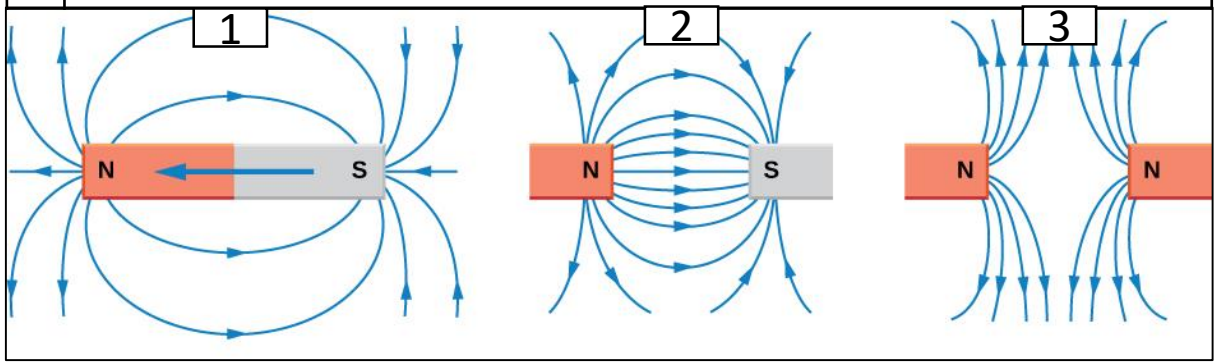
Physics topic 7 Magnetism and electromagnetism

1. Keywords	
Permanent magnet	A material which is always magnetic
poles	the place where the magnetic force is strongest north and south (many field lines)
Magnetic field lines	The lines that show the direction of magnetic force. The closer the stronger the force is. Arrows go from north to south poles
Induced magnet	A material that becomes a magnet when placed in a magnetic field
Magnetic material	A material that can be attracted to a magnet (iron, steel, cobalt and nickel)
Electromagnet	A magnet which works when an electric current flows. A solenoid with an iron core
Solenoid	A coil of wire that can become an electromagnet
Compass	Shows the direction of a magnetic field. Used to plot a magnetic field
Current	The rate of flow of charge
Magnetic flux density (B)	The strength of the magnet lines per m^2 (measured in T (tesla))

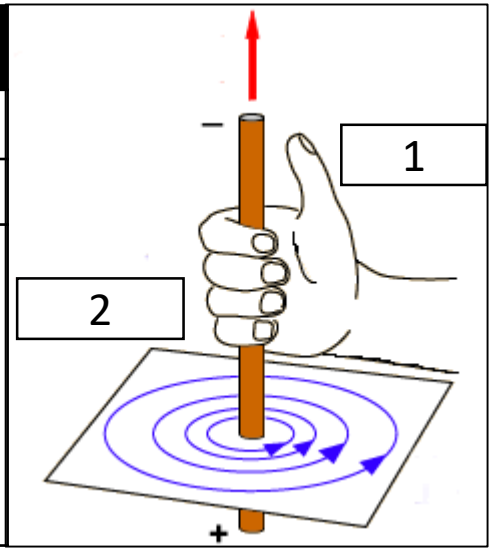
2. Magnetic field lines and force	
1	Magnetic field lines on a magnet
2	Magnetic field lines of attraction between opposite poles
3	Magnetic field lines of repulsion between like poles



3. Electromagnetic field on a wire	
1	Direction of current
2	Direction of magnetic field

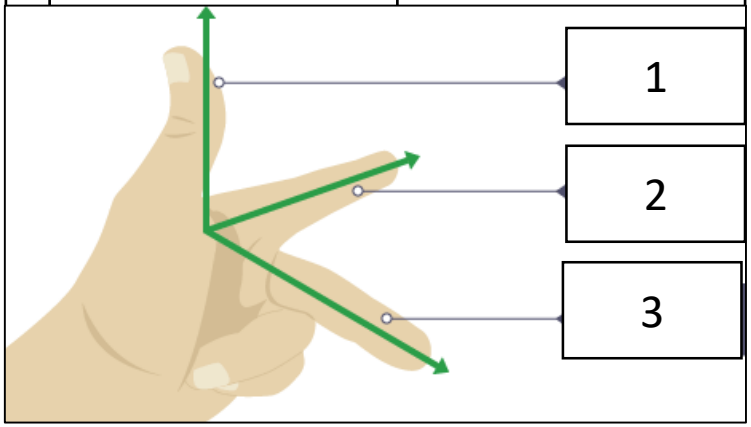
The strength of the magnetic field depends on:
A: The current
B: The distance from the wire.

Shaping the wire into a solenoid makes the field stronger



4. Fleming's left-hand rule (HT ONLY)

	Which finger	What it means
1	Thumb	(F) Movement/Force
2	First finger	(B) Field (north to south)
3	Second finger	(I) Current (+ to -)



