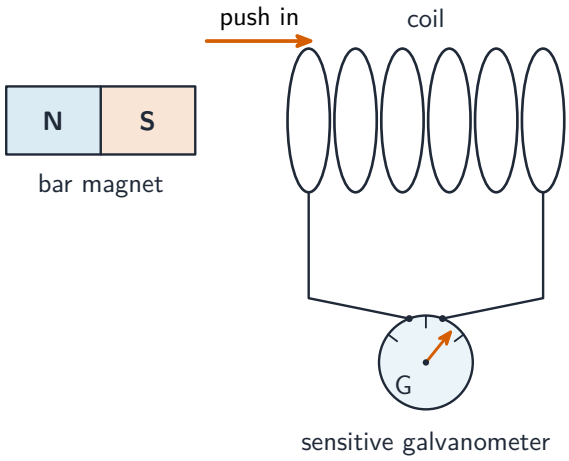
- Move a magnet near a coil of wire and a current appears – with no battery.
- This is how every generator and power station makes electricity.

This sheet lines up electromagnetic induction. Each idea has a worked example.

New ideas

■ 1 Electromagnetic induction

A **changing** magnetic field through a coil drives a current – **electromagnetic induction** . Move a magnet into or out of a coil and a current flows while the magnet is moving.

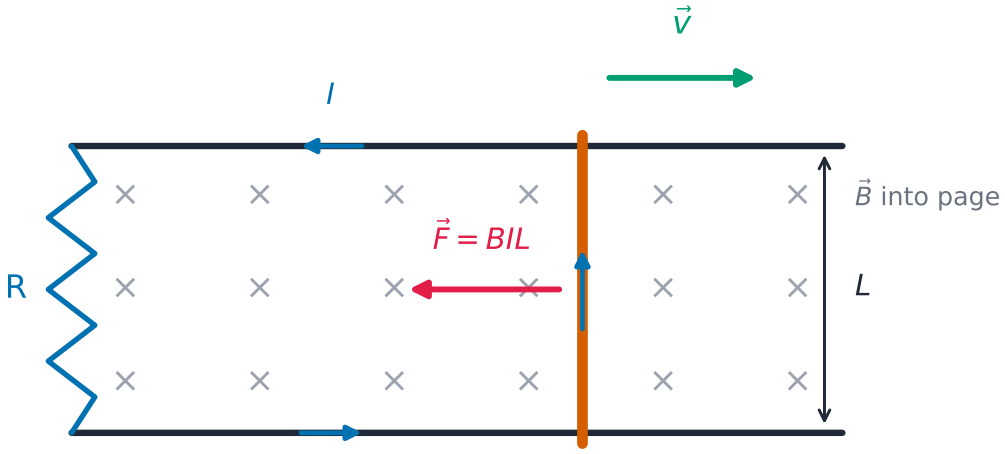


2 Magnetic flux

The **magnetic flux** $\Phi = BA$ measures how much field passes through a loop of area A. The flux changes if the field, the area, or the loop's angle changes.

3 A moving rod

A rod sliding along rails through a field also has a changing flux, so it generates a voltage.



4 The size of the effect

Worked example. If the flux through a single loop changes from 0.020 Wb to 0.008 Wb in 0.030 s, the average voltage is $\dfrac{0.020 - 0.008}{0.030} = 0.40$ V.

Watch out: it is the **change** in flux that induces a current, not the flux itself. A magnet sitting still inside a coil induces **nothing** – the magnet has to be moving.

Practice

Try these in order. The methods are all above.

2.1 State what must happen for a coil to have a current induced in it. [1]

2.2 State what magnetic flux measures. [2]

2.3 The flux through a single loop rises from 0.010 Wb to 0.030 Wb in 0.040 s. Find the induced voltage. [3]

2.4 Name two things that could change the flux through a loop. [2]

2.5 Explain why a magnet held still inside a coil induces no current. [2]