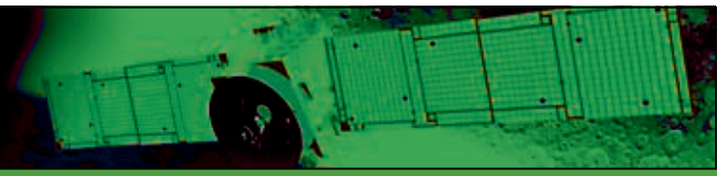
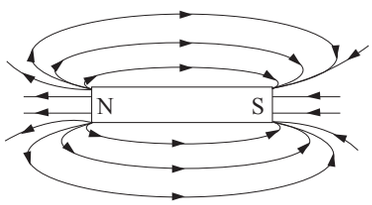
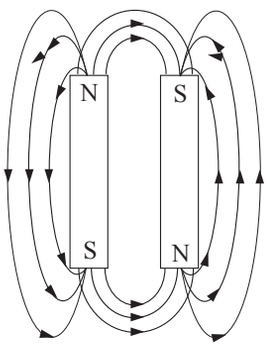
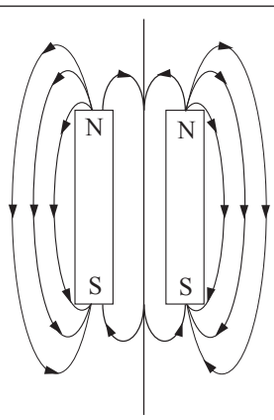
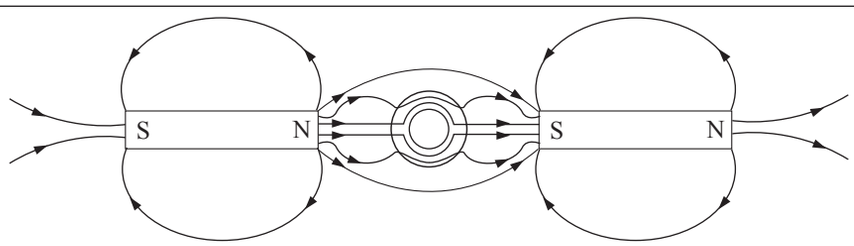
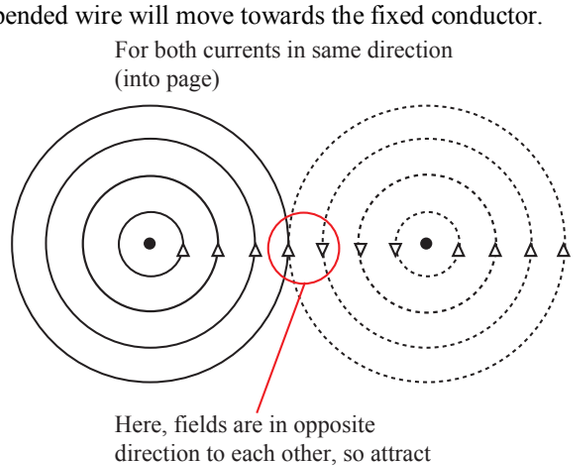
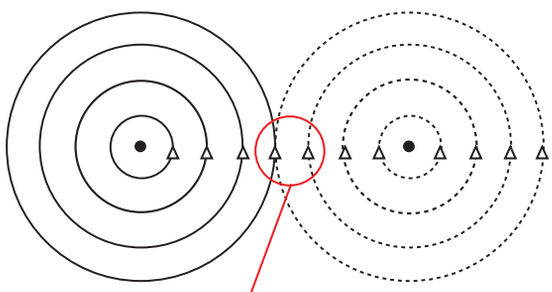
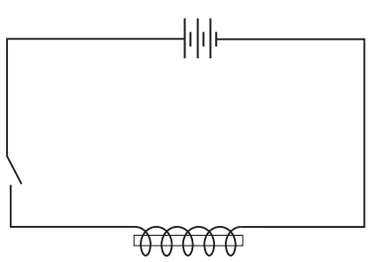
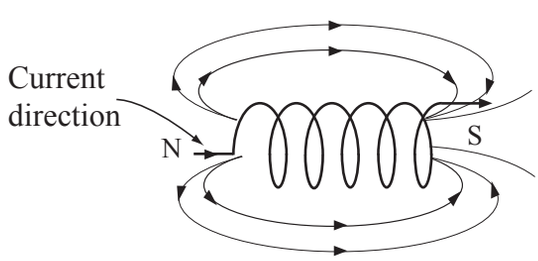
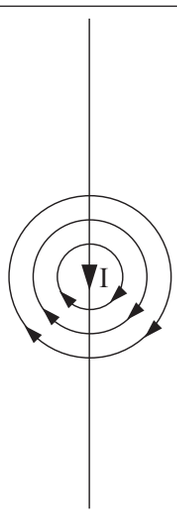
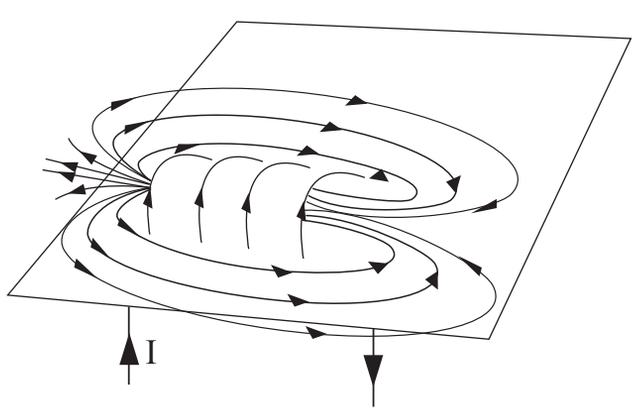
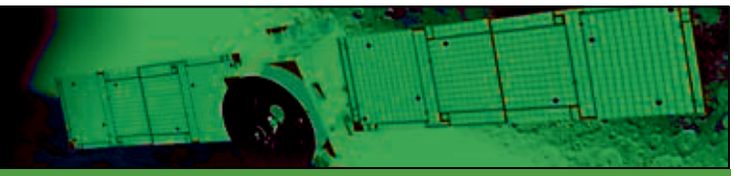