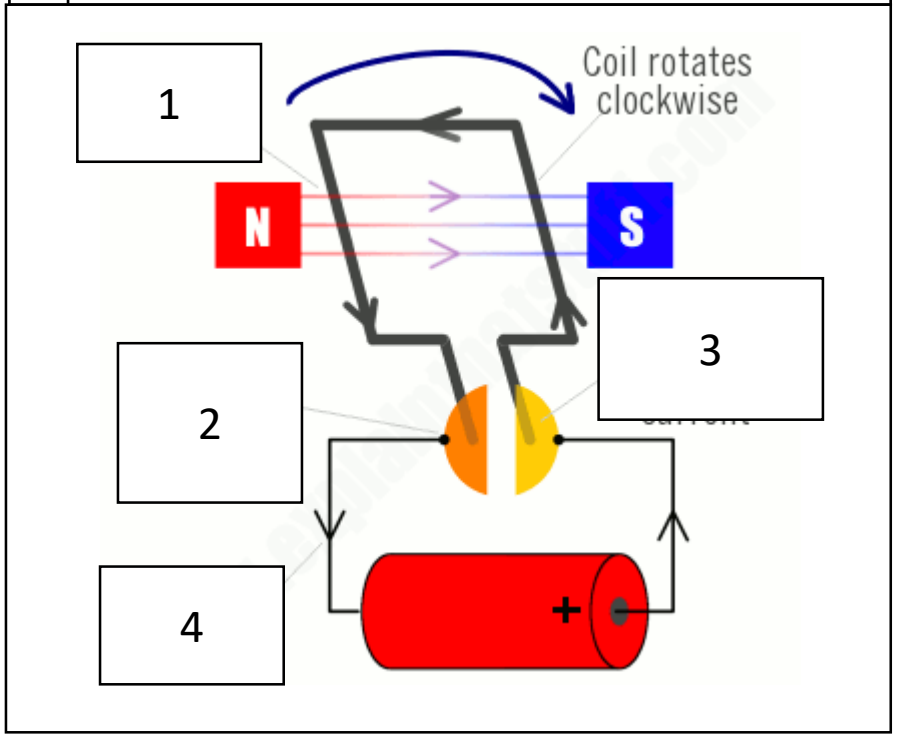
5. Factors that affect the size of the force on the conductor (HT ONLY)

$$F = BIl$$

F	Force (N)
B	Magnetic flux density (Tesla, T)
I	Current (A)
l	Length (m)

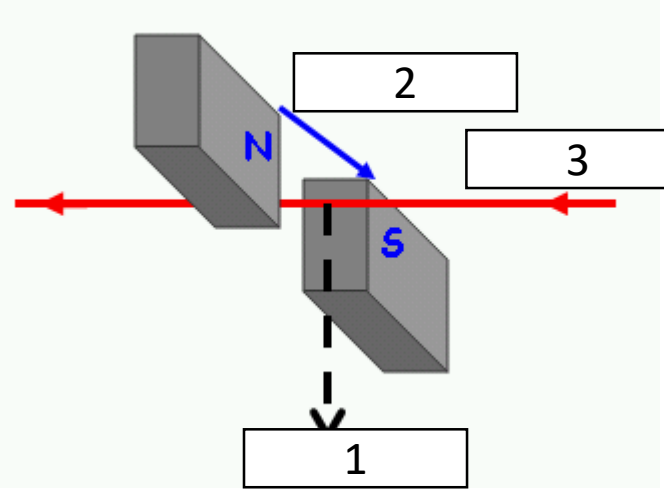
6. Electric motors (HT ONLY)

1	Magnetic field
2	Brushes carry current to commutator
3	Commutator reverses current
4	Electric current



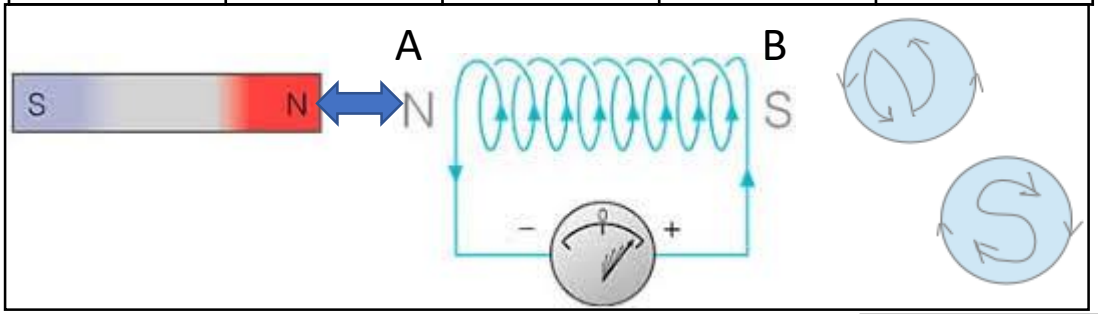
7. The generator effect (PHYSICS HT ONLY)

1	Force moves wire
2	Wire cuts magnetic field
3	Current is induced in wire



8. Factors that affect the size and direction of induced current/potential difference (PHYSICS HT ONLY)

Magnetic pole	Pushed in or pulled out	Direction of current	Induced polarity of A	Magnet and coil
North	In	Anticlockwise	North	Repel
North	Out	Clockwise	South	Attract
South	In	Anticlockwise	South	Repel
South	Out	Clockwise	North	Attract



9. Using the generator effect (PHYSICS HT ONLY)

Alternator	Generates alternating current
Dynamo	Generates direct current
Microphones	Convert pressure variations in sound into electric current

10. Transformers (PHYSICS HT ONLY)

Vp	Potential difference across primary coil (Volts)
n_p	Number of turns in primary coil
Ip	Current in primary coil (Amps)
Vs	Potential difference across secondary coil (Volts)
n_s	Number of turns in secondary coil
Is	Current in secondary coil (Amps)

Work out voltage change:

$$\frac{V_p}{V_s} = \frac{n_p}{n_s}$$

Work out power output:

$$V_p I_p = V_s I_s$$