Scheme of Learning: Magnetism and Electromagnetism

Topic Sequence:

1	2	3	4	5	6	7	8	9	10	11
Organisation	Electric Circuits	Chemical Changes	Mains Electricity	Quantitative Chemistry	Using Resources	Electro-Magnetism	Homeostasis & Response	Energy Changes	Ecology	Waves

Topic Overview:

Electromagnetic effects are used in a wide variety of devices. Engineers make use of the fact that a magnet moving in a coil can produce electric current and also that when current flows around a magnet it can produce movement. It means that systems that involve control or communications can take full advantage of this.

Lesson Sequence:

This topic begins with a detailed look at magnetism. It covers why some materials are magnetic, which materials are magnetic, the ideas of permanent and induced magnetism, how to make the invisible field around a magnet visible and what shape it is. These ideas are then linked together to explain how and why a directional compass works including a discussion of the magnetic field around the Earth.

The second half of the topic then looks at the phenomenon of electromagnetism. This begins with building and testing and electromagnet, before moving on to discuss its many applications including the Motor Effect. Students get the opportunity to build a simple d.c. motor and investigate the means of changing speed and direction of rotation before moving onto the equation F=Bil to study the reasons behind these effects.

Separate physicists then go on to study the Generator Effect and some of its applications including transformers. These are linked back to the Mains Electricity topics, but studied in more depth including the ability to make calculations.

Sequence of Lessons:		Resources:	
1	Magnetic fields	1	Bar magnets, iron filings, plotting compasses
2	What is a magnet?	2	Compass demo
3	Electromagnets	3	Variable power supply, iron core, electromagnet wires, leads and croc clips, steel core, glass core, wooden core, box of paperclips
4	Electromagnet uses *mid-topic assessment*	4	Worksheet – circuit diagrams
5	The Motor Effect	5	Motor kit, Magnadur magnets, variable power supply (grey ones are good here), leads and croc clips, demo – large horseshoe magnet, aluminium foil
6	The Motor Effect calculations	6	Demo – motor kit, length of very thick copper wire, croc clips and leads, variable power supply, top pan balance (small one is better), GCSE questions
7	The Generator Effect *separate physics only*	7	Coil of wire, milliammeter/multi-meter, croc clips and leads, bar magnet
8	Applications of the generator effect *separate physics only*	8	Worksheet – microphone and speaker, homemade speaker kits – half toilet tube, length of insulated wire, speaker cone template, testing kit
9	Transformers *separate physics only*	9	C-core and transformer demo
10	Revision	10	n/a
11	Test	11	n/a

Supportive Reading:

Comprehension activity	TBC

Assessment:

Knowledge:	Multiple choice and short answer questions.
Application of Knowledge:	Exam questions based on the skill of calculate