Electricity and Magnetism: Set 6

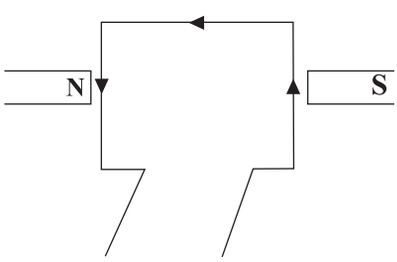
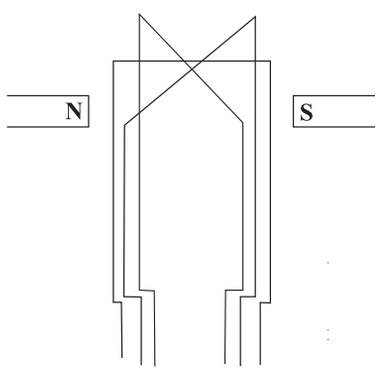
Set	Problem	Solution
6	1a)	
	1b)	
	1c)	
	1d)	
	2	A piece of iron maybe magnetic, in which case the field due to the iron would exert a force on the field due to the wire and distort the field lines.
	3a)	The suspended wire will move towards the fixed conductor. 

Electricity and Magnetism: Set 6

Set	Problem	Solution
6	3b)	The suspended wire will move away from the fixed conductor. For currents in opposite direction  Here, fields are in same direction, so repel
	4	 
	5	Use F = I *l* B = 0.20 A × 0.1 m × 0.35 T × 200 = 1.4N Torque = F × d = 1.4 N × 0.03 m = 0.042 N m
	6a)	
	6b)	



Electricity and Magnetism: Set 6

Set	Problem	Solution
6	7	There is a magnetic field around power cords due to the current being carried in them. This magnetic field can exert a force on the magnetic particles in the recording media, causing their orientation to change resulting in a loss of recording quality.
	8	a) Up the page. b) Down the page c) Upwards, out of the magnet d) No force, the field and current are parallel to each other.
	9	The diagram on page 72 is incorrect. There should be an armature that forms part of the circuit. When the switch is pressed current flows through the circuit and the rod becomes magnetised. The resultant attraction of the armature separates the contacts and breaks the circuit, meanwhile the hammer attached to the armature hits the bell. The magnetism in the rod disappears and the armature returns to its original position. Contact is remade and the action repeated. Consequently the armature vibrates and a hammer attached to it strikes the bell. To make the bell ring louder, you could increase the number of coils covering the rod and the current in the circuit.
	10	Use $F = I\,l\,B = 10\ A \times 0.12\ m \times 2.0\ T$ $F = 2.4\ N$
	11	A motor with many coils is less jerky than a motor with fewer coils because it receives maximum torque many times a rotation. In a commercial motor the coils are all spaced at an angle to each other and the commutator is arranged to feed current to the coil that is in the best position for maximum torque.  With one coil the commutator switches the direction of the current every ½ turn.  With six coils maximum torque is applied every ⅙ turn.
	12	Use $F = I\,l\,B = 40\ A \times 75\ m \times 2.5 \times 10^{-5}\ T$ $F = 0.075\ N$ downward, use right hand rule to determine direction
	13a	It exerts a force perpendicular to the page and out of it.
	13b	Opposite direction to 13a
	13c	Into the page.
	13d	A current in a coil, a permanent magnetic field & a commutator
	13e	In a motor a current is used to create movement, in a generator movement is used to create current.
	13f	Vehicles driven by electric motors use the motor as a generator when using regenerative braking: it is operated as a generator during braking and its output is supplied to an electrical load. The energy supplied to the load provides the breaking effect.
	14