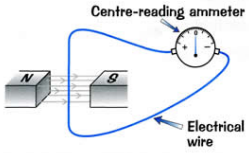
Electromagnetic Induction

Pages 130-131

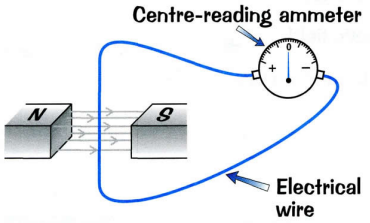
Q1 Look at the apparatus shown in the diagram below.



Electromagnetic induction is sometimes called the generator effect

a) Describe how you could use the apparatus to demonstrate electromagnetic induction.

Move the wire through the field lines from the magnet so that th ey cut the flux lines (at right angles).



b) What would you see on the ammeter?

When the wire is moving so that it cuts the flux lines you see a deflection on the ammeter. When the wire is held still the needle returns to zero. If it is moved parallel to the flux lines (not cutting them) there is no deflection. If the wire is moved in the opposite direction the needle kicks the opposite way

c) What effect, if any, would the following have:

i) swapping the magnets

The needle moves in the opposite direction

ii) reversing the connections to the ammeter

The needle moves in the opposite direction

Q2 A simple generator can be made by rotating a magnet end to end inside a coil of wire.

a) What happens to the magnetic field when the magnet turns half a turn?

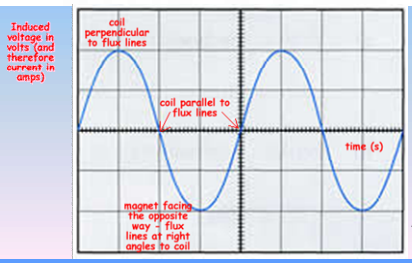
Nothing really - but it is the other way round to the observer! (and the coil)

b) What is created in the wire by this rotation?

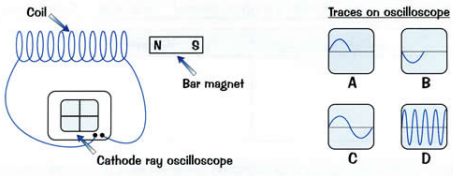
A current flows in the wire because a voltage is induced across its ends

c) The magnet is constantly turned in the same direction.
Would this generate an AC or DC current in the wire?

AC



Q3 Moving a magnet inside an electric coil produces a trace on a cathode ray oscilloscope.



When the magnet was pushed inside the coil, trace A was produced on the screen.

a) Explain how trace B could be produced.

Pull the magnet back out

b) Explain how trace C could be produced.

Push the magnet into the coil and then pull it straight back out again

c) Explain how trace D could be produced.

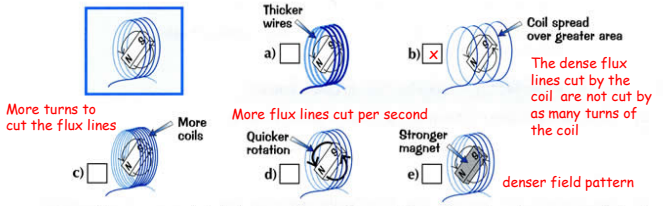
Push the magnet in and out of the coil repeatedly - faster than for D

d) Explain how energy is transferred from the moving magnet to the oscilloscope.

Kinetic energy from the magnet changed into electrical energy in the coil that is then transferred to the oscilloscope

Q4 Look at the simple AC generators sketched below.

Thicker wire, less resistance, more current, stronger field



One of the generators labelled **a)-e)** will **not** induce a higher voltage than the generator in the box.
Tick the appropriate generator.